2001 FEIS KAUAI
NORTH PACIFIC ACOUSTIC LABORATORY
2 OF 2

FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE
NORTH PACIFIC ACOUSTIC LABORATORY
Volume II

Prepared by

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With the cooperation of

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May, 2001

Preliminary Final Environmental Impact Statement for the North Pacific Acoustic Laboratory

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Federal Cooperating Agency:	National Oceanic and Atmospheric Administration National Marine Fisheries Service Office of Protected Resources 1335 East-West Highway Silver Spring, MD 20910
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Applicant:	University of California, San Diego Scripps Institution of Oceanography 9500 Gilman Drive LaJolla, CA 92093-0225
Location of Action:	Ocean waters under state and federal jurisdiction west and north of Island of Kauai, State of Hawaii

Abstract

This Final Environmental Impact Statement identifies and analyzes the proposed action and alternatives for the continued operation for five additional years of the low frequency (LF) sound source (including the seabed power cable) previously installed off the north shore of Kauai, Hawaii, for use in Acoustic Thermometry of Ocean Climate (ATOC) research. The proposed action is reuse of the sound source and cable for the North Pacific Acoustic Laboratory (NPAL), a U.S. Navy Office of Naval Research (ONR) basic research project, which would combine: a second phase of research on the feasibility and value of large-scale acoustic thermometry; long-range underwater sound transmission studies; and marine mammal monitoring and studies. The action would be carried out by Scripps Institution of Oceanography, University of California, San Diego (Scripps), which is the applicant for necessary state and federal permits, and by the Applied Physics Laboratory of the University of Washington.

Please contact the following person with comments and questions:
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ACRONYMS AND ABBREVIATIONS

AIM	Acoustic Integration Model
APL-UW	Applied Physics Laboratory, University of Washington
ARGO	Argos Global Centre
ARPA	Advanced Research Projects Agency
ATOC	Acoustic Thermometry of Ocean Climate
°C	degrees Celsius
CDF	Cumulative Distribution Function
CDUP	Conservation District Use Permit
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
cm	centimeters
COE	Corps of Engineers
CORE	Consortium for Oceanographic Research and Education
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibel
DBDB	Digital Bathymetric Data Base
deg	degree
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources of the state of Hawaii
DO	Dissolved Oxygen
DOA	Department of Agriculture
DOC	Department of Commerce
DOH	Department of Health
DOI	Department of the Interior
DOT	Department of Transportation
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENSO	El Niño Southern Oscillation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
4D	four-dimensional
°F	degrees Fahrenheit
FAD	fish aggregating device
FCMA	Fisheries Conservation and Management Act
FM	Frequency Modulated
fm	fathom

FMP	fishery management plan
ft	feet
GCOS	Global Climate Observing System
GOOS	Global Ocean Observing System
HAPC	habitat areas of particular concern
HAR	Hawaii Administrative Rules
HEPA	Hawaii Environmental Policy Act
HIFT	Heard Island Feasibility Test
HIHWNMS	Hawaiian Island Humpback Whale National Marine Sanctuary
HiTS	Historical Shipping
HORM	Hawaii Ocean Resources Management
HRS	Hawaii Revised Statutes
HURL	Hawaii Undersea Research Laboratory
Hz	Hertz (cycles per second)
in	inches
IPRC	International Pacific Research Center
IWC	International Whaling Commission
KCC	Kauai Community College
kg	kilogram
km	kilometers
km/hr	kilometers per hour
kt	knots (nautical miles per hour)
kw	kilowatts
L	Liters
L_{eq}	Level-equivalent
lbs	pounds
LF	Low Frequency
LFS SRP	Low Frequency Sound Scientific Research Program
LOA	Letter of Authorization
LORAN	Long Range Navigation
m	meters
min	minute
MMRP	Marine Mammal Research Program
μPa	micro Pascal
NEPA	National Environmental Policy Act
nm	nautical miles
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration

NOI	Notice of Intent
NPAL	North Pacific Acoustic Laboratory
NSMRL	Naval Submarine Medical Research Laboratory
NWR	National Wildlife Refuge
OAML	Oceanographic and Atmospheric Master Library
OEQC	Office of Environmental Quality Control
OMZ	Oxygen Minimum Zone
ONR	Office of Naval Research
OTTED	Office of Technology Transfer and Economic Development
PDO	Pacific Decadal Oscillation
PE	Parabolic Equation
PEIS	Programmatic Environmental Impact Statement
PMRF	Pacific Missile Range Facility
PMUS	pelagic management unit species
ppt	parts per thousand
PTS	Permanent Threshold Shift
RL	Received Level
rms	root mean squared
ROD	Record of Decision
Scripps	Scripps Institution of Oceanography
SCORP	State Comprehensive Outdoor Recreation Plan
S.E.	Standard Error
SL	Source Level
SMA	Special Management Area
SPE	Single Ping Equivalent
SPL	Sound Pressure Level
SOFAR	SOund Frequency and Ranging
SOSUS	SOund SUrveillance System
SS1	Shore Station 1
SS2	Shore Station 2
SSI	Seafloor Surveys International, Inc.
SST	Sea Surface Temperature
SURTASS LFA	Surveillance Towed Array Sensor System Low Frequency Active
SWFSC	Southwest Fisheries Science Center
SWTR	Shallow Water Training Range
3D	three Dimensional
TL	Transmission Loss
TTS	Temporary Threshold Shift
W	Watt
W/m^2	Watts per square meter

USC	United States Code
USFWS	U.S. Fish and Wildlife Service
XBT	Expendable Bathythermograph

APPENDIX F

DEIS COMMENTS AND RESPONSES

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This appendix, DEIS Comments and Responses, summarizes the comments received on the DEIS prepared for the North Pacific Acoustic Laboratory. These comments contributed to the evolution of the research program that makes up the proposed action. This appendix also provides the document's preparers' responses to public comments in accordance with the National Environmental Policy Act (NEPA) and the Hawaii Environmental Impact Statement Law. The preparers' comments are also provided by means of appropriate expansion, clarification, or revision of the DEIS. This appendix provides responses and clarifications on issues expressed by the commenters, sets forth resulting modifications to the FEIS, and presents the preparers' final position on actions necessary for the most environmentally conscientious plan to conduct a second phase of research on the feasibility and value of large-scale acoustic thermometry; long-range underwater sound transmission studies; and marine mammal monitoring and studies.

This appendix is made up of three parts: 1) lists of DEIS comment letters received, 2) preparers' responses to comments raised by the DEIS, and 3) copies of comment letters, associated response letters, and the public hearing transcript described below.

F.1 Receipt of Comments

The Office of Naval Research and Scripps Institution of Oceanography received 210 letters during the public comment period from June 2, 2000, through July 24, 2000. During the public comment period, ONR and Scripps held three public meetings: (1) Lihue, Kauai, HI on July 5, 2000; (2) Honolulu, HI on July 6, 2000; and (3) Kilauea, Kauai, HI on July 8, 2000. These meetings provided opportunity for comment on the DEIS and for the asking and answering of questions concerning the proposed project. Participants of the first two meetings did not make any comments, and therefore the transcripts from those meetings were not reproduced in this appendix. The transcript of the third public hearing was included.

F.2 Identification of Comment Letters and Comments

Each comment letter received was assigned one of the following letter codes:

G	Federal, state, or local agencies and officials;
O	Organizations and associations;
I	Individuals; and
F	Form letters.

These labels were assigned for the convenience of readers and to assist in the organization of this document; priority or special treatment was neither intended nor given in the responses to comments. Within each of these categories, each comment letter was also assigned a number, in the order that it was received and processed. These demarcations can be found in the upper right hand corner of each comment letter. Comment letters are reproduced in this appendix in alphabetic order within each of the above categories, as they are listed in the accompanying tables (Table F-1, Federal, State, or Local Agencies or Officials; Table F-2, Organizations or

Associations; Table F-3, Individuals; Table F-4, Individuals Who Sent Identical Letters ("Form Letters")).

Of the 210 letters received, 164 letters were of three versions of a form letter. Any of these form letters that contained slight variations were labeled as a letter from an individual (i.e., it received an I-# assignment) and reproduced in the comment letter section of this appendix. For those letters which were exact replicates, only one copy of the form letter was reproduced, and the individuals who sent those letters were listed in Table F-4.

All comments from incoming letters, and statements from the public hearings were categorized into major issues and subissues. The issue was marked in the right margin of the paragraph in which the comment was made. Responses to these comments were then drafted and reviewed for scientific and programmatic accuracy. The responses also identify locations in which a specific comment generated a revision to the DEIS, or, when the existing text of the EIS was deemed an adequate response to a comment, the appropriate section or subsection was identified.

Table F-1 Federal, State, or Local Agencies or Officials with Comments

Agency/Official	Letter Number	Page
Division of Aquatic Resources, DLNR, State of Hawaii/William S. Devick	G-11	F-81
U.S. Environmental Protection Agency, Region IX/ David Farrel	G-1	F-83
Office of the Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce/Susan B. Fruchter and Hawaiian Islands Humpback Whale National Marine Sanctuary/Naomi MacIntosh	G-12	F-86
Department of Transportation, State of Hawaii/Kazu Hayashida	G-13	F-88
U.S. Fish and Wildlife Service, Department of the Interior/ Paul Henson	G-9	F-89
Public Works Department, Pacific Missile Range Facility/ Robert Inouye	G-7	F-91
Office of Environmental Quality Control, State of Hawaii/ Genevieve Salmonson	G-4	F-93
Marine Mammal Commission/John R. Twiss Jr.	G-8	F-95

Federal, State, or Local Agencies or Officials with No Comment

Agency/Official	Letter Number	Page
Department of Health, State of Hawaii/Gary Gill	G-15	F-105
State Historic Preservation Officer, DLNR, State of Hawaii/ Don Hibbard	G-3	F-105
Department of Water, County of Kauai /Ernest Lau	G-5, 6	F-106
Civil Works Technical Branch, Department of the Army/ James Pennaz	G-14	F-107
Department of Transportation Services, City and County of Kauai /Cheryl D. Soon	G-10	F-107
Regulatory Branch, Department of the Army/George P. Young	G-2	F-108

Table F-2 Organizations or Assocations

Organization/Official	Letter Number	Page
Life of the Land/Henry Curtis	O-9	F-108
Lovelink/Michael Daly	O-5	F-112
Hanalei Community Association/Diane Daniells	O-11	F-114
Whale and Dolphin Conservation Society/Sarah Dolman	O-3	F-116
Stop LFAS Worldwide Network/Elinor Gunter and Cheryl Magill	O-7	F-120
Kauai Goup of the Hawaii Chapter, Sierra Club/Dr. Monte S. Hull	O-10	F-123
COAST/Pamela Polland	O-12	F-125
University of Hawaii Environmental Center/Peter Rappa	O-2	F-126
Pacific Whale Foundation/Dr. Robert Wilder	O-8	F-130

Table F-3 Individuals

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Baird, Dr. Robin W.	I-116	F-131
Basham, Dr. Robert	I-121	F-134
Baum-Pence, Jacqueline	I-168	F-135
Berg, Dr. Carl J.	I-156	F-137
Boardman, Dennis A.	I-175	F-139
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Butler, Lara	I-91	F-144
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Gagliardi, M. and Greenspun, R.	I-172	F-167
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Kressley, Paula Edwards	I-71	F-182
Levy, Joan	I-72	F-183
Meadows, Barbara	I-112	F-185
Miller, Richard A.	I-151	F-190
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Nauha, Imakakoloaihenenui	I-171	F-199
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Norton, Richard	I-110	F-202
Osborn, Mary J.	I-182	F-203
Pleas, Bruce	I-36	F-204
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Robertson, Linda and Craig	I-145	F-211
Santer, Johanna	I-124	F-212

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Stanbro, Joshua	I-21	F-224
Starke, Lynne	I-111	F-226
Stephen, Scott Gerard	I-183	F-227
Takamine, Victoria	I-101	F-229
Waiwai'ole, Healani	I-16	F-231
Wheeler, Breanna	I-47	F-233
Wheeler, Jeanne	I-165	F-235
Wilde, Panther	I-56	F-237

Table F-4 Individuals Who Sent Identical Letters ("Form Letters")

Form Letter #1 (F-1) Page F-237

Last Name, First Name		
Adler, Sean	14 N. Omega Bay	La Marque, TX 77568
Armstrong, Melissa F.	7970 SW 24th Pl., Apt. #102	Davie, FL 33324
Bajwa, Neil	63 Spring Valley Lane	Pittsburgh, PA 15238
Barnes, Scott	Glenwood Drive	Redlands, CA 92373
Bates, Ruth Ann	1865 Olinda Road	Makawao, HI 96768
Bennett, Diana	PO Box 6220 144 Holmes	Big Bear Lake, CA
Black, Catherine	327 Ilihau St.	Kailua, HI 96734
Boddie, Nathan	3070 Greenville Rd.	La Grange, GA 30241
Bourque, Jasmine	16 Ayers Court	Falmouth, ME 04105
Brede, Katherine	2826 Hunter Mill Rd.	Oakton, VA 22124
Brooks, Bill	PO Box 2160	Kailua Kona, HI 96745
Bunch, Terry	17119 W Bernardo Dr. #106	San Diego, CA 92127
CabanillaMaza,L-marina	PO Box 61458	Honolulu, HI 96839
Ciervo, George Jr.	R.R. 2 Box 4053	Pahoa, HI 96778
Cole, Simone	77-6557 Alii Drive	Kailua-Kona, HI 96740
Correll, Kevin	525 W. Penn. Ave	Wernersville, PA 19565
Cronrod, Andrea	Box 646	Hanapepe, HI 96716
Delabre, Lynne	1394 41st Avenue	San Francisco, CA 94122
Denny, Janine	PO Box 433	Lawai, HI 96765
Douglas, Michael	3560 Kaweonui Road	Princeville, HI 96722
Erickson, Kathleen	2992 N. Miller Rd #117	Scottsdale, AZ 85251
Forman, Tyler	1212 E. Minnezona Ave.	Phoenix, AZ 85014
Frontz, Jeffri H.	310 Walhalla Rd.	Columbus, OH 43202
Hampson, Donna	59 Atherton Street	Ayer, MA 01432-1701
Harris, Elliott	3115 Diamond Head Rd	Honolulu, HI 96815
Heimerman, Lea	606 Juniper Court	Redlands, CA 92374
Herrington, Stephen	PO Box 401	Eldorado Springs, CO
Hoberg, Matt	406 Falcon Drive	Kennett Square, PA
Horowitz, Tina	4701 Pine Street M8	Philadelphia, PA 19143
Hutchison, Eve	Rt. 1 Box 22C	Vici, OK 73859
Isaki, Bianca	1306A Artesian St	Honolulu, HI 96826
Jacobson, Bob	PO Box 900	Kurtistown, HI 96760
Johnson, Robin	not available	CA 92234
Kalb, Anjanette	319 Hancock St. #19	Laramie, WY 82072
Kamalii, Adrian	267 Molokai Akau	Kahului, HI 96732
Kaohelaulii, Anna	45-403 Koa Kahiko Street	Kaneohe, HI 96744
Kekoa, Rosemary A.	95-326 Kaloapau St. #134	Milani, HI 96789-1262
Killian, Donna	210 S. Harris Box 53	Manson, WA 98831
Kubiak, Chris	650 Center Drive PSD	Pearl Harbor, HI 96860
Linser, Eliza	4431-5 Kale Pl.	Lihue, HI 96766
Liu, Kawika	2505 C La'i Rd	Honolulu, HI 96816

Table F-4 (cont) **Individuals Who Sent Identical Letters ("Form Letters")**

Form Letter #1 (cont) Page F-237

Last Name, First Name		
Logan, Leonard D.	15-1466 Kahakai Blvd.	Pahoa, HI 96778
London, Barbara	2523 43rd Ave	San Francisco, CA 94116
Lovejoy, Daniel	PO Box 1592	Kealakekua, HI 96750
Mahar, Timothy	285 Payne St., 21 B	Destin, FL
Manro, Ryan	1614 Navajo Point Place	Henderson, NV 89014
Mayo, Mara	HCR1 Box 4620	Keaau, HI 96749
McGuire, Susan	4317 18th Avenue South	Minneapolis, MN 55407
Meyers, Bob	PO Box 929	Kalaheo, HI 96741-0929
Moiseyev, Maya	669 Ashbury St	San Francisco, CA 94117
Morresi, Gian Andrea	111 Melville Avenue	Fairfield, CT 06432-2004
Morris, Nanea	PO Box 273353	Fort Collins, CO 80527
Naranjo, Tracie	91-822 Koalipehu Place	Ewa Beach, HI 96706
Nazdrowicz, Nathan	115 Great Circle Rd	Newark, DE 19711-2335
Neil, Dr. P.	3890 Kamehameha Rd #8	Princeville, HI 96722
Pang, Kealii	3204 Carlos Long Street	Honolulu, HI 96816-3102
Peck, Barbara	PO Box 1197	Hanalei, HI 96714
Pendleton, Saundra	27422 Lindvog Rd NE	Kingston, WA 98346
Poertner, Claire	600 Moss Point Cove Court	Debary, FL 32713
Reghi, Susan	PO Box 1548	Hanalei, HI 96714
Retzlaff, Becky	622 W. Forest Ave #38	Detroit, MI 48201
Sgambati, Lori	636 West 238th Street	Bronx, NY 10463-1400
Sheldon, Kimberlie E.	9131 Guinea Rd	Hayes, Va 23072
Sinnett, D.William	2615 NE 359th Street	Washougal, WA 98671
Somalwar, Sunil	1015 S. Park Ave	Highland Park, NJ 08904
Spence, Jeremiah	914 E. 32nd St., Apt 103	Austin, TX 78705-2721
Strawder, Jill	5536 Winthrop Ave	Indianapolis, IN 46220
Taylor , Matt	314 Norgulf Rd	Reisterstown, MD 21136
Thal , Karuna	1321 Kiowai Pl.	Kapaa, HI 96746
Thoumi, Gabriel Andres	3428 Aldrich Ave S. #4	Minneapolis, MN 55408
Tina, Cohenour	161 Paradise Meadow Loop	Edgewood, NM 87015
Weichman, Joe	959 Princeton St.	Santa Monica, CA 90403
Wright, Ricky	PO Box 21821	St. Simons Island, GA
Zellers, Rosemarie	1017 Walker Dr. NE	Albuquerque, NM 87112

Table F-4 (cont) **Individuals Who Sent Identical Letters ("Form Letters")**

Form Letter #2 (F-2) **Page F-239**

Last Name, First Name		
Benson, Heidi	PO Box 4281	West Sedona, AZ 86340
Bergeron, Kelly A.	2924 Sheffield Lane	Woodward, OK 73801
Boudreaux, Michaela	PO Box 57	Kapaa, HI 96746
Bramsch, William & Joan	3888 Via Miralesta Dr.	St. Louis, MO 63125
Cook, Linda	P.O. Box 953	Kealakekua, HI 96750
Dack, Jamie	3730 Main St.	Jamestown, MO 65046
Dancer, Lotus and Sun	(808) 446-9179	Mauai, HI
Diaz, Pamela Gleninning	67 Pocantice St.	Sleepy Hollow, NY 10591
Donna J. Dickinson	1951 Revolutionary Ct.	Pheonixville, PA 19460
Farrell, Mark	4210 Monterey Rd. #57	San Jose, Ca 95111
Fishbach, Mary	4433 Colbath Ave	Sherman Oaks, CA
Goodman, Roberta	101 Kilua Road	Hilo, HI 96720
Graue, Erin	no information	
Greenleaf, Marta	2 Jefferson Rd	Scarsdale, NY 10583
Greenleaf, William	2 Jefferson Rd	Scarsdale, NY 10583
Harrington, Siobhan	13201 Clayton Rd	St. Louis, MO 63131
Haynes, D. Grant	PO Box 174	Fayetteville, AR 72702
Hecht, Linda	PO Box 3199	Sedona, AZ 86340
Hjelmstad, Gwendolyn	16636 North 35th Street	Phoenix, AZ 85032
Ingram, Renee	PO Box 1655	Hanalei, HI 96714
Jarvis, Barbara	808-822-7627	
Johnson, Vicki L.	2717 Seville Blvd. #5108	Clearwater, FL 33764
Kaparo, R & Boulton, D.	1191 Kuhio Hwy, Ste. 293	Kapaa, HI
Khaled, Penny	Lot 263, 2463 Gulf to Bay Blvd	Clearwater, FL 33765
Knight, Ken	44 Hertford Avenue	London SW14 8EQ
Knox, Craig	PO Box 272105	Concord, CA 94527
Kolter, Marsha	24303 SE 37th Pl.	Issaquah, WA 98029
Landis, Sky	PO Box 1648	Kapaau, HI
Laug, Stefan	Sartoriusstr.19 D-70469	Stuttgart
Lopez-Gonzalez, Georgina	Rio Sena No. 4 Fracc. Pathe	Queretaro, QRO. Mexico
MacIver, Donna	55 Washington Ave.	N. White Plains, NY 10603
Marshall, Cynthia	PO Box 1775	Solana Beach, CA 92075
McClure, Moksha	PO Box 1091	Hanalei, HI 96714
Moen, Ed	701 Springdale St.	Mount Horeb, WI 53572
Morningstar, Myrica	PO Box 1257	Kilauea, HI 96754
Morosey, Michael	2600 Langford Rd	North Collins, NY 14111
Morrill, Kimberly	1617 Kingman Ave	San Jose, CA 95128
Muir, Judith	Polperro Dolphin Swims,PO Box 11	Blairgowrie, 3942 Victoria

Table F-4 (cont) Individuals Who Sent Identical Letters ("Form Letters")

Form Letter #2 (cont) Page F-239

Last Name, First Name		
Mullane, Sharon	4084 Redwood Ave #4	Los Angeles, CA 90066
Nash, Jessalyn	17925 Coleman Valley	Occidental, CA 95465
Noonan, Joseph M.	Planetary Partners, #9 Sixth Street	Plum Island, MA 01951
Petrak-Rajput, Maria	Rudolf-Koeplg. 5/1/7	1220 Vienna, Austria
Pico, Susan	PO Box 1250	Hanalei, HI 96714
Pizzi, Kathee	6002 Crittenden Ave	Indianapolis, IN 46220
Raiter, Deborah M.	PO Box 895	Captain Cook, HI 96704
Resperger, Lourdes	Arnoldgasse 2/5/64	Vienna, Austria
Rundstrom, Pat	Rd. 56-69B	Espanola, NM 87532
Simidian, Adrienne Arabian	160 Seven Hills Lake Drive	Carmel, NY 10512
Sittinger, Heidi	PO Box 1412	Kealakekua, HI 96750
Spilsbury, Ariel	Box 1746	Nohane (?), HI
Stepath, Carl M.	PO Box 549	Hanalei, HI 96714
Stevenson, Melissa	2988 Buhach Rd	Merced, CA 95340
Thomas, Penny	PO Box 970	Captain Cook, HI 96704
Wheelock, David Lopez	8709 Corran Ferry Ln	Austin, TX 78735
Wilcox, Will	PO Box 1031	Hanalei, HI 96714
Williams, Morgan Paul	PO Box 12	Anahola, HI 96703

Form Letter #3 (F-3) Page 241

Last Name, First Name		
Hackett, Douglas	82-955 Aka Ala Street	Captain Cook, HI 96704
Regan, Trish	P.O. Box 171	Captain Cook, HI 96704

RESPONSES TO COMMENTS

ISSUE 1: SIGNIFICANCE OF ACOUSTIC THERMOMETRY RESEARCH

Comment: The significance of the ocean climate research is not conveyed in the DEIS. If the project proceeds, recommend that only the climate-related research be conducted.

Response: The significance of the ocean climate research portion of the NPAL project is detailed in Section 1.1.1. This section explains how the ocean plays an integral role in determining the planet's weather and climate, and the objective of the proposed research to quantitatively assess the feasibility of using acoustic thermometry in an integrated ocean observing system for ocean weather and climate. Studies of long-range acoustic propagation in the ocean are important in many contexts, from the use of acoustic remote sensing methods for measuring ocean temperatures and currents (acoustic thermometry), to studying undersea volcanoes and earthquakes, to determining marine mammal distributions and behavior, to navigating and communicating underwater, and to locating and tracking underwater objects (see Section 1.1.2 for further details). Each of these specialized topics relies on a basic understanding of ocean variability and its influence on long-range acoustic propagation. The Marine Mammal Monitoring Studies element of the proposed action is designed to advance the understanding of the potential for long-term effects of the sound transmissions on marine life through the conduct of aerial surveys off the north Kauai coast (see Section 1.1.3). The three research thrusts are mutually supporting, forming a coherent and integrated whole.

ISSUE 2: MILITARY APPLICATIONS

Comment: More clearly state the military applications that may be derived from the proposed research.

Response: As stated in Section 1.1.2, a full understanding of long-range underwater sound transmission is important for all users of underwater sound since sound is used for such basic tasks as measuring ocean depth, navigating, communicating, and locating underwater objects, including submarines. The proposed project would advance the understanding of the basic principles of low frequency, long-range acoustic propagation and the effects of environmental variability on signal stability and coherence. The ultimate objective is to understand the fundamental limits to acoustic signal processing at long range imposed by ocean processes to enable advanced signal processing techniques to capitalize on the three-dimensional character of the underwater sound and noise fields.

ISSUE 3: PERMITTING REQUIREMENTS
a. DISTINCTION BETWEEN FEDERAL AND STATE PROCESSES

Comment: Clarify that ONR is not applying for state approval or permits (specifically see pages ES-1, paragraph 1 and 2; p. 1-1, paragraph 1; p. 1-18, paragraph 5 of the DEIS).

Response: ONR is not applying for state approval or permits. ONR is the lead agency for purposes of NEPA. Scripps is the entity which will carry out the research activity and is the applicant for the various permits. As applicant to the Hawaii Department of Land and Natural Resources for a Conservation District Use Permit, Scripps is the "applicant" under the Hawaii EIS Law, and DLNR is the "accepting agency." In response to the DEIS citations in this comment, the associated phrase indicating that Scripps, and not the Navy, is applying for state approval or permits can be found in the following nearby sentences: page 1-1, paragraph 4 "Scripps is the applicant for all necessary permits."; p. ES-1, paragraph 2 "The action would be carried out by Scripps Institution of Oceanography, University of California, San Diego (Scripps), which is the applicant for necessary state and federal permits..."; Section 1.3.5, paragraph 2 "Scripps has applied to DLNR for a use permit (see Section 1.3.6)..."; Section 1.3.6, paragraph 2: "Scripps has submitted a CDUP application..."

However, two locations in the DEIS that were not cited were edited in the FEIS to clarify for the reader that Scripps is the entity pursuing a LOA for the proposed project (1st paragraph, Section 1.3.2; 1st paragraph, Section 6.1.2).

> ...~~ONR/~~Scripps, in coordination with the National Marine Fisheries Service (NMFS), which administers the MMPA ~~have~~*has* determined to pursue a letter of authorization (LOA)...

ISSUE 3: PERMITTING REQUIREMENTS
b. PUBLIC INVOLVEMENT

Comment: Meetings [public hearings for comment on the DEIS] were not publicized well enough; meetings were held at nights and on Saturday afternoon when people don't want to attend meetings; meetings were scheduled the day after the 4th of July holiday.

Response: The public hearings were scheduled for evenings and a Saturday to avoid the traditional weekday working hours. This ensured that the greatest majority of people interested in attending the public hearings could do so without having to take personal leave. The public hearings were scheduled for early July because the public comment period on the DEIS began in early June, and ended in late July; therefore, the early July dates allowed participants adequate time to review the DEIS and provide oral comments at the hearings, while providing additional time for people who attended the hearings to provide written comments before the comment period ended.

Individualized letters that included the date, time and location of the public hearings were sent to scoping meeting attendees and agency participants. Meeting notices appeared in the Federal Register and in the OEQC Bulletin, as well as in the Kauai Garden Island and Honolulu Star Bulletin newspapers.

Prior to the meetings, Scripps also sent meeting notices to the following print and broadcast media :
Hawaii Public Radio
Hawaii Sanctuary Newsletter
Hawaii-KGMB/Honolulu
Hawaii-KMFN FM
Hawaii-KQNG AM
Hawaii-KUAI AM
Honolulu Advertiser-J. TenB.
Kauai Times
KHNL (NBC)
KHON-TV/Honolulu
Lanai Times
Maui News-Tim Hurley
KITV (ABC)
Associated Press

ISSUE 3: PERMITTING REQUIREMENTS
c. LAND USE PLANS AND POLICIES; PERMITS AND APPROVALS

Comment: Include in the Executive Summary the proposed project's compatibility with land use plans and policies and a listing of permits and approvals.

Response: A new subsection titled "Environmental Impact Analysis" was added to the Executive Summary summarizing necessary permits and approvals, compatibility with applicable land use plans and policies, and other environmental information. The new discussion appears after the "Purpose and Need for the Proposed Action" section. The third paragraph in the introduction of the Executive Summary was moved to become the first paragraph in the new section and the remaining material was taken from Chapters 1 and 6 of the DEIS, where more extensive discussions on these matters appear. Through the pre-DEIS consultation and DEIS comment processes, it was determined that land use plans and policies relevant to the proposed project are carried out through the conservation district use permit program of the DLNR and the federal consistency program of the Hawaii Office of Coastal Zone Management. Both are discussed in detail in Chapter 6. Land use plans and policies of the County of Kauai carried out through the Special Management Area permit program do not apply to this project because it is located entirely seaward of the County's SMA jurisdiction. Nor do provisions of the County's General Plan apply to the project. See Section 6.2.8. Chapter 6 also contains discussion of the project's relationship to other resource policies applicable in the State of Hawaii.

ENVIRONMENTAL IMPACT ANALYSIS

Under the National Environmental Policy Act and the Hawaii Environmental Impact Statement Law, ONR and Scripps must ensure that the potential environmental effects of the proposed project have been adequately addressed and analyzed. This analysis includes consideration of the project's consistency with land use plans and policies as well as policies and standards of applicable state and federal regulatory requirements. The information and analysis is presented primarily through this EIS, which is prepared in compliance with state and federal law. It will be used by other agencies in determining whether to approve aspects of the project under their specific jurisdiction. Federal, state, and local authorities potentially relevant to review and approval of this project are discussed in detail in Chapters 1 and 6. Required agency approvals are summarized below.

AGENCY	*ACTION*
National Marine Fisheries Service (NMFS)	*Incidental harassment/taking authorization under MMPA/ESA*
NMFS	*Consultation under ESA, § 7*
NMFS	*Coordination under Magnuson-Stevens Fisheries Conservation and Management Act*

Hawaii Department of Land and Natural Resources	*Conservation District Use Permit* *Approval of Disposition of Land*
Hawaii Office of Coastal Zone Management	*Federal Consistency Certification*
Department of the Navy	*Decision to Proceed*

DLNR review of Scripps' application for a Conservation District Use Permit is triggered by use of state submerged lands for a portion of the cable route. The land lies within the Resource Subzone of the Conservation District, for which the objective is "to develop, with proper management, areas to ensure sustained use of the natural resources of these areas..." Hawaii Administrative Rule (HAR) § 13-5-13. As discussed in Section 6.2.1, the public purposes and specific characteristics of the scientific research activities provide DLNR with a foundation for finding the project consistent with the objective and specifically allowable uses of the Resource Subzone.

Federal consistency review by the Hawaii Office of Coastal Zone Management (OCZM) is triggered by the project's need to obtain authorization under the Marine Mammal Protection Act. Such authorizations are listed in the State's federally approved Coastal Zone Management Program as a basis for federal consistency review. Scripps has prepared a certification that the proposed project is consistent with the State's Coastal Zone Management Program. This consistency certification includes consideration of each of the program's enforceable policies. The analysis appears in Section 6.2.2 and is supported by information in this EIS.

ISSUE 3: PERMITTING REQUIREMENTS
d. MARINE MAMMAL PROTECTION ACT REQUIREMENT

Comment: Statements in the DEIS appear to indicate that it is not known from the observed behavioral effects whether the proposed action could have long-term cumulative effects on survival or productivity. However, believe that the proposed monitoring studies are intended to meet one of the requirements necessary to obtain a "small take" exemption under the MMPA; therefore, these statements should be revised to be more accurate.

Response: When the ATOC MMRPs were developed, it was agreed that the results obtained would be limited to the detection of short-term effects, and that the issue of the potential for long-term effects could not be addressed during the two years of studies. Therefore, one of the main purposes of the proposed marine mammal monitoring and studies is to conduct studies on the possible long-term effects from the sound transmissions on marine life (as stated in Chapter 1). The work that would be conducted as part of the marine mammal monitoring and studies would also be used to meet one of the requirements necessary to obtain a small take exemption under the MMPA. The entire marine mammal monitoring and studies program is described in greater detail in the FEIS, including the protocol for immediate response to acute or short-term effects and annual reporting to NMFS (see the response to Issue 17a Comment 1), and no further modifications are necessary.

ISSUE 4: PREFERRED ALTERNATIVE
a. LENGTH OF PROPOSED PROJECT

Comment: Recommend that the preferred alternative seek approval/authorization for 24 to 36 months, rather than 5 years.

Response: The commenter states that "continued operation for 24 to 36 months would be a more preferable option. During this period of 24-36 months, data on the project's direct, indirect and cumulative effects on marine life should be gathered and evaluated by the Navy and its Federal cooperating agency (NOAA), in order to determine the effects of multi-year exposure to acoustic research." Participants of the NPAL project agree that this would be a viable alternative if the ATOC project and its associated Marine Mammal Research Programs had not already been conducted. During the ATOC project, the sound sources off Kauai and on Pioneer Seamount transmitted for two years while studies of the effects of these transmissions were conducted. Additional laboratory and smaller-scale field studies were also conducted. Results from the ATOC MMRPs, summarized in Chapters 1 and 4, demonstrate no overt or obvious short-term changes in behavior, distribution, or abundance in response to source transmissions. All of the effects detected by the MMRPs were subtle and found only after intensive statistical analysis. Therefore, the NPAL project does not feel that another short-term study of 24 to 36 months is necessary.

A short-term study of 24 to 36 months also does not meet the purpose and need of the proposed project. Five years of data are needed to address the objectives of all phases of the proposed research, as stated in Sections 1.1.1, 1.1.2, and 1.1.3. Results from the ATOC project demonstrated that acoustic thermometry is a powerful tool for making routine measurements of large-scale ocean temperature variability and heat content, as originally hypothesized. This second phase of acoustic thermometry feasibility requires longer time series of acoustic measurements in order to determine whether the acoustically-derived time series of large-scale ocean temperature and heat content variability prove to be as valuable as expected in studying seasonal and interannual ocean variability associated with phenomena such as El Niño/La Niña and the PDO.

Furthermore, as detailed in Section 5.2 (see the revised section in the response to Issue 17a Comment 1), annual reports to NMFS would be an essential component in the five-year authorization. These reports would provide external review to ensure that no biologically significant effects have been detected.

ISSUE 4: PREFERRED ALTERNATIVE
b. <u>LENGTH OF TRANSMISSION</u>

Comment: Clarify the rationale for selecting a 20-minute transmission duration.

Response: While the rationale for a 20-minute transmission duration was included in Section 2.1.3.2 of the DEIS, it would benefit the reader to also include that information in Section 2.1.1.2 which discusses the transmission characteristics of the proposed project. Therefore, the following paragraph was added as the second paragraph of Section 2.1.1.2 in the FEIS:

> *Optimum waveform and acoustic signal coding are used to reduce the required source levels. The nominal source waveform is a digital sequence of coded signals that has been optimized for decoding at the distant underwater receivers (Munk et al., 1995). The transmission length of 20 minutes is designed to spread the energy over time, at much lower source levels than if the signals were sent as short, loud pulses of the same total energy. Although the sounds cannot be "heard" in the usual sense over most of the transmission path or at the receivers, they are detected and timed using advanced digital signal processing techniques, similar to those used by NASA to retrieve data from deep space satellites. Since the signal-to-noise ratio at the receiver after appropriate processing is directly proportional to the duration of a transmission, weak but carefully constructed signals of long duration can be extracted from below-ambient noise levels. However, signals of much longer than 20-minute duration lose their coherence, and therefore lose the correlation between signal duration and signal-to-noise ratio. Results from the first phase of the ATOC feasibility study demonstrate that these source characteristics provide adequate, but not excessive, signal-to-noise ratios at the receiver ranges of interest. As a result, the current waveform parameters are designed to optimize reception, thereby reducing the RLs to which marine animals are exposed.*

ISSUE 4: PREFERRED ALTERNATIVE
c. SOURCE TRANSMISSION TIMES

Comment: Recommend that operations avoid primary breeding seasons of sea turtles and marine mammals. Recommend that 8 percent transmissions be restricted to months during which the minimum number of whales are present in Hawaiian waters, perhaps September through November.

Response: The migratory habits of the sea turtle species most likely to pass through the source sound fields (leatherback, loggerhead, olive ridley, and green sea turtles) are less well-known than the humpback whales' and thus it would be difficult to alter transmission times to avoid their presence (see discussion in Section 2.1.3.1). Restricting source transmissions to seasons when humpback whales are not present would severely reduce the utility of both the acoustic thermometry and long-range propagation studies, however, as well as make it essentially impossible to study the potential long-term effects of low frequency sound transmissions on marine life. Since humpback whales are sighted more than an order of magnitude more frequently than any other species (see Table 3.2-1) and their migration to Hawaiian waters is relatively well known, the 8 percent duty cycle would not occur during the peak humpback season (January - April). However, further restricting the 8 percent duty cycle transmissions to specific months each year would limit the potential results of both the acoustic thermometry and long-range propagation studies, and would not meet the purpose and need of the proposed project. Since neither the California nor the Kauai ATOC MMRP found any overt or obvious short-term changes in the abundance or distribution of marine mammals in response to the transmissions of the ATOC sound sources (see further discussion in Section 4.2.1.2.1), it is not anticipated that overt or obvious short-term changes in abundance or distribution would result from continued use of the ATOC sound source.

ISSUE 5: ALTERNATIVES
a. ALTERNATE METHODS OF STUDYING LONG-RANGE PROPAGATION

Comment: The need to study long-range propagation is cited as a reason why satellite measurements of sea surface temperature are inadequate. Discuss alternate methods of studying such propagation, including methods that employ existing sound sources (natural and anthropogenic).

Response: In order to study long-range propagation, it is necessary to have a controlled sound source that transmits a known waveform designed for that purpose. By knowing the waveform, or structure, of the sound that was sent, and comparing it to the sound received, an interpretation of the effect of the ocean on the variability of transmitted signals can be inferred. Therefore, since the waveform of signals transmitted by natural sound sources are unknown, natural sound sources do not offer a viable alternative for the study of long-range propagation. No anthropogenic sound sources are currently deployed that would meet the purpose and need of the proposed project like the sound source presently in place off the north shore of Kauai.

ISSUE 5: ALTERNATIVES
b. ALTERNATE SITE LOCATIONS

Comment: The possibility of a sound source off the U.S. west coast should be discussed in the Alternate Project Site Section.

Response: The possibility of a U.S. west coast sound source was not put forth as an alternative because it would not meet the purpose and need of the proposed project as effectively as a mid-Pacific site. However, discussion of this possible alternative was added after the first sentence of the first paragraph following the second series of bullets in Section 2.1.4 of the DEIS, and the remainder of the paragraph was separated into an individual paragraph.

> Potential sites in the Pacific Ocean were comprehensively evaluated by project scientists. *One of the key siting criteria was the number of receiving locations that have clear acoustic pathways from the source location. Computer-generated "shadow plots" were created in which the white "spokes" represent those areas that would be in an acoustic shadow. A mid-Pacific site was preferred to an eastern Pacific site since transmissions in the mid-Pacific have the potential to reach both central Pacific and eastern Pacific existing subsea listening arrays (i.e., SOSUS arrays). Because of the bathymetry along the U.S. west coast, west coast listening arrays would not receive transmissions by a west coast source. A shadow plot from a source located on Pioneer Seamount, off the California coast, is included for comparison (Figure 2.1-9, Pioneer Seamount Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis). As shown in Figure 2.1-9, most of the west coast arrays are in shadow. The number of acoustic paths obtained is therefore significantly reduced compared to the number obtained with a mid-Pacific source. The reduction in the number of paths reduces the geographic coverage for acoustic thermometry, as well as the variety of oceanographic environments in which sound transmissions can be studied. Therefore, in order to maximize the number of transmission paths and the geographic coverage of the region, potential sites in the Pacific Ocean were restricted to the mid-Pacific.*
>
> In the mid-Pacific, only a few locations are feasible given the spareness of islands, the fact that many of those islands are uninhabited, and the remoteness of many of those islands....

ISSUE 6: REMOVAL OF CABLE
a. <u>CONDITION OF THE CABLE</u>

Comment: No scientific evidence or photo documentation of the condition of the cables on the sea floor was provided in the DEIS. No data were presented to substantiate the claim that if the cable was left, it would have no effect on the benthic environment.

Response: PMRF has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables that exist off the west and northwest sides of Kauai. This additional information was included in the eighth paragraph of Section 2.1.1.1 and the third paragraph of Section 4.1.1.1 of the FEIS. The revised paragraphs follow.

> Section 2.1.1.1:
> The cable was installed for the ATOC project in October 1993. By now, natural processes such as sediment drift are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Depending on the characteristics of the sediment, the cable may be lying on the seafloor surface in some areas and buried 2.54 cm (1 in) to 30.5 cm (1 ft) in other areas. By the end of the proposed NPAL project, the cable will have been on the seafloor for approximately 12 years, and can be expected to be even more deeply buried and integrated into the benthic (seafloor) environment. ~~Assessing the effect of cable removal on the surrounding environment and the cable itself, the Handbook of Ocean and Underwater Engineering (Myers et al., 1969) states, "a cable that is well buried on a favorable bottom and left undisturbed will probably last many years. Breaking it out is detrimental in every respect."~~ *PMRF conducted an ROV survey of cables on the west-northwest side of Kauai in 1995 out to water depths of approximately 300 ft (100 m) (Dick, pers. comm.,. September 14, 2000). Mr. Dick stated that the ATOC cable was encountered during the ROV survey, and that it was buried under sand and barely visible. He said that when the cable was laid, a concerted effort was made to place the cable along the 300 ft (100 m) depth contour where the sediment consists of a prehistoric drowned beach; therefore it is likely that the majority of the cable along this depth contour is buried by sand. Furthermore, the existing seashore interface cable that the ATOC cable was connected to has been in place for approximately 20 years, and photos document massive coral growth on that 0.7 nm section (Dick, pers. comm., September 14, 2000). Mr. Dick commented that, to depths of approximately 200 ft (61 m), the ATOC cable also has coral growing on it, but not to the same extent since it hasn't been in place as long as the seashore interface cable. Therefore, removal of the cable could result in damage to the coral that has begun to grow on it.*
>
> Section 4.1.1.1:
> The No Action Alternative and the Midway Alternative involve the removal of the sound source and cable presently in place off northern Kauai. Since the cable has been on the seafloor for 6 years, natural processes such as sediment drift are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Depending on the characteristics of the sediment, the cable may be lying on the

seafloor surface in some areas and buried 2.54 cm (1 in) to 30.5 cm (1 ft) in other areas. Under the Preferred Alternative, the cable will have been on the seafloor for approximately 12 years, and can be expected to be even more deeply buried and integrated into the benthic (seafloor) environment. ~~Assessing the effect of cable removal on the surrounding environment and the cable itself, the Handbook of Ocean and Underwater Engineering (Myers et al., 1969) states, "a cable that is well buried on a favorable bottom and left undisturbed will probably last many years. Breaking it out is detrimental in every respect."~~ *PMRF conducted an ROV survey of cables on the west-northwest side of Kauai in 1995 out to water depths of approximately 300 ft (100 m) (Dick, pers. comm.,. September 14, 2000). Mr. Dick stated that the ATOC cable was encountered during the ROV survey, and that it was buried under sand and barely visible. He said that when the cable was laid, a concerted effort was made to place the cable along the 300 ft (100 m) depth contour where the sediment consists of a prehistoric drowned beach; therefore it is likely that the majority of the cable along this depth contour is buried by sand. Furthermore, the existing seashore interface cable that the ATOC cable was connected to has been in place for approximately 20 years, and photos document massive coral growth on that 0.7 nm section (Dick, pers. comm., September 14, 2000). Mr. Dick commented that, to depths of approximately 200 ft (61 m), the ATOC cable also has coral growing on it, but not to the same extent since it hasn't been in place as long as the seashore interface cable. Therefore, removal of the cable could result in damage to the coral that has begun to grow on it.*

ADDED REFERENCE:

Dick, Mr. Michael of Pacific Missile Range Facility. Personal Communication with Ms. Kathleen Vigness Raposa on September 14, 2000.

DELETED REFERENCE:

Myers, et al., 1969.

ISSUE 6: REMOVAL OF CABLE
b. <u>REQUIREMENT OF ORIGINAL PERMIT</u>

Comment: Request that the cable and transmitter be fully removed, as required by the original permit.

Response: The ATOC project as originally proposed included plans for removal of the cable and sound source, and these plans were reflected in the application for the original conservation district use permit (CDUP). The CDUP required removal of the cable within 6 months after termination of the research project, which was then expected to span 2 years. The CDUP did not address the sound source, which is located outside state waters. The environmental review process associated with the proposed reuse of the sound source and cable for the NPAL project makes provision for consideration of current information in assessment of the environmental impacts associated with removal or retention of the cable.

As more fully discussed in Sections 2.1.1.1. and 4.1.1.1 and amplified in response to comments under Issue 6a, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. As a consequence of delays in start and completion of the ATOC project, the project's original schedule had to be extended. The cable has been on the seafloor for 6 years, and natural processes such as sediment drift are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Depending on the characteristics of the sediment, the cable may be lying on the seafloor surface in some areas and buried 2.54 cm (1 in) to 30.5 cm (1 ft) in other areas. Under the NPAL Preferred Alternative, the cable will have been on the seafloor for approximately 12 years at the project's conclusion and can be expected to be even more deeply buried and integrated into the benthic (seafloor) environment. (See information on ROV survey of cables in the area, response to comments on Issue 6a.)

An additional consideration is the intervening installation by Pacific Missile Range Facility of sensitive cable and instrumentation facilities overlying the ATOC cable along approximately one-third of its length. As discussed in Sections 2.1.1.1 and 4.1.1.1, the sensitivity and value of these new facilities prohibit removal of this portion of the ATOC cable.

In light of the new information concerning environmental damage from removal of the cable after its proposed extended use, together with the new information on the sensitive PMRF facilities, removing the cable is not considered to be a practical alternative to leaving the cable in place after conclusion of the project.

In evaluating the proposal to abandon the cable in place, DLNR may consider the effect of HAR § 13-5-42 (c) (1) and (3), which establishes standards for Board consideration of deviations from a condition of a previously approved permit. For the reasons discussed above and in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, these standards are met with respect to the proposed abandonment of the cable. To provide clear and focused information on this point, the following new discussion has been added to Section 6.2.1 following the seventh paragraph.

Condition 7 of the ATOC Project CDUP requires removal of the cable after termination of the project (extended by permit amendment to September 30, 2001). Because the NPAL Preferred Alternative would abandon the cable in place after conclusion of the research, the Board may chose to consider the proposal under HAR § 13-5-42, which provides that a deviation from any condition of a Conservation District Use Permit only when the proposal is supported by a satisfactory written justification covering four standards. The EIS sets forth the information called for by each of these standards, as follows.

(1) <u>The deviation is necessary because of the lack of practical alternatives.</u> The presence of the cable on the seabed much longer than originally contemplated, the new information concerning environmental damage from removal of the cable, and the intervening presence of sensitive Navy facilities overlying the ATOC cable have eliminated removal of the cable as a practical alternative. Sections 2.1.1.1 and 4.1.1.1.

(2) <u>The deviation shall not result in any substantial adverse impacts to natural resources</u>. Section 2.1.1.1 provides information on the cable and the natural resources along its route and concludes that, if left on the seafloor, the cable would have no effect on the benthic environment. However, Sections 2.1.1.1 and 4.1.1.1 indicate that removal of the cable could have adverse impacts to natural resources.

(3) <u>The deviation does not conflict with the objective of the subzone</u>. The objective of the Resource Subzone, where the relevant portion of the cable is located, is "to develop, with proper management, areas to ensure sustained use of the natural resources of those areas ...." Given the benign nature of the cable resting on the seabed (Section 2.1.1.1), the proposed use of these lands for this purpose and to enable the proposed scientific research is consistent with the subzone's objective.

(4) <u>The deviation is not inconsistent with the public health, safety, or welfare</u>. Information and analysis in Sections 2.1.1.1 and 4.1.1.1 demonstrate that abandoning the cable in place would meet this standard.

ISSUE 6: REMOVAL OF CABLE
c. PORTION TRANSITING THE SANCTUARY

Comment: Request that the fate of the portion of the cable transiting the Hawaiian Islands Humpback Whale National Marine Sanctuary be determined at the end of the proposed project.

Response: A decision on the fate of the entire cable is tied to DLNR action on the current NPAL proposal to reuse the cable, as well as Scripps's success in obtaining other necessary authorizations for the NPAL project. Grant funds from the ATOC project have been set aside to remove the cable if the necessary authorizations are not secured. However, grant funds will have expired before the end of the NPAL project and no replacement funding is available. Therefore, the fate of the cable must be determined at this time. For further related considerations affecting decisions about the cable, see Response to Comment Issue 6b.

ISSUE 7: SOCIAL ENVIRONMENT
a. <u>WHALE WATCHING AND TOUR BOAT INDUSTRY</u>

Comment: Section 3.4.1 is very outdated and incomplete with respect to the whale watching and tour boat industry on Kauai. Recommend obtaining recent report prepared for the Hawaiian Islands Humpback Whale National Marine Sanctuary.

Response: A copy of the report by Dan Utech (1999), "Valuing Hawaii's Humpback Whales: The Economic Impact of Humpbacks on Hawaii's Ocean Tour Boat Industry", was obtained from the HIHWNMS. Data from this report were used to revise the part of Section 3.4.1 that addressed the whale watching and tour boat industry on Kauai. The revised third and fourth paragraphs are included below.

> According to Townsend (1991), the major recreational activities on Kauai are fishing, boating, diving, snorkeling, waterskiing, whale-watching, sea kayaking, parasailing (commercial), and riding pleasurecraft (private and commercial). *In 1998, Governor Cayetano closed the Hanalei ocean tour boat industry. A handful of operators were allowed to continue operations on a temporary basis; these operators have sued the State and are continuing to operate under a court order (Utech, 1999). The majority of operators moved their business to the west coast of Kauai, particularly the Port Allen small boat harbor. The results of this shift are that larger vessels are favored because the trip to the Na Pali coast, the main destination for most Kauai ocean tours, is longer from the west coast.*
>
> *Direct revenues in 1999 from the respective ocean tours were $0.9 million for whale watching, $17.1 million from snorkeling, and $3.7 million from sunset cruises. The total economic impact from the respective ocean tours were estimated as $1.6 million and 23 jobs for whale watching, $29.3 million and 420 jobs for snorkeling, and $6.4 million and 92 jobs for sunset cruises (Utech, 1999). In April 1999, a large vessel that had operated dinner cruises on Maui shifted to Kauai; however, the total estimate of dinner cruise revenues across these two islands should not be greatly affected by this change (Utech, 1999).*

ADDED REFERENCE:
Utech, D. 1999. Valuing Hawaii's Humpback Whales: The economic impact of humpbacks on Hawaii's ocean tour boat industry. Report prepared for the Hawaiian Islands Humpback Whale National Marine Sanctuary. 36 pp.

ISSUE 7: SOCIAL ENVIRONMENT
b. PUBLIC FUNDING

Comment: Please disclose the amount of public funds that would be expended for this project.

Response: It is anticipated that roughly $125,000 per year would be available for the operation of the source, and that of that amount, $50,000 per year would be expended on the associated marine mammal monitoring studies. In addition, Scripps and APL-UW anticipate receiving funding from ONR to operate the acoustic receivers, to process and archive the receptions, to analyze the data collected (from previous phases of the NPAL Project as well as from the proposed phase), and to prepare publications on the results.

ISSUE 7: SOCIAL ENVIRONMENT
c. SOCIOECONOMIC EFFECTS

Comment: The statement is made in the DEIS that "The No Action Alternative would not have any socioeconomic effects." (page ES-10) However, wouldn't employing people to remove the cable have a positive socioeconomic effect?

Response: The No Action Alternative would not have any socioeconomic effects on the Hawaiian Islands because the resources necessary to remove the source and cable north of Kauai are highly specialized equipment that would need to be chartered from the mainland. However, as stated in Sections 4.3 and 4.4., the Preferred Alternative would have a minor positive effect on the economic and social environment through the increased economic activity due to payrolls and support expenditures for the 5 to 10 scientists, most from Hawaii marine science educational institutions, who would be involved in aerial surveys as part of the Marine Mammal Monitoring and Studies.

ISSUE 8: SOUND FIELD
a. <u>EXISTING SOUND FIELD</u>

Comment: 1) Believe study of ambient noise (possible acronym "ANADS") was undertaken at PMRF. Suggest contacting PMRF to determine if this database would be useful for this project. 2) Believe that it is inaccurate to state that "limited military activities occur in the vicinity of the Kauai source" with PMRF doing extensive surface and underwater testing.

Response: 1) The system mentioned is Ambient Noise And Data System (ANADS). ANADS measured the amount of noise radiated from passing Navy ships, not the ambient noise off PMRF. In addition, ANADS measurements were concluded at PMRF in the early 1980s, so any measurements made are out-of-date. Therefore, this database would not be a useful resource for this project.

2) It is agreed that the phrase "military activities" should be further clarified. Toward this end, the beginning of the fifth paragraph of Section 4.1.2.2 has been modified as follows.

> ~~Limited military activities occur in the vicinity of the Kauai source.~~ PMRF currently has no environmental authorization to conduct active underwater acoustic tests. *Therefore, cumulative effects from their activities are limited to transits of vessels. Since PMRF and its shallow water training range are located approximately 12 nm from the ATOC sound source, the cumulative sound level from the radiated noise of vessels on the range and transmissions from the ATOC sound source would be negligible.* Other military training missions...

ISSUE 8: SOUND FIELD
b. TRANSMISSION CHARACTERISTICS OF PROPOSED PROJECT

Comment: 1) In Section 6.3, the DEIS states that the proposed project would involve short-term increase in underwater sound. Do not consider 5 years to be short-term. 2) If the Kauai source may continue to operate beyond the 5 years specified in the proposed action, this should be noted and reflected in the assessment of possible long-term cumulative effects. 3) Explain the x-axis on Figure 2.1-5. Clarify the information included in the DEIS on the transmission characteristics of the sound source (i.e., difference between Figure 2.1-5 and the transmission loss work done as part of the MMRP). 4) Figure 2.1-4 shows humpback whale and its dive depth. Given the average rates of descent and ascent documented during unpublished work by Baird, it is theoretically possible for humpbacks to dive to over 700 meters, so potential exposure to higher sound levels is possible. In addition, why not show beaked whales (known to be sensitive to low frequencies) or sperm whales (since they were shown to be affected in previous ATOC experiments).

Response: 1) The statement "short term increase in sound" refers to the proposed 2-8 percent duty cycle, not the proposed duration of the project. As stated in Chapter 1, the purpose of the proposed marine mammal monitoring and studies is to conduct studies on the possible long-term effects from the sound transmissions on marine life. To clarify this for the reader, the first sentence of the sixth paragraph of Section 6.3 of the FEIS will be edited to read as follows.

> The proposed project would involve ~~short-term~~ *an* increase in underwater sound *on a 2-8 percent duty cycle* in the area.

2) As discussed in Chapter 1, part of the purpose of the proposed project is to perform a second phase of research on the feasibility and value of large-scale acoustic thermometry. Without a quantitative assessment of the role which acoustic thermometry can play in an integrated ocean observing system, it is unknown whether it would be worthwhile for the Kauai source, or another similar source at a different location, to operate beyond the five years specified in the proposed action. At present there are no plans or specific proposals for an additional acoustic thermometry project following the NPAL research. Any attempts at description and analysis of any such project necessarily would be speculative and is thus not required by state or federal environmental laws. Relevant discussion was included in the DEIS in Section 1.3.1.2, in response to scoping comments that raised the issue of whether a programmatic EIS should be prepared. Another consideration, as discussed in Section 2.1.1.1, is that "all components [of the source] have a design life in excess of 10 years with a minimum guaranteed design life specification of three years." Since the source was placed off Kauai in late July, 1997, and the projected end period of the proposed five year authorization would be approximately early 2006, it is highly possible that the source may not be functional and available for further operations. Finally, the results from the ATOC MMRPs were designed to address potential short-term effects, while the marine mammal monitoring and studies included as part of the proposed project are designed to address potential long-term effects. Therefore, if the proposed project is conducted, a more accurate estimate of the potential for long-term cumulative effects could be made.

3) The computer program that created the PE plot in Figure 2.1-5 inadvertently shortened the x-axis labels so that the decimals were not displayed. The x-axis label should read "0-0.5-1.0-1.5...." This is corrected in the FEIS. There are no estimates in the text of received sound levels derived from this figure. As stated at the beginning of the 11th paragraph of Section 2.1.1.2 which contains estimates of received levels at different distances from the source, PE models have difficulty making accurate predictions of RL as sound travels upslope near shore. Therefore, to know precisely the RLs that animals may be exposed to inshore of the sound source, measurements of RL at different distances from the source were made during the Kauai ATOC MMRP, which are the results cited in this paragraph and shown in Figure 2.1-7. To clarify this further for the reader, the beginning of the 11th paragraph will be reworded as follows.

> Even PE models have difficulty making accurate predictions of RL as sound travels upslope near shore. *To resolve this issue, RL data were collected by the Kauai ATOC MMRP (Frankel and Clark, 2000). The power in the 60-90 Hz band was calculated each second, and the 25th percentile value of each calculation was returned as the received level measurement. The data points displayed in Figure 2.1-7 represent modal estimates of all RLs measured at the given range from the source. Frankel and Clark (2000)* found that RL decreases rapidly as the sound travels upslope towards Kauai, as can be seen in Figure 2.1-7 (Measured Received Levels from Kauai Sound Source).

4) Given the rates of ascent and descent demonstrated in Baird et al. (2000) and Dolphin (1987), it is theoretically possible for humpback whales to dive to deeper depths than are shown in Figure 2.1-4. However, as stated by Baird et al. (2000), if the recorded dives are restricted to include only those whales found in waters deeper than 100 m and only those dives greater than one body length, 89% of the dives recorded are still less than 100 m. Therefore, the maximum dive depth used in the figure, as substantiated by the research of Hamilton et al. (1997), is the best available data, and the estimated exposure levels represent typical scenarios for humpback whales distributed off the north shore of Kauai. Humpback whales were shown in this figure because they are known to frequent the region where the sound source is located. Therefore, they could potentially pass within the vicinity of the sound source while it is transmitting. Beaked or sperm whales were not shown in this figure because they are typically distributed in regions where the water depths are greater than those where the sound source is located (Mobley et al., 1999b), and therefore it is unlikely that they would be within the vicinity of the sound source. Furthermore, it is more probable that humpback whales are sensitive to the NPAL transmissions than either beaked or sperm whales. No odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds. Results from the California ATOC MMRP suggest that there was a possible shift in distribution of sperm whales away from the source while it was transmitting, but that was detected only after intensive statistical analysis and no overt or obvious short-terms changes in distribution or abundance were observed during either the California or the Kauai ATOC MMRPs.

ADDED REFERENCE:

Baird, R. W., A. D. Ligon, and S. K. Hooker. 2000. Sub-surface and Night-time Behavior of Humpback Whales off Maui, Hawaii: A preliminary report. Report prepared by the Hawaii Wildlife Fund, Paia, HI. 18 pp.

ISSUE 9: BEHAVIORAL DISRUPTION OF MARINE MAMMALS
a. ACOUSTIC INTEGRATION MODEL

Comment: 1) Invalid assumption included in the take analysis that animals are distributed uniformly or randomly throughout their ranges in the North Pacific.
2) Include a summary of humpback whale movement around the Hawaiian Islands during the winter months in Chapter 3, and revise take calculations in Chapter 4 as appropriate.

Response: The take analysis did not include the assumption that animals are distributed uniformly or randomly throughout their ranges in the North Pacific. As stated in Section 4.2.1.2.1, under the Sample Model Run/AIM Model Input Parameters and Data subsection, "...the best available scientific data for each species was used to model their individual dive profiles and distributions in the modeled areas. This precludes homogeneously-distributed animal densities in the three dimensions of latitude, longitude, and depths, as can be seen in the initial humpback whale positions shown in Figure 4.2-4." Each of the rectangles shown in Figure 4.2-3, an area of 10 nm by 6 nm, is assigned an animal weight or density for each of the modeled species. The specific assigned animal weight or density allows the inputted data to reflect known bathymetric or oceanographic phenomena which may concentrate or disperse animals in the area. The start locations within each rectangle are determined randomly to preclude uniform distribution. Therefore, animal distribution on the large scale reflects known concentrations of animals, and distribution on the small scale represents the patchiness that is observed in the field.

2) As stated in Section 4.2.1.2.1, in the Potential for Physical Auditory Effects and Behavioral Disturbance subsection, take estimates were calculated for all species over two time scales. The first estimation was the potential for effects over one 20-minute transmission, and the second estimation was the potential for effects over one day of transmissions (i.e., one 20-min transmission every four hours for 24 hours). Estimations of potential effects over longer time scales can be made from the data provided.

ISSUE 9: BEHAVIORAL DISRUPTION OF MARINE MAMMALS

b. RISK CONTINUUM

Comment: 1) The term "non-injurious harassment" is not defined. Please define, or replace with "Level B Harassment" which is defined in the Marine Mammal Protection Act. 2) Clarify what is meant by "prolonged reaction." 3) Clarify the curvilinear shape of risk continuum and its underlying assumptions. Explain 2.5% at 150 dB, 50% at 165 dB. WDCS does not believe that the findings of Au et al. (1997) quoted in the DEIS on page 1-13 can be taken to be representative of other species of toothed whales. Croll et al. (1999) and Richardson et al. (1995) include statements that effects could occur at levels below those cited in this DEIS. 4) Text should make clear that the risk continuum treats each minute of transmission as a ping, not the whole 20-minutes of transmission. (see page ES-5, paragraph 4)

Response: 1) It is agreed that the term "non-injurious harassment" is not adequately defined in the DEIS, and so it has been replaced in the FEIS in all places that it is found with "a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding, and migration, which have a potential to impact on the reproductive success of the animals." Edits were made in the FEIS in the y-axis labels of Figures ES-1 and 4.2-1, the 4th paragraph of the section titled "Potential Environmental Effects" of the Executive Summary and in the first paragraph of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1, as shown, respectively, below.

> Executive Summary:
> In order to determine the potential for risk, threshold standards were established. These threshold standards set the amount of *potential* risk for *a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal* if an animal received one signal at that received level. The threshold standards, which were developed into a risk continuum, were based on a comprehensive literature review and the results of recent studies on the effects of LF sound on marine mammals.
>
> Chapter 4:
> Marine mammals exposed to LF sound are *potentially* at risk for several types of biologically significant impacts, including injury and ~~non-injurious harassment~~ *a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.*

2) It is agreed that the term "prolonged disturbance of biologically important behavior" was not adequately defined in the DEIS, and so it has been replaced in the FEIS in all places that it is found with "a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding, and migration, which have a potential to impact on the reproductive success of the animals." To this end, edits were made to the second paragraph of the subsection titled "Acoustic Modeling" in Section 4.2.1.2.1, and the last two sentences were separated into a new paragraph. The two revised paragraphs follow.

Next, the relationship *was developed* ~~of~~ *between* marine mammal exposure to LF sound ~~to~~ *and* the risk of ~~TTS or prolonged disturbance of biologically important behavior was developed~~ *a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.*

Using the results of acoustic modeling, the potential effects of the LF sound source were assessed in relation to received levels (RLs) and repeated exposure. The development of this risk analysis process (risk continuum) is described below.

Edits were made to the last paragraph of the subsection titled "Acoustic Modeling" in Section 4.2.1.2.1:

The results of the AIM modeling process are used as the inputs to the risk continuum to determine the *potential* risk of ~~TTS and prolonged disturbance of biologically important behavior to marine mammals~~ *a biologically significant response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.*

Edits were made to the fourth paragraph of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1:

While there is no guarantee that marine mammal behavioral responses exhibit patterns similar to human hearing, the human model is the best objective foundation for an assessment. Thus, the 10 $\log_{10}(N)$ formula is considered appropriate for assessing the *potential* risk to a marine mammal for ~~TTS and prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity* from coherent LF sound like the NPAL sound source transmissions.

Edits were made to the 11th and 25th paragraphs of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1:

The second assumption is that the *potential* risk of ~~prolonged disturbance of~~ *a biologically significant response that affects a* biologically important ~~behavior~~ *activity* is zero below 120 dB. The third assumption is that 2.5 percent of a population exposed to a single ping at a RL of 150 dB would experience ~~prolonged disturbance of~~ *a biologically significant response that affects a* biologically important ~~behavior~~ *activity.*

Edits were made to the 15th paragraph of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1:

In order to understand the significance of the risk of ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important

~~behavior~~ *activity*, it is necessary to determine how this risk might affect a population of marine mammals, starting with bioacoustic criteria. First, the animal must be able to hear LF sound. Second, the animal must incur a ~~prolonged reaction~~ *biologically significant behavioral response* to the LF sound. Third, any effect must involve a significant behavioral change in a biologically important activity. For LF sound effects on marine mammals, this would relate primarily to *survival,* feeding, ~~and~~ breeding *and migration*, ~~both~~ *all* of which are essential to the reproductive success of the animal.

Edits were made to the 17th paragraph of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1:

The third assumption, that 2.5 percent of a population exposed to a single ping at a RL of 150 dB would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity*, is based on results from the recent Low Frequency Sound Scientific Research Program (LFS SRP)....

Edits were made to the 23rd paragraph of the subsection titled "Risk Continuum Analysis" in Section 4.2.1.2.1:

Taken together, the three phases of the LFS SRP do not support the predictions that most animals exposed to RLs near 140 dB would exhibit disturbance of behavior and avoid the area. These experiments, which exposed animals to RLs ranging from 120 to 150 dB, elicited only minor, short-term behavioral responses, but not ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity.*

Edits were made to the 8th paragraph of the subsection titled "Sample Model Run" in Section 4.2.1.2.1:

The AIM results are then processed using the risk continuum to derive percentages given in Tables 4.2-5 and 4.2-6. These percentages estimate the portion of the population that would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior or~~ *activity and* TTS for the Preferred Alternative and the Midway Alternative.

Edits were made to the 1st paragraph of the subsection titled "Potential for Physical Auditory Effects and Behavioral Disturbance" in Section 4.2.1.2.1:

Physical auditory effects and ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity* are the two effects of potential significance regarding the Preferred and Midway alternatives.

3) In the subsection titled "Determination of Risk Function" under the "Risk Continuum Analysis" subsection of Section 4.2.1.2.1 of the DEIS, the first two paragraphs discuss the curvilinear shape of the risk continuum and the assumptions underlying such a shape. To clarify this further for the reader, these paragraphs have been revised as follows.

> Up to now, the definition of biological risk to marine mammals has generally been based on an arbitrary received sound level threshold for individual species. For example, TTS values have been used as a threshold. However, *the use of a threshold, or step function, assumes that all animals react to sound in the same manner, and that the same reaction occurs at the same RL for all animals. Therefore,* ~~this approach sets a threshold under which~~ any RL value below the threshold is considered risk-free, and any value above it is considered certain to cause adverse responses by marine mammals.
>
> In contrast, a more realistic approach to assessing biological risk is to use a smooth, continuous function that maps RL to risk. Scientifically, this ~~acknowledges~~ *reflects the research that has been conducted on terrestrial species demonstrating* that individuals vary in sensitivity, so if an entire population is exposed to a given level of sound, biologically important responses will be observed in a percentage of the population rather than in *none of the population or* the entire population. *For example, in the third phase of the LFS SRP, discussed in greater detail later, some singing humpback whales showed apparent avoidance responses and cessation of song at RLs ranging from 120 to 150 dB. However, an equal number of singing whales exposed to the same levels showed no cessation of song. To reflect this varied response between individuals, a curvilinear risk continuum is most accurate.* Mathematically, ~~this~~ *the curvilinear shape of the risk continuum* eliminates the possibility for dramatic changes in estimated impact as a result of small changes in parameter values. As a result, the potential for misleading results is greatly reduced.

The research on which the risk continuum for this LF sound source is based is described in detail in the subsection titled "Determination of Risk Function" under the "Risk Continuum Analysis" subsection of Section 4.2.1.2.1 of the DEIS, and the commenter is referred to that section for the explanation of the assumptions underlying the risk assessment. The work of Au et al. (1997) on page 1-13 specifically mentions that "the hearing sensitivity of two species of dolphins...was measured behaviorally." Neither here, nor later in the discussion of Chapter 4, are these results extrapolated to all species of odontocetes (e.g., sperm whales). However, Au et al. (1997) summarizes additional studies of hearing sensitivity of other small odontocetes, the results of which demonstrate a trend of relative insensitivity to low-frequency sounds. Therefore, given the best available data, it is assumed that small odontocetes whose auditory systems are adapted for high ultrasonic frequencies would experience similar reactions to those observed by Au et al. (1997).

4) Though the reader is referenced to Chapter 4 in this paragraph for a detailed explanation of the take analysis, the text of the identified paragraph has been modified to clarify the issue that the risk continuum is designed for pings of duration of 1 minute. However, with this added detail, modifications were also necessary in the following paragraph to clarify for the reader that the

modeled data inputted into the risk continuum for the take assessment was adjusted to account for the full 20-min transmission or a full day of transmissions. Therefore, the energy of the 20 1-min pings over one transmission, or the 120 1-min pings that an animal received over one day of transmissions, was summed to compute a single ping equivalent that related the total energy received to the amount of energy (and thus RL) that an animal would experience from an equivalent one 1-min ping. The revised paragraphs follow.

> In order to estimate the potential for biological risk, a comprehensive program of underwater acoustical modeling was undertaken. The potential for biological risk is a function of an animal's exposure to sound. The parameters used for determining exposure were RL in decibels, length of the signal, and the number of signals received. Therefore, the level of risk for an animal depends on its location in relation to the sound source. In order to determine the potential for risk, threshold standards were established. These threshold standards set the amount of risk for disturbance of a biologically important behavior if an animal received one *1-min* signal at that received level. The threshold standards, which were developed into a risk continuum, were based on a comprehensive literature review and the results of recent studies on the effects of LF sound on marine mammals. As explained in detail in Chapter 4, the risk continuum estimates that 95 percent of the marine mammals exposed to a single *1-min* ping at 180 dB could incur a temporary threshold shift (TTS); that the risk of disturbing a biologically important behavior is zero below 120 dB; and that 2.5 percent of a population exposed to a single *1-min* ping at a RL of 150 dB would experience disturbance of a biologically important behavior. The resulting risk continuum is shown in Figure ES-1.
>
> To quantify the potential for risk, the sound field around the source was estimated using the Navy's standard acoustic performance prediction transmission loss model. These data are input to the Acoustic Integration Model (AIM) which coupled the acoustic environment with population distribution, abundance, density, general movement and diving profile data for marine mammals in the area. AIM was used to simulate the acoustic exposure for each animal over one 20-min transmission and over one day of transmissions (six 20-min transmissions). *To account for animal movement during the 20-min transmission and over one day of transmissions, the NPAL signal was broken up into 1-min pings. The energy an animal received from each of these 1-min pings (either 20 1-min pings for one transmission or 120 1-min pings for one day of transmissions) was then summed and the corresponding received level for one 1-min ping (i.e., the single ping equivalent) was calculated. The single ping equivalent was the input into the risk continuum to estimate the potential effects of the NPAL transmissions.* Estimates of the percentages of marine mammal populations potentially affected by the Preferred Alternative and the Midway Alternative are displayed in Tables ES-1 and ES-2, respectively. A value of zero means that less than 0.01% (i.e., 0.0001) of the marine mammal population are potentially affected. These results demonstrate that only humpback whales near Kauai have a chance for disturbance of a biologically important behavior, and no TTS effects are expected with any of the species at either site.

ISSUE 9: BEHAVIORAL DISRUPTION OF MARINE MAMMALS
c. <u>POTENTIAL FOR BEHAVIORAL DISRUPTION</u>

Comment: 1) Relate the estimate of the number of animals expected to be exposed to various sound levels to the estimates of the potential biological removal (PBR) level, as well as to estimates of the total size, of the potentially affected stocks. 2) In Section 1.3.2, make clear that Level B Harassment is likely to occur and that it is not known whether such taking could have long-term effects. 3) Recommend including monk seals in modeling for Kauai site (include in Tables 4.2-3, 4.2-5/ES-1).

Response: 1) PBR, as the name implies, relates to biological removal of animals from the population, whether through mortality or serious injury. It is not anticipated that the proposed project would result in either mortality or serious injury, and therefore it is inappropriate to relate the estimates of the number of animals expected to be exposed to various sound levels to PBR levels. Further, as shown in Tables 4.2-5 and 4.2-6, all but one of the estimates of the number of animals potentially affected by the Preferred Alternative and Midway Alternative, respectively, are zero. Only humpback whales that remain in the vicinity of the sound source for a full day of transmissions, which from observations made during the Kauai ATOC MMRP is not expected, may experience an effect from the source transmissions.

2) The issue raised is clarified for the reader by modifying the second sentence of Section 1.3.2, and the fifth sentence of Section 6.1.2. The revised sentences follow.

> Section 1.3.2:
> While the intensive statistical analysis of Kauai MMRP data revealed some subtle changes in the behavior of humpback whales in response to *ATOC-like playback* sounds and transmissions of the ~~ATOC~~ Kauai *ATOC* source, the suggested effects do not support ~~a~~ *the need to* request ~~for~~ a LOA *because they do not indicate a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.*
>
> Section 6.1.2:
> Although the suggested effects do not support ~~a~~ *the need to* request ~~for~~ a LOA *because they do not indicate a biologically significant behavioral response,...*

The Marine Mammal Monitoring Studies element of the proposed action is designed to advance the understanding of the potential for long-term effects of the sound transmissions on marine life through the conduct of aerial surveys (Chapter 1).

3) Hawaiian monk seals were added to the take analysis for the Preferred Alternative in the FEIS. That modification is reflected in the following rows added to the respective tables.

Table 4.2-3 AIM Input for Distribution, Abundance, and Density

Site	Species	Abundance Estimate	Site Estimate	Distribution, Abundance, and Density Information
Kauai	*Hawaiian monk seal*	*1423*	*16*	*Found occasionally in waters less than 1000 m (3281 ft), rarely in deeper waters.*

Table 4.2-5 Percentages of Marine Mammal Populations Potentially Affected by the Preferred Alternative

Marine Mammals	One Transmission		One Day of Transmissions	
	Disturbance of Biologically Important Behavior (120-180 dB)	TTS (≥ 180 dB)	Disturbance of Biologically Important Behavior (120-180 dB)	TTS (≥ 180 dB)
Hawaiian monk seal	*0*	*0*	*0*	*0*

Table ES-1 Percentages of Marine Mammal Populations Potentially Affected by the Preferred Alternative

Marine Mammals	One Transmission		One Day of Transmissions	
	Disturbance of Biologically Important Behavior (120-180 dB)	TTS (≥ 180 dB)	Disturbance of Biologically Important Behavior (120-180 dB)	TTS (≥ 180 dB)
Hawaiian monk seal	*0*	*0*	*0*	*0*

In addition, a discussion of how the distributional preferences of Hawaiian monk seals influence the potential effect of the sound source on them was added to the end of the first paragraph of subsection "Preferred Alternative" in Section 4.2.1.2.1. This added discussion follows:

> *Hawaiian monk seals are the only pinniped species that may be found around Kauai. However, because the majority of monk seals are located around the Northwest Hawaiian Islands feeding at depths of less than 100 m (328 ft), few, if any, are expected to be exposed to received levels >120 dB.*

ISSUE 9: BEHAVIORAL DISRUPTION OF MARINE MAMMALS
d. <u>POTENTIAL FOR MASKING</u>

Comment: Summarize the known hearing range and sensitivity, nature and uses of sounds produced, and how vocalizations and behaviors change in response to sounds for all odontocetes. In the masking section (Section 4.2.1.2), include marine mammal vocalizations that fall within and could be masked by NPAL.

Response: Figures were constructed that summarize the known frequencies of sounds produced by mysticetes (Figure 3.2-1, Frequency Range of Sounds Produced by Mysticetes) and odontocetes (Figure 3.2-4, Frequency Range of Sounds Produced by Odontocetes), as well as a figure that provides the best available scientific data on marine mammal hearing thresholds (Figure 3.2-2, Marine Mammal Audiograms). These figures are included below, and were inserted into Sections 3.2.2.1 and 3.2.2.2. A paragraph summarizing the known hearing range and sensitivity of mysticetes was included as the second paragraph of the introduction of Section 3.2.2.1. A paragraph and a table (Table 3.2-2, Known Underwater Hearing Sensitivities of Odontocetes) summarizing the known hearing range and sensitivity of odontocetes was included as the fourth paragraph of the introduction of Section 3.2.2.2. Both of these paragraphs and the table are included below. For information on how vocalizations and behaviors change in response to sounds, the reader is referred to the information included in Chapter 4 and to Richardson et al. (1995). The fifth (mysticetes) and seventh (odontocetes) paragraphs of subsection "Potential for Masking" in Section 4.2.1.2.1 were revised to include discussion of the marine mammal species that may be masked by NPAL, and the revised paragraphs are included below.

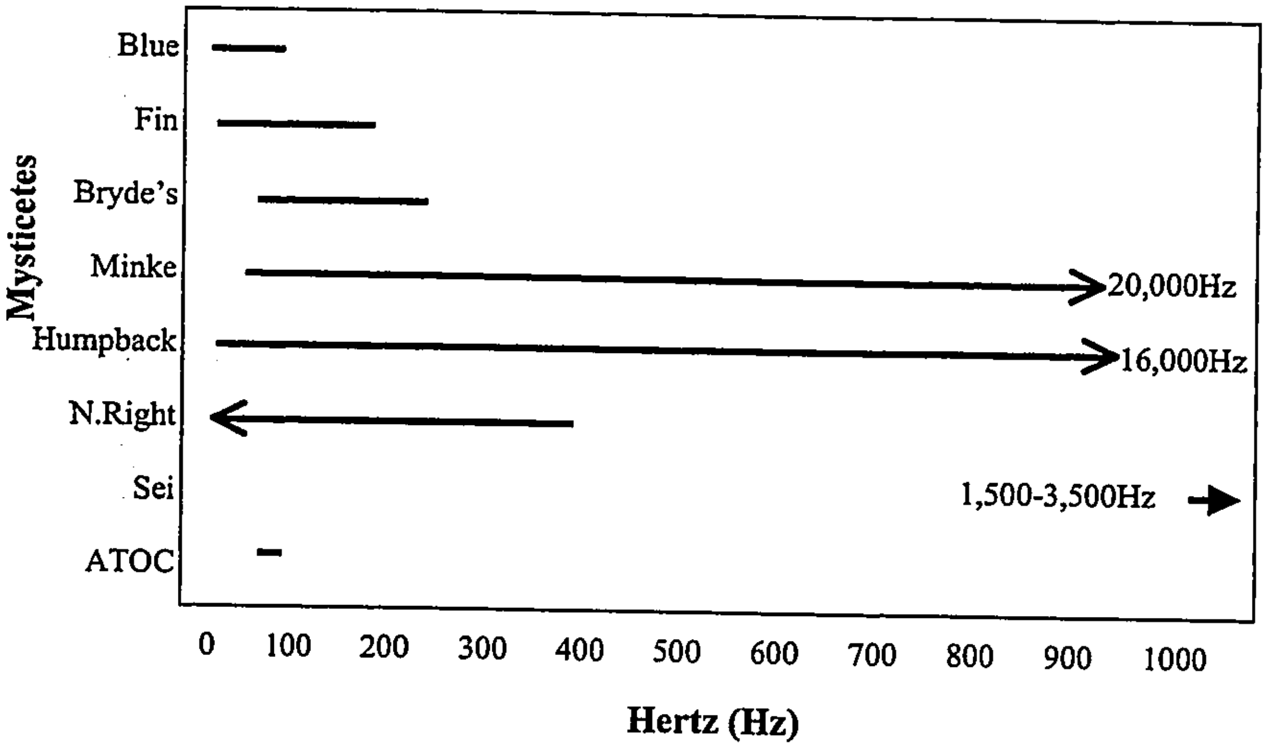

Figure 3.2-1 Frequency Range of Sounds Produced by Mysticetes

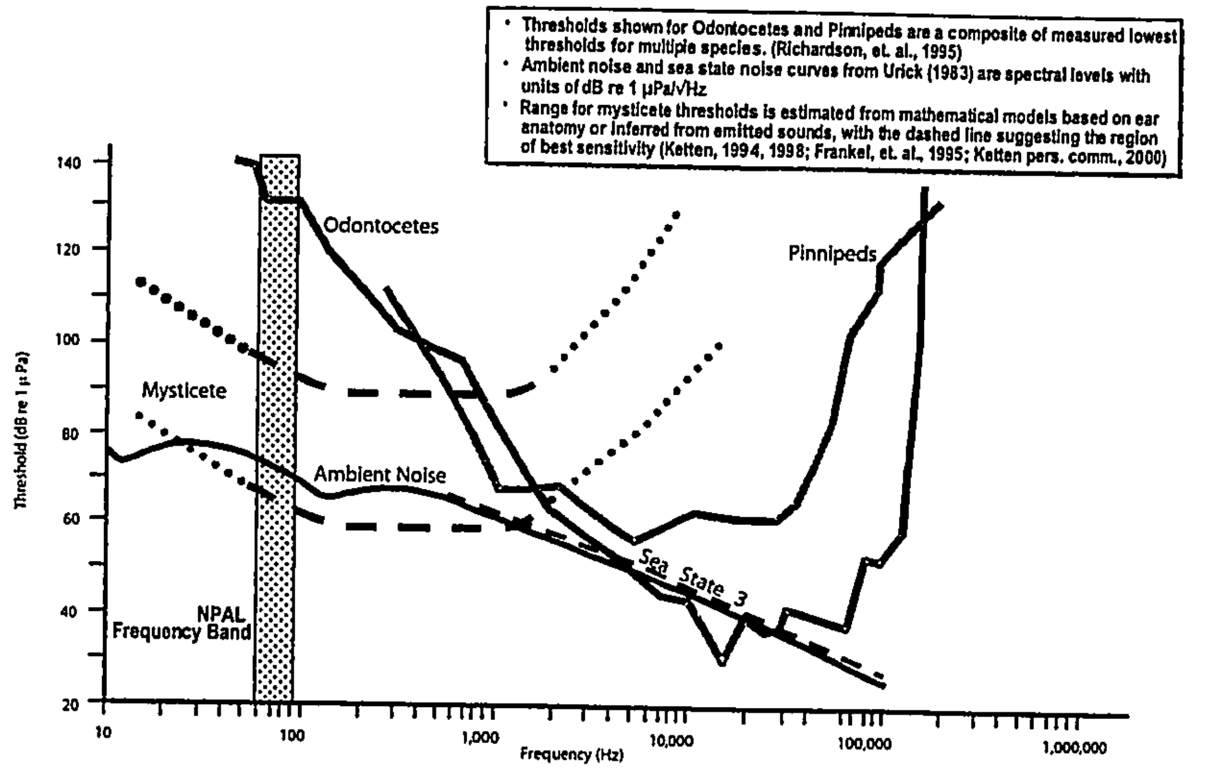

Figure 3.2-2 Marine Mammal Audiograms

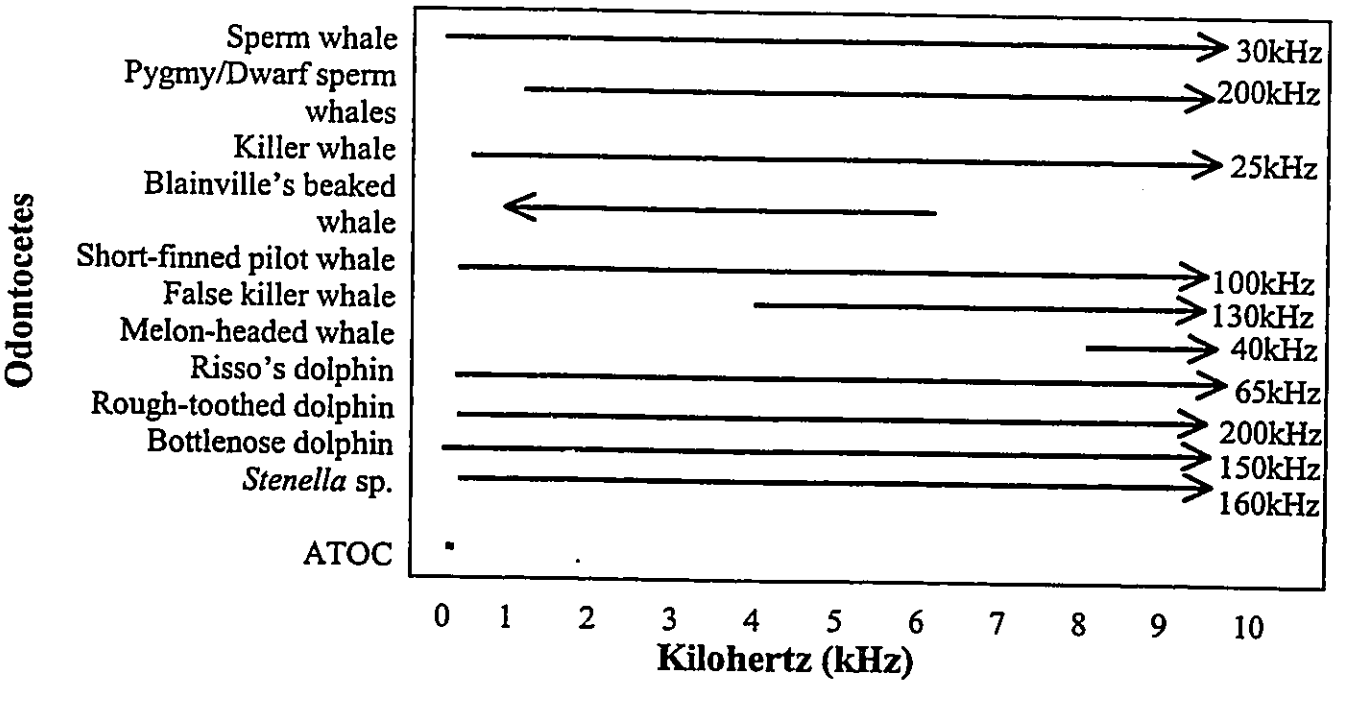

Figure 3.2-4 Frequency Range of Sounds Produced by Odontocetes

Section 3.2.2.1 Mysticetes

A summary of the frequency range of sounds produced by mysticetes is included as Figure 3.2-1 (Frequency Range of Sounds Produced by Mysticetes). Au et al. (2000) provide a summary of what is known about hearing by mysticetes. No direct data on the underwater hearing range or sensitivity of mysticetes is available. Functional models based on anatomical data indicate that the functional hearing range for mysticetes commonly extends to 20 Hz, with several species expected to hear well into infrasonic frequencies (Ketten, 1998) (Figure 3.2-2). The upper functional range for most mysticetes has been predicted to extend to 20-30 kHz. The playback of biologically meaningful sounds (song, social sounds, and feeding call) to humpback whales estimated a response threshold at broadband received levels of 102 dB re 1 μPa for the feeding call, and 106 dB re 1 μPa for synthetic sound (Frankel et al., 1995)

The composite audiogram shown in Figure 3.2-2 (Marine Mammal Audiograms) illustrates that the best scientific data suggests that mysticetes have the most sensitive LF hearing of all marine mammals.

Section 3.2.2.2 Odontocetes

A summary of the frequency range of sounds produced by odontocetes is included as Figure 3.2-4 (Frequency Range of Sounds Produced by Odontocetes). Au et al. (2000) provide a summary of what is known about hearing by odontocetes. Audiograms are available for seven odontocete species, most of which are delphinids, but also includes beluga whales and harbor porpoises. There are no published audiograms for sperm or beaked whales. Best sensitivities range from 12 kHz in killer whales to over 100 kHz in harbor porpoises (Ketten, 1998) (Figure 3.2-2). No odontocete has been shown audiometrically to have acute hearing (<80 dB re 1 μPa) below 500 Hz (Table 3.2-2, Known Underwater Hearing Sensitivities of Odontocetes).

Table 3.2-2 Known Underwater Hearing Sensitivities of Odontocetes

Species	Underwater Hearing Sensitivity
Sperm whale (*Physeter macrocephalus*)	- Good hearing sensitivity above 2.5 kHz; lower limit of hearing probably 100 Hz
Pygmy and dwarf sperm whales (*Kogia* sp.)	- Best underwater hearing from 90-150 kHz from auditory brainstem response study
Killer whale (*Orcinus orca*)	- Hear sounds from <0.5 kHz to 105 kHz - Maximum sensitivity (+36 dB re 1 μPa) at 20 kHz
Blainville's beaked whale (*Mesoplodon densirostris*)	- No hearing data available
Cuvier's beaked whale (*Ziphius cavirostris*)	- No hearing data available
Short-finned pilot whale (*Globicephala macrorhynchus*)	- No hearing data available
False killer whale (*Pseudorca crassidens*)	- Hear sounds from <1.0 kHz to 115 kHz - Hearing threshold for 75 Hz pure-tone signal is 140.7 ± 1.2 dB, for ATOC signal is 139.0 ± 1.1 dB
Melon-headed whale (*Peponocephala electra*)	- No hearing data available
Risso's dolphin (*Grampus griseus*)	- Hear sounds from 0.75 kHz to 100 kHz - Hearing threshold for 75 Hz pure-tone signal is 142.2 ± 1.7 dB, for ATOC signal is 140.8 ± 1.1 dB
Rough-toothed dolphin (*Steno bredanensis*)	- No hearing data available
Bottlenose dolphin (*Tursiops truncates*)	- Hear underwater sounds from 0.15 kHz to 135 kHz - Behavioral alterations to 400 Hz signal occurred at RLs of 180 dB; no TTS occurred at RLs of up to 193 dB
Striped dolphin (*Stenella coeruleoalba*)	- Hear sounds from <10 kHz to >100 kHz
Spinner dolphin (*Stenella longirostris*)	- No hearing data available
Spotted dolphin (*Stenella attenuata*)	- No hearing data available
Sources: Richardson et al., 1995; Croll et al., 1999; Szymanski et al., 1999; Au et al., 1997; Schlundt et al., 2000.	

Section 4.2.1.2.1, Potential for Masking
Mysticetes (5th paragraph):

During the proposed sound transmissions (mostly 2 percent of the time), sound levels (in the 57.5-92.5 Hz band) in the vicinity of the source, and out to a radius of approximately 10 km (5.4 nm) towards shore (Figure 2.1-7), could be greater than average ambient levels (see discussion of ambient noise in Chapter 2). At these times, masking of communication calls and other environmental sounds which may be important to mysticetes could occur in some portion of the ensonified area if those sounds are in the same frequency band as the NPAL source. *Species in the vicinity of the Preferred or Midway Alternatives that have the potential to be masked (see Figure 3.2-1 for summary of mysticete vocalizations) include blue, fin, sei, Bryde's, minke, northern right and humpback whales.* However, there is virtually no information about the nature and effects of masking under field conditions, nor about the adaptations that marine mammals may use to reduce masking effects. ~~The few~~ *Most* relevant data on masking have come largely from studies of high frequency echolocation by toothed whales. The importance to mysticetes of barely-detectable calls from distant conspecifics is unknown, so the biological significance of masking of faint calls is, likewise, unknown, and may be minor or negligible at most times (Richardson, pers. comm., 1994). Thus, the extent to which masking may occur, or the extent to which mysticetes might be affected by such masking is unknown.

Odontocetes (7th paragraph):

Although low frequency hearing has not been studied in many odontocete species, those species that have been tested (white whale, killer whale, false killer whale, and bottlenose dolphin) exhibit low audiometric and behavioral sensitivity to low frequency sound. It is not clear whether sperm and pilot whale vocalizations were masked by the 1991 *Heard Island Feasibility Test (*HIFT*)* acoustic signals, or if those species simply stopped emitting sounds during the test (Bowles et al., 1994). Vocalization cessation would be expected with sperm whales because they frequently become silent in the presence of human-made noise (Watkins and Schevill, 1975; Watkins et al., 1985). Thus, for sounds dominated by low frequency components, the maximum radius of audibility for most odontocete species often may be determined by their hearing sensitivity, rather than the background noise level. It appears, therefore, that with the possible exception of the sperm and pilot whale*s and bottlenose dolphins (see Figure 3.2-3 for summary of odontocete vocalizations)*, the potential for increased masking for any odontocete, as a result of the proposed sound transmissions, is expected to be minimal.

ADDED REFERENCES:

Au, W. W. L., A. N. Popper, and R. R. Fay. 2000. Hearing by Whales and Dolphins. Springer Handbook of Auditory Research, Vol. 12. Springer-Verlag. 384 p.

Frankel, A. S., J. R. Mobley Jr., and L. M. Herman. 1995. Determining auditory thresholds in free-ranging cetaceans using biologically meaningful sound. *In:* R. A. Kastelein, J. A. Thomas, P. Nachtigall (eds.), Sensory Processes of Aquatic Animals. Pp. 55-70. De Spil Publishers, Woerden, Netherlands.

ISSUE 10: STRANDINGS

Comment: The DEIS did not examine all impacts of the proposed action because it did not include information on strandings related to military sonar (e.g., Simmonds and Lopez-Jurado, 1991; Frantzis, 1998). Reports of strandings in areas close to military activities suggest the serious possibility of harm caused to marine life.

Response: The referenced sonars have signal and operational characteristics very different from those of the Kauai source. For example, in response to the stranding of beaked whales in the Bahamas on March 15, 2000, the Navy and NMFS are investigating the transit of several ships using standard, hull-mounted sonar operating within normal frequency ranges, power outputs, and duty cycles, which are, respectively: 3.5 and 7.5 kHz, 235 dB and lower re: 1 μPa at 1 m, and "pings" of short duration (about one tenth of a second or less duration on a standard duty cycle of 24 seconds). (letter of Mr. Robert B. Pirie, Jr., Department of the Navy, Assistant Secretary of the Navy (Installations and Environment) to Ms. Penelope D. Dalton, Assistant Administrator for Fisheries, NOAA, June 9, 2000). Since these sonars do not have signal and operational characteristics similar to the Kauai source, it is not appropriate for this EIS to analyze those strandings. However, in a review of the California stranding data while the Pioneer Seamount ATOC source was operational, there are no significant changes in the number, frequency, or species composition during that time period (Table RTC-1, California Stranding Data, 1990-1998)

The Pioneer Seamount source began transmitting on December 2, 1995, and continued on an opportunistic basis through November 25, 1998. During that time, there were a total of 1,046 twenty-minute transmissions, with the highest number occurring in 1996. The breakdown by year is as follows: 41 transmissions in 1995, 587 transmissions in 1996, 172 transmissions in 1997 and 246 in 1998.

Table RTC-1 California Stranding Data, 1990-1998

Species	1990	1991	1992	1993	1994	1995	1996	1997	1998
Common Dolphin	23	15	21	28	66	35	30	15	35
Harbor Porpoise	17	11	8	4	8	16	18	26	37
Dall's Porpoise	3		1	1	3	2	2	4	2
Bottlenose Dolphin	9	5	8	8	5	10	3	3	4
Northern Right Whale Dolphin	2					5			
Pacific White-sided Dolphin	6	5	7	1	2	5	1	5	5
Killer whale			1		1		1	1	
Risso's Dolphin	1	5	3	1	1	1	1	2	3
Pygmy Sperm Whale				2		1	2		6
Northern Right Whale						1			1
Stripped dolphin	1	1						1	2
Short finned pilot whale	1								
Unidentified Dolphin	1	7	3	5	11	7	8	16	12
Beaked whale	3	1	2	1	3	0	2	2	4
Sperm whale	1	1	2	2	4			1	
Minke Whale	4		2	2		2	1		1
Gray Whale	11	16	16	11	15	13	13	10	30
Humpback Whale	1		4	6	1	5	1	3	2
Blue whale			1	1			1		
Fin Whale		1		1		1	1	1	1
Unidentified Balaenopertid	1						1	1	
Unidentified Whale	3			3	1	2	1	7	2
Unidentified Cetacean			2		1	1	2	3	
Total	88	68	81	77	122	107	89	101	147

ISSUE 11: HAWAIIAN MONK SEAL

Comment: Since the aerial surveys conducted as part of the MMRP were poorly designed for observing monk seals, additional up-to-date information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal should be incorporated. Recommend obtaining data from Tesoro SPM hose spill response/restoration aerial surveys conducted during 1998-1999, which estimated 16-24 monk seals on Kauai. Recommend including animals inhabiting Niihau in discussion.

Response: It is agreed that the aerial surveys conducted as part of the Kauai ATOC MMRP were not ideal for estimating the abundance or distribution of Hawaiian monk seals. Additional data on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal were incorporated into Section 3.2.2.3 of the FEIS, as shown below.

3.2.2.3 Pinnipeds

The Hawaiian monk seal or ilio-holo-i-ka-uaua (*Monachus schauinslandi*) is *the only pinniped species known to occur within the general study region. This species* occurs only in the Hawaiian Islands, where its greatest distribution is in the small, mostly uninhabited chain of islands and atolls stretching 1100 nm (2037 km) northwest of the main Hawaiian Islands, ~~most~~ *all* of which *except Kure Atoll* are included in the Hawaiian *Islands* National Wildlife Refuge *or the Midway Atoll National Wildlife Refuge* (USFWS, 1984; Tomich, 1986). Hawaiian monk seals are listed as endangered under the ESA and protected under CITES.

The hearing sensitivity of a young male Hawaiian monk seal was studied at Sea Life Park on Oahu (Thomas et al., 1990). Auditory thresholds from 2 to 48 kHz were measured. The resulting audiogram shows a narrow hearing range than for other tested pinnipeds, with the most sensitive region being from 12 to 28 kHz. Below 8 kHz, the monk seal's hearing was less sensitive than other pinniped species.

~~This is the only pinniped species known to occur within the general study region. Monk seals are reported from around the main Hawaiian Islands (USFWS, 1984). They tend to stay near land (Tomich, 1986), and small numbers (1-4) are regularly seen around Kauai and each of the other main Hawaiian Islands (Nitta, pers. comm., 1995). There is a small undetermined population on Niihau.~~ *More than 90 percent of all pups are born at six major breeding colonies located at French Frigate Shoals, Laysan Island, Pearl and Hermes Reef, Lisianski Island, Kure Atoll, and Midway Atoll (MMC, 1999).* Most pups are born between March and May, but pupping has been recorded year-round (U.S. Dept. of Commerce, 1986). ~~A single female gave birth to a female pup on the north coast of Kauai in 1988 (Reeves et al., 1992) and a pup was born in the Poipu Beach area during the summer of 1989 (Naughton, pers. comm., 1990a). There were three monk seal sightings on Kauai in 1993 (Anahola, Kipu Kai, and Kapaa). One monk seal was observed off the north shore of Kauai during recent shore-based MMRP surveys (Smultea et al., 1994). Virtually nothing is known about the distribution and movement patterns of this species when they are at~~

~~sea (Gilmartin, 1983; U.S. Dept. of Commerce, 1986).~~

Counts of Hawaiian monk seals have been made since the late 1950s at the atolls, islands, and reefs where they haul out on the northwest Hawaiian Islands ~~(NMFS, 1991~~ *(Johanos and Ragen, 1999)*. ~~In 1982, the highest count for all atolls was about 50% of those made in 1957-58.~~ ~~NMFS (1991)~~ *Forney et al. (2000)* estimates ~~that currently the monk seal population is slightly more than 1000 animals~~ *the minimum population size for the species is 1436 seals.* ~~By most recent counts, it appears that the population is declining at about 5%/yr (Ragen, pers. comm., 1995). However, based on data collected at the five major haul-outs, the number of births recorded in 1990 declined by 23% from the average annual levels recorded between 1983 and 1989 (NMFS, 1991).~~ *Johanos and Ragen (1999) noted that the age composition of animals counted remains skewed towards adults and expressed concern that reproduction would decrease in the near future if older adult females were not replaced by young females reaching reproductive age.*

~~At the breeding islands, m~~ *M*onk seals *are opportunistic foragers, eating prey as they are encountered. Their diet can consist of* ~~feed on~~ octopus, spiny lobster, eels, bottom fish, and reef fish (Rice, 1960; Gilmartin, 1983). *Recent research (Parrish et al., 2000) fitted 24 adult male seals with a video camera. All documented feeding was directed at demersal and benthic fish, and most prey were caught at depths of 50-100 m (164-328 ft) on the relatively level terraces which are remnant of prehistoric sea-level change. Most of the seals' dives were to the bottom in water 10-100 m (33-328 ft) deep, though 3 of the 24 seals made dives greater than 300 m (984 ft).* ~~Limited data on diving patterns indicate that for adult males about half of their foraging activity is shallower than 35 m (114.8 ft) (NMFS, 1991); however, recent time-depth recorder information from a tagged monk seal revealed that it dove to at least 500 m (1640.5 ft) (Ragen, pers. comm., 1995).~~

On the island of Kauai, "the numbers of adults and numbers of births seem to be clearly on the increase." (Heacock, pers. comm., September 18, 2000). In 1997, Mr. Heacock started the Kauai Monk Seal Watch Program with the cooperation of the county lifeguards, Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), and NMFS. Though there are no published reports, Mr. Heacock noted that the total count of beached monk seals recorded in 1999 by this program was 10-12, with 1 birth also recorded. In August, 2000, NMFS conducted a statewide aerial survey which observed 17 beached seals for Kauai County (Kauai, Niihau, Lehua Rock and Kalua Rock) and 3 births which were all on the island of Kauai (Heacock, pers. comm., September 18, 2000). NMFS normally multiplies their beach counts of seals by a correction factor of 3 to account for animals that may not be observed to obtain a reasonable estimate of the actual population size.

Hawaiian monk seals ~~breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs (Tomich, 1986). They~~ are ~~also~~ known to ~~use~~ *breed at* the Midway Islands, among other northwest Hawaiian Islands (USFWS, 1984). The colony on Midway was virtually eliminated during the active use by the U.S. Navy. However, the beach count of 24 seals in 1998 was the highest since 1960. Furthermore, 11 pups were born at Midway in both 1997 and 1998. Twenty of the 22 pups were successfully weaned (MMC, 1999). These encouraging findings suggest that the seals at Midway may reestablish the atoll as a major breeding site.

ADDED REFERENCES:

Forney, K. A., J. Barlow, M. M. Muto, M. Lowry, J. Baker, G. Cameron, J. Mobley, C. Stinchcomb, and J. V. Carretta. 2000. U.S. Pacific Marine Mammal Stock Assessmemts: 2000. NOAA Technical Memorandum. NOAA-TM-NMFS-SWFSC-300.

Heacock, Don of Kauai DLNR Aquatic Resources, Personal Communication with Dr. Joseph Mobley, September 18, 2000.

Johanos, T. C. and T. J. Ragen. 1999. The Hawaiian Monk Seal in the Northwestern Hawaiian Islands, 1997. NOAA Technical Memorandum NMFS. NOAA-TM-NMFS-SWFSC-262.

Parrish, F. A., M. P. Craig, T. J. Ragen, G. J. Marshall, and B. M. Buhleier. 2000. Identifying diurnal foraging habitat of endangered Hawaiian monk seals using a seal-mounted video camera. Marine Mammal Science. 16(2): 392-412.

Thomas, J., P. Moore, R. Withrow, and M. Stoermer. 1990. Underwater audiogram of a Hawaiian monk seal (*Monachus schauinslandi*). J. Acoust. Soc. Am. 87(1): 417-420.

ISSUE 12: FISH

Comment: 1) The NPAL project is required to address the potential effects of sound on fishes and ecosystems, as well as any effects on fish under the Magnuson-Stevens Act. 2) Believe the statement on page ES-5 that "only the potential for physical auditory effects and behavioral disruption are believed to be of any significance" misleads the reader to conclude that impacts could be significant in other respects. 3) Because of the limited information on hearing for marine fish species, the DEIS is unable to adequately address direct, indirect, and cumulative effects (see p. ES-8).

Response: 1) The NPAL DEIS did address the potential effects of sound on fishes and ecosystems in Section 4.2.1.2.3. Potential effects on fish under the Magnuson-Stevens Act were summarized in Section 1.3.4 and fully addressed in Section 4.2.5 of the DEIS. To emphasize this for the reader, the following edits were made to Section 1.3.4 to direct the reader to Section 4.2.5 for further details and to include the conclusion reached in Section 4.2.5 for the potential for effects to essential fish habitats.

> **1.3.4 The Magnuson-Stevens Fisheries Conservation and Management Act**
>
> The Magnuson-Stevens Fisheries Conservation and Management Act (16 USC §§ 1801-1861) addresses the *sustainability* of fish stocks through risk-averse management practices and habitat protection, including the designation of essential fish habitat. Federal agencies must consult with NMFS on activities which may adversely affect essential fish habitat. This issue is being addressed through the NEPA review process *(see Section 4.2.5 for the full discussion). There is no indication that the proposed project would reduce the quality and/or quantity of essential fish habitat.*

2) It is agreed that the cited sentence could be clearer. The following sentence replaces it in the FEIS.

> ~~Though s~~Several potential effects due to source transmissions are discussed, including the potential for physical auditory effects, behavioral disruption, habituation, masking, long-term effects, and indirect effects. ~~only the potential for physical auditory effects and behavioral disruption are believed to be of any significance.~~

3) There is sufficient information on fish species to estimate the potential for direct, indirect and cumulative effects. The statement in the DEIS is that "Little information on hearing exists for the marine fish species in the vicinity of the proposed sites." This is not meant to imply that insufficient information exists to estimates potential effects on fish species. To clarify this for the reader, the first two sentences of the cited paragraph will be modified as follows.

> *Though little* ~~Little~~ information on hearing exists for *the particular* marine fish species in the vicinity of the proposed sites, *sufficient research on fish and their hearing mechanisms allows fish species to* ~~However, fish species can~~ be grouped into two categories *to estimate potential effects*: "specialists" that have specializations that

enhance their hearing sensitivity, and “nonspecialists” that do not possess such capabilities.

ISSUE 13: CUMULATIVE EFFECTS

a. PHYSICAL ENVIRONMENT

Comment: Section 4.1 covers the potential effects on the physical environment, but fails to consider the impact these cumulative disruptions may have together.

Response: This is an important issue, and within the limits of existing knowledge, the EIS has devoted substantial discussion to this issue. The construction and removal of facilities (Section 4.1.2.1) and the underwater sound generated by the source (Section 4.1.2.2) are anticipated to have only negligible cumulative impact on the physical environment with other past, present, and reasonably foreseeable future activities.

ISSUE 13: CUMULATIVE EFFECTS
b. FEDERAL REQUIREMENTS

Comment: The DEIS does not address the project's potential cumulative impacts within the framework of the Council on Environmental Quality's guidance to federal agencies, ***Considering Cumulative Effects Under the National Environmental Policy Act***, issued in 1997.

Response: Scripps and ONR believe that the principles of cumulative effects analysis discussed in the handbook are included in the cumulative effects analyses of the DEIS. Cumulative effects are addressed in terms of the aggregate of past, present, and reasonably foreseeable future actions, and both direct and indirect effects are discussed for each identified resource. As the handbook recommends, cumulative effects are limited in geographic and time scope to allow a meaningful evaluation. The reader is referred to Section 4.1.2 for potential cumulative effects on the physical environment, Section 4.2.2 for potential cumulative effects on the biological environment, Section 4.3.2 for potential cumulative effects on the economic environment, and Section 4.4.2 for potential cumulative effects on the human environment.

ISSUE 14: ATOC MARINE MAMMAL RESEARCH PROGRAM (MMRP)
a. METHODOLOGY

Comment: 1) On p. 4-10, *Behavioral Measures*: Clarify the received level that animals were exposed to during the MMRP experiments. 2) No studies were done on the physiological or psychological reaction of humpback whales to sound; therefore, the MMRP was inadequate. Scientists working with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these animals. Do ATOC researchers have similar techniques? 3) Feel that the methods used in the MMRP were primitive, and that the MMRPs were not planned ahead to address the questions that needed to be answered to determine if animals were being affected.

Response: 1) Several studies of the behavioral responses of humpback whales and elephant seals are being discussed in the referenced paragraph. The playback study on humpback whales conducted in 1996 with ATOC-like signals was limited to maximum received levels of 130 dB. In contrast, the studies on free-ranging animals (both humpback whales and elephant seals) were conducted with a fully operational ATOC source, and the received levels at the observed animals could represent a wide spectrum of values. To clarify this for the reader, the referenced paragraph and a similar paragraph in Section 1.2.2 are revised as shown below.

> Section 4.2.1.2.1:
> *Behavioral measures.* Neither MMRP found any overt or obvious short-term changes in the behavior of humpback whales *in response to the playback of ATOC-like sounds, n*or elephant seals *or humpback whales* in response to ~~the playback of ATOC-like sounds or to~~ transmissions of the ATOC sound sources. *Northern elephant seals tagged with satellite, swim-speed, time-depth, and acoustic data loggers were released seaward of the operating California ATOC source, and their return to Año Nuevo rookery was studied. No statistically significant changes were found in any behaviors measured (Costa et al., 1998).* In 1996, the behavioral responses of humpback whales to the playback of ATOC-like signals (maximum received level of 130 dB) were studied. Humpback whales showed no overt responses to these ATOC playbacks (Frankel and Clark, 1998). By contrast, the single playback of a humpback whale feeding call provoked dramatic changes similar to those seen in previous playback experiments (Mobley et al., 1988). In 1998, the behavior of humpback whales *during transmissions from the fully-operational Kauai ATOC source* was observed from a shore-station on the north coast of Kauai ~~while the Kauai ATOC source was transmitting~~ (Frankel and Clark, ~~1999a~~*2000*~~) and compared to observations made during 1994 when the Kauai ATOC source was not transmitting (Frankel and Clark, 1999b~~). Intensive statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; Frankel and Clark, ~~1999b~~*2000*). Both studies found that the distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing sound levels. This result is not what would be predicted, in that if the animals were stressed by the sound source, it might be expected that they would remain at the surface longer because of the lower received

levels there. Longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors measured.

Section 1.2.2:
Behavioral measures. During the MMRPs conducted in both California and Hawaii, there were no observations of overt or obvious short-term changes in the behavior of humpback whales *to the playback of ATOC-like sounds,* nor elephant seals *or humpback whales* in response to ~~the playback of ATOC-like sounds or to~~ transmissions of the ATOC sound sources. Intensive statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; Frankel and Clark, 2000). The study results showed that the distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing sound levels. This result is not what would be predicted, in that if the animals were stressed by the sound source, it might be expected that they would remain at the surface longer because of the lower received levels there. Longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors measured.

2) Studies of direct physiological or psychological reactions require captive specimens. With large marine mammals, this is typically not an option for research. Therefore, the best available methods include indirect estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the Kauai ATOC MMRP. These are the techniques supported throughout the marine mammal community, and approved during reviews of the ATOC MMRP protocols. (see further discussion of the review of the MMRP protocols in the response to Issue 14a Comment 3).

3) Scripps and ONR disagree with the comment. The protocols of both the Kauai and California ATOC MMRPs were developed by the leading marine mammal scientists who conducted the studies. Before any studies were conducted, the protocols were reviewed by the National Marine Fisheries Service and the ATOC MMRP Advisory Board, as well as being available for public comment in the ATOC DEIS. The MMRP Advisory Board included leading marine mammal scientists, as well as representatives from the National Marine Fisheries Service, the National Marine Sanctuaries Program, the Marine Mammal Commission, the Hawaii Department of Land and Natural Resources, and leading environmental organizations.

ISSUE 14: ATOC MARINE MAMMAL RESEARCH PROGRAM (MMRP)
b. RESULTS AND CONCLUSIONS

Comment: 1) Need to include the results from Mobley's aerial surveys conducted during the 2000 humpback season. 2) The statement that there were no significant changes in abundance is in marked contrast to the changes in distance from the source reported in Popper et al., 2000 (appropriate citation is National Research Council, 2000). 3) Limited statistically significant effects were observed in the Kauai ATOC MMRP, but researchers do not know what these effects signify. Need to offer more complete research data before minimal or no impacts claims can be substantiated. 4) Not confident that the correlation between ATOC testing and marine mammal responses, or lack thereof, were of sufficient scope to delineate long-term and chronic effects on humpback whales.

Response: 1) Dr. Mobley has not prepared a preliminary report on the results from his aerial surveys conducted during the 2000 humpback season (Mobley, pers. comm., September 14, 2000). However, Dr. Mobley did provide a figure of the humpback whale sightings in the Kauai/Niihau area (Figure RTC-2, 2000 Humpback Whale Season Aerial Survey Results: Humpback Whales Sighted in the Kauai/Niihua Area). There were 34 sightings of humpback whales (8.5 whales/survey) within the 40-km radius around the source compared to 28 sightings (7whales/survey) in 1998 and 48 sightings (5.3 whales/survey based on 9 surveys) in 1994.

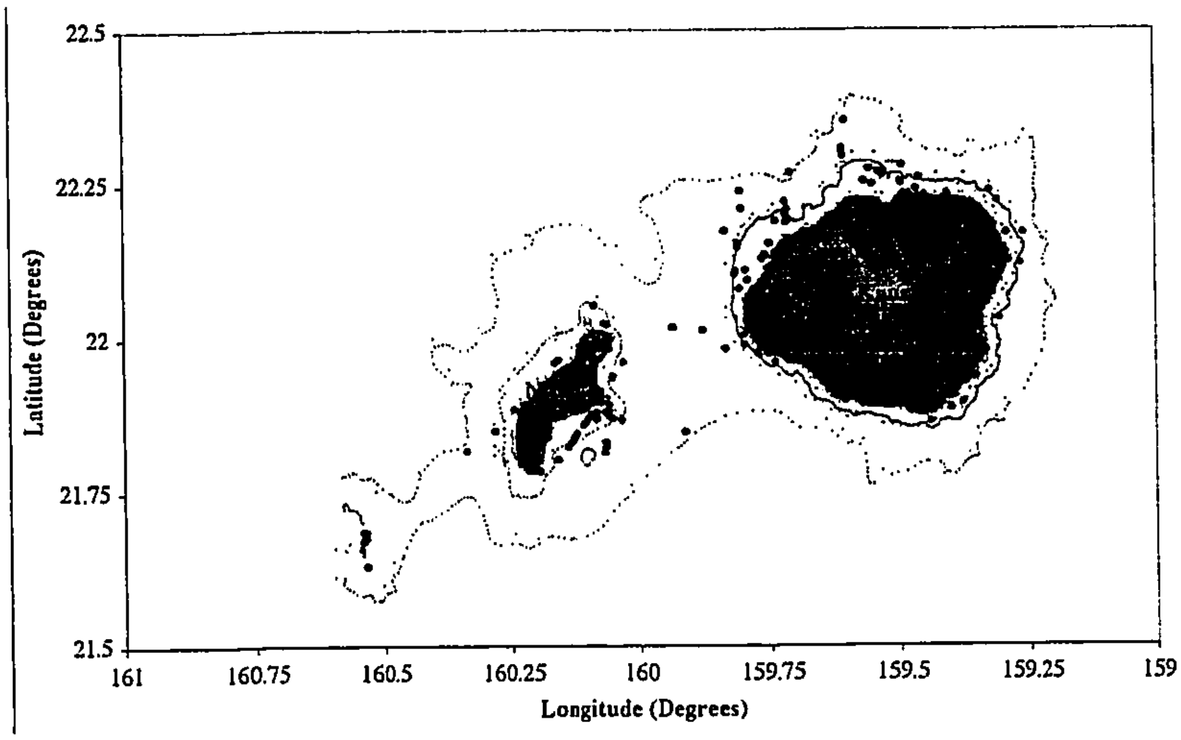

Figure RTC-2 **2000 Humpback Whale Season Aerial Survey Results: Humpback Whales Sighted in the Kauai/Niihau Area**

2) The commenter is confusing two separate measures of behavioral response, that of distributional shift and of change in abundance. As stated in the DEIS, there were no significant changes in abundance for any species. However, intensive statistical analyses of aerial survey data showed some subtle shifts in the distribution of humpback (and possibly sperm) whales away from the Pioneer Seamount source during transmission periods.

3) The NPAL project is proposing to continue transmissions under a Letter of Authorization that includes annual reporting to the National Marine Fisheries Service. These annual reports will include analyses of aerial surveys conducted to monitor for short-term or acute effects, and potential long-term cumulative effects. Therefore, more complete research data would continue to be obtained during the proposed project.

4) The research conducted under the ATOC MMRPs was not designed to address long-term or chronic effects on any species, and was never stated as such. This is the main purpose of the marine mammal monitoring and studies proposed as part of the NPAL project.

ADDED REFERENCES:

Mobley, Dr. Joseph of University of Hawaii. Personal Communication with Ms. Kathleen Vigness Raposa, September 14, 2000.

National Research *Council. 2000.* Marine Mammals and Low-Frequency Sound: Progress Since 1994. National Academy Press. Washington, D.C.

ISSUE 15: INSUFFICIENT KNOWLEDGE OF POTENTIAL EFFECTS

a. SHORT-TERM EFFECTS

Comment: There is a general lack of scientific knowledge regarding the impacts of sound on marine mammals. Very little is known about beaked whales; they have shown an adverse reaction to low frequency sounds. The NPAL project should consider all comments received by NMFS regarding the LWAD 00-2 OEA; all comments received by the Navy regarding the DEIS for LFAS deployment, particularly comments related to the LFS SRP; results from Woods Hole report on changes in humpback song length as suggestion that breeding behavior is affected at received levels of 140 dB.

Response: While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, an extensive investigation into the potential effects of the Kauai sound source was conducted during the ATOC MMRPs, whose results are summarized in Chapter 1. As the results from the MMRPs suggest, the proposed project would not result in biologically significant acute or short-term effects; however, the proposed project would include marine mammal monitoring and studies to continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source. No odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds. Comments regarding Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) are for systems substantially different from the Kauai source, and therefore are not relevant to discussions of potential impacts from this sound source. The final reports of the marine mammal research conducted as part of the LFS SRP have not been published in peer-reviewed journals. Any preliminary results discussed in the Low Frequency Sound Scientific Research Program Technical Report were included in the DEIS. As that research is published, it will be included in the analysis of potential effects of low frequency sound on marine mammals. As such, the FEIS has been modified to include reference to the paper by Miller et al. (2000) which was not available prior to the release of the DEIS. The revised paragraph discussing the results of the third phase of the LFS SRP research in subsection "Determination of Risk Function" in the subsection "Risk Continuum Analysis" of Section 4.2.1.2.1 follows below.

> The third phase of LFS SRP research examined potential effects of LF transmissions on singing humpback whales. *In five of 18 playbacks of LF transmissions,* ~~These~~ the whales ~~showed some apparent avoidance responses and cessation of song occurring at RLs ranging from 120 to 150 dB~~ *stopped singing, presumably in response to the playback (Miller et al., 2000).* However, ~~an equal number of~~ *during 9 of the 18 playbacks*, singing whales exposed to the same levels *(RLs ranging from 120 to 150 dB)* showed no cessation of song. Further analysis is required to establish how often male humpbacks stop singing in the absence of the LF transmissions and to evaluate the significance of the song cessation observed during playbacks. Of the whales that did stop singing, there was little response to subsequent pings. Most joined with other whales or resumed singing within less than an hour of the possible response. *For six whales where at least one complete song was recorded, on average,*

humpback whales' songs were 29 percent longer during LF playback, but returned to normal after exposure (Miller et al., 2000). The authors suggest that humpbacks sang longer songs during LF transmissions to compensate for acoustic interference.

ADDED REFERENCE:

Miller, P. J. O., N. Biassoni, A. Samuels, and P. L. Tyack. 2000. Whale songs lengthen in response to sonar. Nature 405: 903.

ISSUE 15: INSUFFICIENT KNOWLEDGE OF POTENTIAL EFFECTS
b. LONG-TERM EFFECTS

Comment: The long-term effects of ATOC/NPAL are not known for any protected species, nor are effects on breeding patterns or on marine mammal fetuses in utero.

Response: Although the MMRP did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. The NPAL marine mammal monitoring and studies would focus on possible long-term effects from the sound transmissions on marine life. The aerial surveys would monitor the distribution and abundance of marine mammals and sea turtles in the vicinity of Kauai and Niihau (see the revised Section 5.2 included as part of the response to Issue 17a Comment 1 for further details) in order to advance the understanding of the potential for long-term effects from the acoustic transmissions. Answers to the questions about breeding and reproduction would be addressed in that context.

ISSUE 16: MITIGATION MEASURES

a. TRANSMISSION CHARACTERISTICS OF SOUND SOURCE

Comment: Believe mitigation measures 1 and 3 are erroneous and misleading because they are an economic decision and are not included for the welfare or conservation of the species involved.

Response: Scripps and ONR disagree with this comment. The proposed transmission schedule meets the purpose and needs described in the DEIS; however, by restricting the duty cycle to 2 percent for 10 months and 8 percent for 2 months each year, the project is limited in the amount of data that can be collected. If considerations for the project design were limited to the scientific aspects of the project, increased duty cycles would be preferred. Section 2.1.3.2 of the DEIS discusses the considerations that were made for a source level necessary to meet the purpose and need of the proposed project. By constructing a 20-min signal, the energy of the transmission is spread over time, at much lower source levels, than if the signals were sent as short, loud pulses of the same total energy. If considerations for the project design were limited to the scientific aspects of the project, increased source levels would be preferred to give improved signal-to-noise ratios at the receivers. The acoustic source is capable of transmitting at higher power levels than those used during ATOC and proposed for NPAL.

ISSUE 16: MITIGATION MEASURES
b. RAMP-UP

Comment: There is no research that demonstrates that animals can, or will, leave a specific area even if sound levels are damaging. Studies to validate ramp-up as a mitigation measure are necessary.

Response: While it is recognized that ramp-up may not be an effective mitigation tool, until such time as there is an indication that it is not effective, Scripps, the Navy, and NMFS prefer to err on the side of caution and to incorporate ramp-up into mitigation programs whenever possible. The Minerals Management Service has contracted for studies on ramp-up effectiveness, so it is possible that this issue may be resolved in the near future. Estimates of potential effects included in the DEIS were not reduced to account for the effectiveness of ramp-up as a mitigation measure.

ISSUE 17: MONITORING PROGRAM
a. <u>METHODS OF MONITORING STUDIES</u>

Comment: 1) Include sufficient details of the monitoring program to assess whether the program will be capable of detecting possible project-related changes in distribution, abundance, or productivity. For example: how will aerial surveys be conducted, what area(s) will be surveyed, what is the duration of the studies, what effects are you looking for, what level of change is the monitoring program designed to detect. Aerial surveys should be run at least an average of once per week during the humpback breeding season, rather than the once per month as stated. 2) Suggest using the hydrophone arrays and processing equipment that detect and analyze the source transmissions to gather information on population distribution and abundance. Develop a partnership with PMRF to monitor vocalizations on their arrays before, during, and after NPAL transmissions to collect data on potential effects. Compare vocalizations before, during, and after to resolve masking issue. 3) Recommend studying auditory organs, then the physiological responses to a range of acoustics before conducting behavioral studies of responses to potentially harmful sounds. 4) Continue to monitor for immediate, acute effects.

Response: 1) Section 5.2 was extensively expanded to address the level of detail requbsted during the public comment period. The part of the revised section pertaining to the Marine Mammal Monitoring and Studies follows.

5.2 MONITORING TO PREVENT LONG-TERM EFFECTS TO MARINE ANIMALS

The following monitoring measure to prevent adverse changes in distribution and abundance to marine animals would be conducted as a component of the proposed action:

Monitoring Measure 1: The focus of the Marine Mammal Monitoring Studies is to advance the understanding of the potential for long-term effects of man-made sound on marine mammals by monitoring the distribution and abundance of marine mammals in the vicinity of the sound source.

~~The Marine Mammal Monitoring Studies element of the proposed action is designed to advance the understanding of the potential for long-term effects of the sound transmissions on marine life through the conduct of aerial surveys in the vicinity of the sound source. Thus, ONR would seek answers to the most important scientific issues surrounding potential long-term effects: animal abundances and distribution. A total of four aerial surveys would be conducted during each humpback whale season. The Marine Mammal Monitoring Studies would have four components:~~

- ~~data analysis: NPAL abundance and distribution data would be statistically analyzed and compared with those data collected during the Kauai ATOC Marine Mammal Research Program (MMRP);~~

- ~~data reporting: NPAL aerial survey results, data compilations and findings would be published in reports (documents and/or electronic versions);~~

- ~~data sharing: ONR/Scripps would make all published reports available in the public domain. Information from the Marine Mammal Monitoring Studies would be provided annually to NMFS for review; and~~

- ~~data monitoring: Marine mammal stranding data in Hawaii would be monitored for any long-term trends.~~

During the years 1993-98, aerial surveys of marine mammals resident in the waters surrounding Kauai were performed as part of the ATOC Marine Mammal Research Program (ATOC MMRP), with focus on endangered humpback whales. Data were collected during the humpback winter breeding season (Feb-Apr) for a total of three baseline years when the Kauai ATOC source was not transmitting (1993, 1994, and 1995) and for one year when it was transmitting (1998). An additional year of baseline surveys was conducted in the area off the north shore of Kauai during the 2001 humpback winter breeding season.

In order to maintain a basis of comparison with previous Kauai surveys, the proposed survey protocol would follow the protocol used in the earlier 1993-98 surveys (Mobley et al., 1999b). North-south tracklines spaced 7 nm apart would be projected within a 40-km radius of the ATOC source (Figure 5-1, Tracklines Used During the 1998 ATOC MMRP Aerial Surveys). One or two additional lines spaced 3.5 nm apart would be added in the immediate vicinity of the Kauai source. Sightings of all marine mammal and sea turtle species would be made by two experienced observers, one on each side of the aircraft. Sightings would be called to a data recorder who would note the species sighted, number of individuals, presence or absence of a calf, angle to the sighting, and any apparent reaction to the aircraft. Additionally, GPS locations and altitude (measured by a radar altimeter) would be automatically recorded at 30-sec intervals and whenever a sighting is made.

The NPAL project proposes to conduct eight surveys from February through early April. The surveys would be scheduled eight days apart to match the NPAL transmission schedule. Based on an average of seven humpback sightings per survey observed during the 1998 season, and assuming a moderate sized effect due to the NPAL transmissions, eight surveys should produce a minimum of 56 sightings of humpback whales, which would result in an estimated power of .80 (i.e., there would be an 80% probability of detecting a change in distribution if an effect is present)

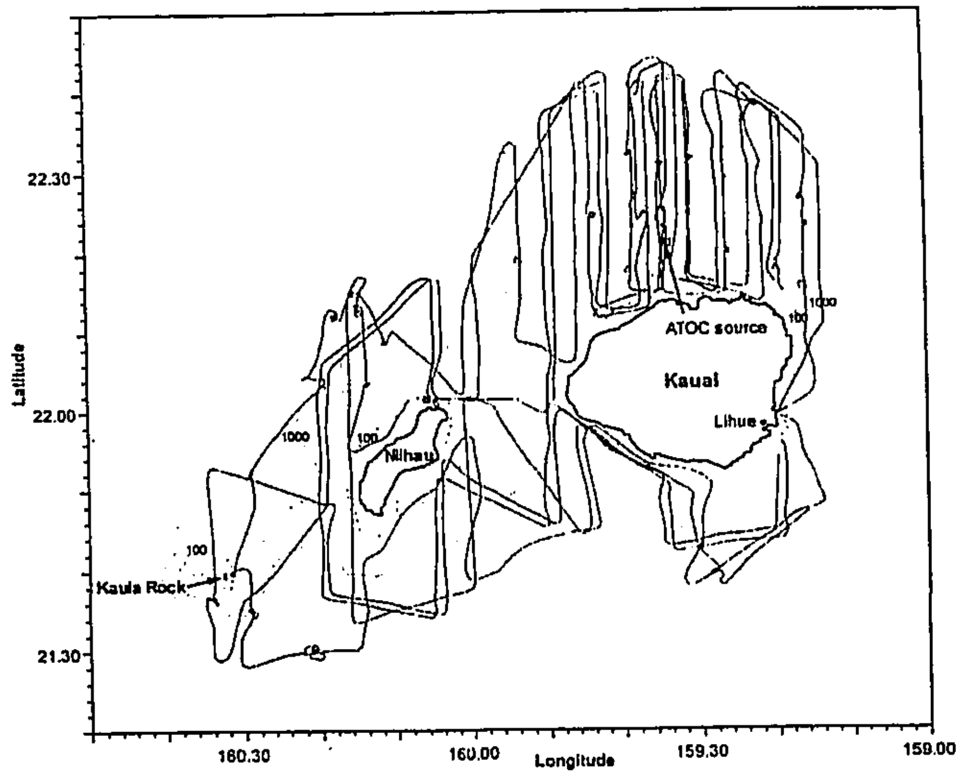

Figure 5-1 ***Tracklines Used During the 1998 ATOC MMRP Aerial Surveys***
North-south tracklines were placed 13 km apart to cover a 40-km radius around the ATOC source. Tracklines for the Marine Mammal Monitoring and Studies for the NPAL project would be based on the same design as shown here.

(Welkowitz et al. 1991). The estimate of 56 sightings is presumed to be a minimum, given previously reported evidence that the Hawaiian wintering population of humpback whales is increasing (Mobley et al., 1999a;1999c).

As described in detail in Chapter 1, the purpose of the Marine Mammal Monitoring and Studies is to conduct studies on the possible long-term effects from sound transmissions on marine life. Annual reports of the results obtained would include numbers and locations of all marine mammal and sea turtle sightings. The annual report would be submitted to NMFS as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the HIHWNMS. For humpback whales, any apparent avoidance reactions in response to the NPAL source would be assessed by examining distance from the source to each sighting as well as distance offshore, based on GPS position data.

The Marine Mammal Monitoring and Studies would also continue to monitor for acute, short-term effects, even though none were observed during the ATOC MMRP. Visual aerial surveys are capable of detecting the following acute or short-term effects:

- *Animal dead or disabled (primary capability)*
- *Increase in number of beached animals (potential/limited capability)*
- *Increase in number of animals struck by vessels (potential/limited capability)*
- *Repeated/prolonged activity (blowing, time on surface, etc.) (potential/limited capability)*
- *Abnormal number of animals present/absent (primary capability)*
- *Abnormal mother-calf activity (potential/limited capability)*

If at any time a Marine Mammal Monitoring and Studies team member positively identifies the occurrence of an acute or short-term effect, the information would be immediately communicated to the Marine Mammal Monitoring and Studies leader (Dr. J. Mobley, University of Hawaii). If the leader ascertains that an acoustic transmission (i.e., during the 5-min ramp-up or the 20-min transmission) coincided with the observed effect, he would contact the Barking Sands shore termination site and Scripps, and suspend source operations immediately until further notice. The leader would collate all pertinent information relative to the incident and contact NMFS to inform them of the situation. NMFS, in consultation with the leader, would make the determination as to the severity of the situation, based upon the knowledge of the species type, the animal's location relative to the source, the source level at the time of the incident, the estimated received level at the animal, whether there were any other noise sources in the vicinity, etc. Based upon analysis of the information supplied, NMFS would recommend that one of the following options be executed:

- *Continue experiment as planned;*
- *Continue experiment with modifications to maximum source level or duty cycle; or*
- *Suspend experiment pending consultation with NMFS*

Regardless of the decision, within 24 hours, a written summary of the incident would be forwarded to ONR, Scripps, and NMFS.

2) The arrays that receive the source transmissions are located at distances on the order of 1000 to 5000 km (540-2700 nm) from the Kauai source. At such distances, it is inappropriate to correlate changes in a population's distribution and abundance with the Kauai source transmissions. Similarly, the facilities of PMRF are located in an area where the received levels from the Kauai source are too low to study the potential acoustic impact of source transmissions on marine mammals. The potential for masking was studied during the Kauai ATOC MMRP, and is included in the summary of the MMRP results in Chapters 1 and 4. The potential effects of masking on marine mammals are discussed in Section 4.2.1.2.1 of the DEIS. The Kauai ATOC MMRP did not find any overt or obvious short-term changes in the singing behavior of humpback whales in the vicinity of the sound source. In addition, no statistically significant changes in the underwater sound output from humpback whales in one of the frequency bands in which they vocalize was found in the vicinity of the Kauai source. Therefore, it is estimated that the potential for effects from masking would be minimal, and no further studies associated with the Kauai source are required.

3) It is an ideal sequence to be able to investigate auditory organs, then the physiological responses to a range of acoustics before conducting behavioral studies of responses to potentially harmful sounds. However, to collect auditory organs requires relatively recently deceased specimens, and physiological tests require captive animals, both of which are rare occurrences for most marine mammals. Furthermore, studies conducted as part of the ATOC MMRPs demonstrated that all of the detected effects were subtle and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population.

4) The Marine Mammal Monitoring and Studies would continue to monitor for acute or short-term effects. The protocol for this is detailed in the revision of Section 5.2 provided as the response to Issue 17a Comment 1.

ISSUE 17: MONITORING PROGRAM

b. ANALYSIS OF MONITORING STUDIES DATA

Comment: 1) What are the baseline control data to compare the monitoring results against? 2) Indicate the level of changes that, if observed, would trigger a review, suspension, and termination of the project. Include details of what would be done if observed effects of transmissions were determined to be detrimental. How long would analyses take before results would be available for altering the transmission schedule.
3) Recommend an external, independent review of the monitoring program annually. Consult with NMFS to determine if existing Hawaii scientist coordination meetings would be appropriate. Include the HIHWNMS in the annual review.

Response: 1) As described in the revised Section 5.2 (see the response to Issue 17a Comment 1), data were collected during the humpback winter breeding season (Feb-Apr) for a total of three baseline years when the Kauai ATOC source was not transmitting (1993, 1994, and 1995). An additional year of baseline surveys is expected to be conducted in the area off the north shore of Kauai during the 2001 humpback winter breeding season.

2) As described in the revised Section 5.2 (see the response to Issue 17a Comment 1), protocols similar to those during the ATOC project would be followed for the review, suspension, and termination of the project. If at any time a Marine Mammal Monitoring and Studies team member positively identifies the occurrence of an acute or short-term effect, the information would be immediately communicated to the Marine Mammal Monitoring and Studies leader (Dr. J. Mobley, University of Hawaii). If the leader ascertains that an acoustic transmission (i.e., during the 5-min ramp-up or the 20-min transmission) coincided with the observed response, he would contact the Barking Sands shore termination site and Scripps, and suspend source operations immediately until further notice.

3) As described in the revised Section 5.2 (see the response to Issue 17a Comment 1), annual reports of the results obtained would include numbers and locations of all marine mammal and sea turtle sightings. The annual report would be submitted to NMFS as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the HIHWNMS. For humpback whales, any apparent avoidance reactions in response to the NPAL source would be assessed by examining distance from the source to each sighting as well as distance offshore, based on GPS position data.

ISSUE 17: MONITORING PROGRAM
c. TARGET SPECIES OF MONITORING STUDIES

Comment: The number, methods and schedule of suggested surveys do not allow for a rigorous assessment of the potential for long-term impacts on other protected species that utilize the area year-round. Need to include information on how monitoring of other mammals (monk seals, sea turtles, dolphins, etc.) will occur. Should include weekly aerial surveys for the larger species (e.g., humpback whales) complemented with frequent boat-based surveys for the smaller species (e.g., dolphins). Recommend consultation with NMFS and/or USFWS to determine whether marine mammal monitoring program should be broadened to include fish and turtles.

Response: The 8 aerial surveys planned for the Marine Mammal Monitoring and Studies would be conducted between February and early April at intervals of 8 days. While humpback whales are the target species of these aerial surveys, all marine mammal and sea turtle species that are sighted are recorded in the data log. This was also the case for the 1993-1998 ATOC MMRP aerial surveys, from which the results included as Table 3.2-1 of the DEIS list all species seen during the flights. Species other than humpback whales are not sighted at a sufficient frequency to conduct statistically significant analyses of aerial survey data to assess the potential for long-term impacts. Boat-based survey for smaller species (e.g., dolphins) and broadening the marine mammal monitoring program to include fish (the aerial surveys already note sea turtle sightings) are not an efficient use of the project's resources. Neither small odontocetes nor fish are expected to be sensitive to the Kauai source transmissions. Therefore, the focus of the Marine Mammal and Monitoring Studies is on the species most likely to be affected by the proposed transmissions.

ISSUE 17: MONITORING PROGRAM
d. USE OF HAWAII STRANDING NETWORK FOR MONITORING

Comment: 1) In terms of monitoring cetaceans, the Hawaii stranding network is ineffective due to a lack of public awareness and a lack of coordination with local organizations and residents by NMFS. In addition, species that regularly strand are not the most common species in the area, and thus using strandings to monitor long-term trends in numbers is not necessarily appropriate. 2) The Hawaii stranding network should meet and finalize protocols prior to the initiation of transmissions (recommend including NMFS and HIHWNMS in deliberations). If a correlation between marine mammal strandings and NPAL operations occurs, recommend NPAL immediately modify or stop its operations.

Response: 1) Marine mammal stranding data available in California showed no significant changes during the period when the ATOC Pioneer Seamount source was operating (see data included as part of response to Issue 10). The Hawaii stranding network is therefore not the primary method being proposed to investigate the potential for long-term effects. However, in the unlikely event that a peculiar stranding event or trend does occur, it would benefit all parties, i.e., the NPAL project, the local Kauai contact (Mr. Don Heacock of DLNR Aquatic Resources), and the NMFS-Honolulu contact (Ms. Margaret Dupree), if previous communication had already occurred.

2) Coordination between the NPAL project, Mr. Don Heacock, and Ms. Margaret Dupree would occur prior to the initiation of transmissions. During those communications, appropriate contact information would be conveyed in the unlikely event that a peculiar stranding event or trend occurs during the NPAL project.

ISSUE 17: MONITORING PROGRAM
e. <u>EXPENSES</u>

Comment: Disclose the amount of funds, staff time, equipment, etc. that would be expended on monitoring and mitigation as part of the proposed project.

Response: A total of approximately $300,000 would be expended on the Marine Mammal Monitoring and Studies. This would include approximately $50,000 for the baseline aerial surveys to be conducted of the area off the north shore of Kauai during the 2001 humpback winter breeding season, and $50,000 per year (of the $125,000 per year budget) for the 5 years the source would be transmitting to conduct aerial surveys of the area around Kauai and Niihau (see the response to Issue 17a Comment 1 for a detailed description of the aerial survey protocol).

ISSUE 18: GENERAL

a. UNRESOLVED ISSUES

Comment: Include in Executive Summary and in DEIS a discussion of unresolved issues and how such issues will be resolved.

Response: A discussion of unresolved issues and how such issues will be resolved was included in the Section 4.5.11 of the DEIS. To include a discussion of this topic in the Executive Summary, a new section will be added after the Potential Environmental Effects section, and is included below.

> *UNRESOLVED ISSUES*
>
> *The principal unresolved issue presented by the proposed project is the degree to which LF, subsea sounds could potentially affect marine animals over the long-term (NRC 1994, 1996, 2000). Results from the California and Hawaii ATOC MMRPs, which occurred over a time period of two years, are summarized in Chapters 1 and 4. All of the effects detected by the MMRPs were subtle, of short duration, and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, 1999). The proposed project is reuse of the sound source and cable for an additional five years of transmissions. This EIS acknowledges that the current level of knowledge on potential long-term effects is relatively sparse. Chapter 4 summarizes the scientific evidence relevant to this issue and evaluates potential long-term impacts based upon the ATOC MMRPs data and, when necessary, reasonable extrapolations from that data.*
>
> *The project itself is intended to fill information gaps and reduce uncertainty concerning the possible long-term effects of low frequency sounds on marine animals. The benefits of the proposed project could not be fully realized by any of the other alternatives proposed.*

ADDED REFERENCES:

National Research Council (NRC). 1994. Low-Frequency Sound and Marine Mammals: Current Knowledge and Research Needs. National Academy Press. Washington, D.C.

National Research Council (NRC). 1996. Marine Mammals and Low-Frequency Sound: Progress Since 1994 – An Interim Report. National Academy Press. Washington, D.C.

ISSUE 18: GENERAL
b. SEA TURTLE EXPOSURE TO SOUND LEVELS

Comment: On page ES-8, paragraph 1, there is an incorrect comment about the maximum level of sea turtle exposure. The maximum exposure level for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) assumably will be near the 195 dB source level, with maximum sensitivity for these species estimated at 132 dB on page 4-35.

Response: Prior to the cited sentence in paragraph 1 on page ES-8, it is stated that the maximum dive depths for leatherbacks are > 1000 m (3281 ft), but that no other species of sea turtle are known to dive > 500 m (1591 ft). Therefore, the maximum exposure level for green, olive ridley, loggerhead, and hawksbill turtle would not be near the 195 dB source level, but rather approximately 145 dB if the turtle were to dive directly over the sound source. Thus, the statement that the measured hearing threshold for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) is only slightly lower than the maximum levels to which these species could be exposed is correct.

ISSUE 18: GENERAL
c. POTENTIAL FOR INDIRECT EFFECTS

Comment: The DEIS overlooked the potential impacts on the marine ecosystems structure and function (e.g., the effect on the abundance and biomass of fish that are the prey of monk seals).

Response: The EIS provides a statement and analysis of the proposed action's potential environmental effects, mitigation measures for avoiding or minimizing effects, and alternatives to the proposed action. Towards this objective, the potential direct, indirect and cumulative effects on fish were included in the DEIS in Sections 4.2.1.2.3 and 4.2.2.2.3. In addition, any potential indirect effects on monk seals, and other marine mammals, were included in Section 4.2.1.2.1. Furthermore, the Magnuson-Stevens Fisheries Conservation and Management Act allows NMFS to review proposed federal activities and their potential effects on designated essential fish habitat. This issue is being addressed through the NEPA review process. There is no indication that the proposed project would reduce the quality and/or quantity of essential fish habitat (see Section 4.2.5 for the full discussion).

ISSUE 18: GENERAL
d. WORD CLARIFICATIONS/CHANGES

Comment: 1) In the section on species screening (Section 3.2.1), clarify the term "physically affected." 2) Suggested word changes: p. 4-17, paragraph 4, sentence "Thus, the 10 $\log_{10}(N)$ formula is considered appropriate for assessing…" suggest change "considered appropriate" to "the best available"; p. 4-18, last paragraph, sentence "The risk continuum estimates that…" suggest change "estimates" to "assumes"; p. ES-6, paragraph 1, sentence "These results demonstrate that only humpback whales near Kauai have a chance for disturbance…" suggest change "demonstrated" to "suggest." 3) Please define acronym HIFT on p. 4-31. 4) Change name of Commanding Officer for PMRF to CAPT Brian W. Moss; Add P.O. Box 128 to his address in the Distribution List (p.9-1). 5) The following libraries were listed twice: Lihue, Lanai, Hanapepe, Molokai, Koloa, Waimea in Appendix C. 6) Explain difference between air and water standards for sound values early on in the text to avoid confusion. 7) Further clarify the sections relating to acoustic modeling and risk analysis for the general public.

Response: 1) The term "physically affected" was an attempt to put in plain English the concept of acoustic impedance mismatches. Since this term was found to be more confusing than the discussion of acoustic impedance mismatches, Section 3.2.1 has been revised as follows.

3.2.1 Species Screening

In order for an animal to be affected by the proposed sound source, the animal must possess (1) some sensory mechanism that allows it to perceive LF sounds or (2) tissue with sufficient acoustic impedance mismatch to be affected by LF sounds. An acoustic impedance mismatch results when two dissimilar media (e.g., seawater and an air-filled cavity) exist side-by-side. The acoustic energy exiting from one medium must be transferred to the other medium. Since the media are dissimilar, the particles in the two media vibrate differently with the same amount of acoustic energy. The difference in the vibrations of these two media may stress or damage any connective tissues or barriers between the two media (Ketten, 1998).

Based on these considerations, a detailed analysis of only those organisms in the proposed or alternate site areas that meet the following criteria was undertaken in this document:

- Does the area receiving sound from the proposed sound source overlap the distribution of this species? If so,
    - ~~Is the species capable of being physically affected by LF sound?~~ Are acoustic impedance mismatches large enough to enable LF sound to ~~have a physical effect~~ *stress or damage any tissues*?
    - Can the species sense LF sound?

2) Each of the suggested word changes was made in the FEIS.

3) The acronym HIFT (Heard Island Feasibility Test) was defined on page 4-31 and included in the Acronyms and Abbreviations list in the FEIS.

4) The name of the new commanding officer and his address were edited in the FEIS as requested.

5) The duplicate libraries were deleted from Appendix C of the FEIS.

6) The following sentences were added at the end of the introduction to the Executive Summary and at the end of the introduction to Chapter 1 to encourage readers unfamiliar with underwater sound to read Appendix A prior to reviewing the EIS. Beyond mentioning that there is a difference between air and water standards, however, Appendix A does not go into further detail since it is not as simple as converting the reference values.

> *An understanding of the basic principles of subsea sound is important for assessing the material included in this EIS. Therefore, readers unfamiliar with subsea sound are referred to Appendix A for a summary of fundamental knowledge.*

7) Revisions were made to the sections on acoustic modeling and risk analysis as part of the response to other comments. These modifications were aimed at clarifying these sections for the reader.

ISSUE 18: GENERAL
e. LITERATURE CITED

Comment: Errors in Literature Cited:
1) 2 papers by Frankel and Clark, 1999 mentioned on page 1-13
2) Frankel and Clark, submitted cited on page 3-5 but not included in Literature Cited.
3) It is not appropriate to cite unpublished reports that are not readily available for public review. For non-peer-reviewed papers and abstracts, describe actual data and analyses. LFS SRP was a series of three short-term studies whose results have not been finalized, and it is therefore premature to consider these as conclusive evidence.

Response: 1) The citation of Frankel and Clark, 1999, on page 1-13; Frankel and Clark, 1999a; and the corresponding reference in the Literature Cited to Frankel and Clark, 1999a (page 8-9) are updated in the FEIS to reflect the new status of this scientific paper, as were all references to this paper throughout the FEIS. The citations on page 1-13 now read "Frankel and Clark, 2000" as do all references to Frankel and Clark, 1999a included in the DEIS, and the corresponding reference on page 8-9 reads as follows.

Frankel, A. S. and C. W. Clark. 2000. Behavioral responses of humpback whales (*Megaptera novaeangliae*) to full-scale ATOC signals. J. Acoust. Soc. Am. 108(4): 1930-1937.

References to Frankel and Clark, 1999b, has been deleted from the FEIS since it has not been published yet (see Comment 18e3).

2) The citation on page 3-5 was corrected in the FEIS to refer to Frankel and Clark, 2000, the published paper described in the above response.

3) It is agreed that it is not appropriate to cite unpublished reports that are not readily available for public review. Every attempt has been made in the FEIS to replace references to materials that are not readily available with technical reports that could be found in a library or are readily available. For example, the citation of Calambokidis et al., 1998, was replaced with Costa et al., 1998, as shown below.

Costa, D. P., D. E. Crocker, D. M. Waples, P. M. Webb, J. Gedamke, D. Houser, P. D. Goley, B. J. LeBoeuf, and J. Calambokidis. 1998. The California Marine Mammal Research Program of the Acoustic Thermometry of Ocean Climate experiment. *In*: Conference Proceedings of California and the World Ocean '97: Taking a look at California's ocean resources: an agenda for the future. O. T. Magoon et al. (eds). American Society of Civil Engineers, Reston, VA. pp. 1542-1553.

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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MANAGEMENT
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RESOURCES ENFORCEMENT
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

July 24, 2000

Dr. Peter Worchester
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Subject: Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory

Dear Dr. Worchester:

The State of Hawaii, Department of Land and Natural Resources, Division of Aquatic Resources, offers for your consideration the following comments regarding the May 2000 Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory (NPAL). These comments focus primarily on aspects of the project that are directly related to DLNR's mandate to manage Hawaii's marine resources, as well as DLNR's responsibility to co-manage the Hawaiian Islands Humpback Whale National Marine Sanctuary in partnership with the National Oceanic and Atmospheric Administration.

17c.

We continue to be concerned about the potential for serious adverse impacts of NPAL on humpback whales, other marine mammals, and sea turtles, especially during their breeding periods in Hawaiian waters. While we recognize the value of ATOC's original marine mammal research program, as well as the marine mammal monitoring studies proposed for NPAL, we believe that a more comprehensive and rigorous research effort is necessary to accurately evaluate the short and long-term impact of NPAL and other low frequency sound transmissions on Hawaii's protected marine species. We suggest, therefore, that a comprehensive marine protected species monitoring program be included as a component of the selected alternative. This program should include weekly aerial surveys for the larger species (e.g., humpback whales) complemented with frequent boat-based surveys for the smaller species (e.g., dolphins).

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5a.

In addition, we note that the study of long-range acoustic propagation was not specified as an objective of the original ATOC project, while it is listed as a one of the objectives of NPAL. This objective is cited as a principal reason why satellite measurement of sea surface temperature is not considered as a viable alternative to the proposed action. A discussion of alternative methods of studying such propagation, including methods that employ existing sound sources (natural and/or anthropogenic), would be useful in evaluating the needs to accomplish the proposed action.

We appreciate the opportunity to provide these comments. If there are any questions, please contact Jeffrey Walters at (808) 587-0106.

Sincerely,

for WILLIAM S. DEVICK
Administrator

cc: Dean Uchida, DLNR, Land Division
Genevieve Salmonson, OEQC
Kathleen Vigness Raposa, Marine Acoustics, Inc.

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LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

William S. Devick, Administrator
State of Hawaii
Department of Land and Natural Resources
Division of Aquatic Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Devick:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested including information on how monitoring of other mammals (monk seals, sea turtles, dolphins, etc.) will occur. You also suggested that the monitoring should include weekly aerial surveys for the larger species (e.g., humpback whales) complemented with frequent boat-based surveys for the smaller species (e.g., dolphins). It should be noted that while humpback whales are the target species of the proposed aerial surveys, all marine mammal and sea turtle species that are sighted would be recorded in the data log, as was done in the 1993-1998 ATOC MMRP aerial surveys (see Table 3.2-1). Species other than humpback whales are not sighted at a sufficient frequency to conduct statistically significant analyses of aerial survey data to assess the potential for long-term impacts. Boat-based survey for smaller species (e.g., dolphins) and broadening the marine mammal monitoring program to include fish (the aerial surveys already note sea turtle sightings) are not an efficient use of the project's resources. Neither small odontocetes nor fish are expected to be sensitive to the Kauai source transmissions. Therefore, the focus of the Marine Mammal and Monitoring Studies is on the species most likely to be affected by the proposed transmissions. These comments are addressed in Issue 17c of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You noted that the need to study long-range propagation was cited as a reason why satellite measurements of sea surface temperature are inadequate, and requested that the FEIS contain a discussion of alternate methods of studying such propagation, including methods that employ existing sound sources (natural and anthropogenic). In order to study long-range propagation, it is necessary to have a controlled sound source that transmits a known waveform designed for that purpose. By knowing the waveform, or structure, of the sound that was sent, and comparing it to the sound received, an interpretation of the effect of the ocean on the variability of transmitted signals can be inferred. Therefore, since the waveform of signals transmitted by natural sound sources are unknown, natural sound sources do not offer a viable alternative for the study of long-range propagation. No anthropogenic sound sources are currently deployed that would meet the purpose and need of the proposed project like the sound source presently in place off the north shore of Kauai. This comment is addressed in Issue 5a of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dr. Jeffrey Simmen, Program Manager
Ocean Acoustics Program
Office of Naval Research, U.S. Navy
800 N. Quincy Street
Alexandria, Virginia 22217

July 17, 2000

Dear Dr. Simmen:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the ***NORTH PACIFIC ACOUSTIC LABORATORY, Island of Kauai, Hawaii*** (CEQ #000165 - #D-USN-K39059-HI). Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Section 309 of the Federal Clean Air Act, and the Council on Environmental Quality's (CEQ) NEPA Implementing Regulations (40 CFR 1500-1508). The lead Federal agency is the U.S. Navy's Office of Naval Research, and the National Oceanic and Atmospheric Administration (NOAA) is a Federal cooperating agency. The State of Hawaii's accepting authority is the Hawaii Department of Land and Natural Resources.

The DEIS analyzes the environmental impacts associated with continued operation for five (5) additional years of the low frequency (LF) sound source, including the seabed power cable, previously installed off the north shore of Kauai, for use in Acoustic Thermometry of Ocean Climate (ATOC) research. The Proposed Action (Preferred Alternative) is to reuse the sound source and cable for the North Pacific Acoustic Laboratory (NPAL), which is an Office of Naval Research basic research project. The proposal entails a second phase of research on the feasibility and value of large-scale acoustic thermometry; long-range underwater sound transmission studies; and marine mammal monitoring and studies. The action would be carried out by the Scripps Institute of Oceanography (University of California - San Diego) and the Applied Physics Laboratory (University of Washington). In addition to the Proposed Action, continued operation of the Kauai source, the DEIS analyzed No Action and an alternate project site at Midway Island (Midway Island Alternative).

Page ES-5 acknowledges several potential effects on marine species from source transmissions. These include potential physical auditory effects, behavioral disruption, habituation, masking, long-term effects, and indirect effects. However, even though page ES-5 asserts that "only the potential for physical auditory effects and behavioral disruption are believed to be of any significance," we believe wording in the DEIS could lead the reader to

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conclude that project-related impacts could be significant in other respects, either directly,
12 indirectly and/or cumulatively. As one key example, the DEIS acknowledges that informational and data gaps exist, such as a recognition (p. ES-8) that "little information on hearing exists for marine fish species in the vicinity of the proposed sites." However, agencies and the public are not informed whether this may have implications in terms of project impacts, either for the marine fish species (a direct impact) or for marine mammals, turtles and/or birds that may feed on the marine fish species (an indirect impact). Because little information exists on how the
18 project could affect populations of various marine fish species (due to potential impacts on their hearing), we question whether reliable information can be derived, and presented for review under NEPA, on how other species (turtles, marine mammals, birds) may be indirectly affected should the project have an adverse effect on marine fish species, to the extent that such species rely upon marine fish species for food. We believe that, at a minimum, the Final EIS (FEIS) should acknowledge that this question is one requiring clearer resolution as project planning and implementation moves forward.

In addition to the deficiency noted above regarding direct and indirect impacts, the DEIS does not address the project's potential cumulative impacts within the framework of the Council on Environmental Quality's guidance to Federal agencies, ***Considering Cumulative Effects Under the National Environmental Policy Act***, issued in 1997. (The DEIS correctly provides
13b the Council on Environmental Quality's definition of cumulative impacts, e.g., at section 4.1.2 of the DEIS). We strongly recommend that, for each impact area analyzed in the DEIS, the Navy re-examine the project's cumulative impacts in light of CEQ's guidance to Federal agencies on this matter.

In light of the uncertainties regarding the totality of direct, indirect and cumulative effects, we strongly recommend that the Navy seek a project approval/authorization for a period less than the five (5) years contemplated under the Proposed Action (Preferred Alternative). We believe that continued operation for 24 to 36 months would be a more preferable option. During
4a this period of 24-36 months, data on the project's direct, indirect and cumulative effects on marine life should be gathered and evaluated by the Navy and its Federal cooperating agency (NOAA), in order to determine the effects of multi-year exposure to acoustic research. An approval period of 24 to 36 months enables the Navy to more readily modify the project should significant, adverse effects on marine species (mammals, fish, turtles, seabirds) be detected, whether such impacts are direct, indirect or cumulative.

In terms of mitigation and monitoring, we concur that marine mammal monitoring and studies should be an integral component of the Proposed Action. However, in view of significant uncertainties regarding the proposal's direct, indirect and cumulative effects on other species (e.g., the statement on page ES-8 on how hearing in fish species could be affected), we
17c recommend that the Navy determine, in consultation with the National Marine Fisheries Service and possibly U.S. Fish and Wildlife Service, whether the marine mammal monitoring program should be broadened to address the project's effect on other species as well (fish and turtles). We request that appropriate commitments in this regard be reflected in the FEIS and the Navy's Record of Decision under NEPA.

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Page ES-4 indicates that, should No Action be selected, "alternate techniques for detecting quiet acoustic sources would need to be utilized and/or developed." We interpret this statement to imply that there may be purposes for the proposed research besides climate-related research. Although NEPA does not preclude the Navy from utilizing the information gathered from this project for other purposes, we believe that the FEIS should more clearly state what applications (such as military applications) could or would be derived from this research. This would serve to facilitate effective, full public disclosure as required by NEPA. We also recommend that the phrase "quiet acoustic sources" be defined in the FEIS. 2

Based upon our review, we rate the document as EC-2, Environmental Concerns - Insufficient Information. Please refer to the "*Summary of Rating Definitions and Follow-Up Action*" (attached) for a detailed explanation of EPA's rating system. We appreciate the opportunity to comment on the DEIS. Please send one copy of the FEIS to me (code: CMD-2) at the letterhead address when it is filed with EPA's Washington, D.C. office. If you have any questions regarding our comments, please contact David Tomsovic of my staff at 415-744-1575.

Sincerely,

Laura Fujii for

David Farrel, Chief
Federal Activities Office

Attachment: "*Summary of Rating Definitions and Follow-Up Action*"

cc: NOAA, National Marine Fisheries Service, Office of Protected Resources, 1335 East-West Highway, Silver Spring, Maryland 20910

SUMMARY OF EPA RATING DEFINITIONS

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This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

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LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

David Farrel, Chief
Federal Activities Office
United States Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Farrel:

Thank you for your July 17, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that the statement "only the potential for physical auditory effects and behavioral disruption are believed to be of any significance" on page ES-5 misleads the reader to conclude that impacts could be significant in other respects. We agreed that the cited sentence could be clearer and replaced it in the Final Environmental Impact Statement (FEIS). We refer you to Issue 12 of the Responses to Comments (Appendix F) in the FEIS for the detailed response to this comment.

You also commented that because of the limited information on hearing for marine fish species, the DEIS is unable to adequately address direct, indirect, and cumulative effects (see p. ES-8). The statement in the DEIS is that "Little information on hearing exists for the marine fish species in the vicinity of the proposed sites." This is not meant to imply that insufficient information exists to estimate potential effects on fish species. This was clarified for the reader in the FEIS by modifying the first two sentences of the cited paragraph, and we refer you to Issue 12 of the Responses to Comments (Appendix F) in the FEIS for the detailed response to this comment.

You also commented that the DEIS does not address the project's potential cumulative impacts within the framework of the Council on Environmental Quality's guidance to federal agencies, ***Considering Cumulative Effects Under the National Environmental Policy Act***, issued in 1997. Scripps and ONR believe that the principles of cumulative effects analysis discussed in the handbook are included in the cumulative effects analyses of the DEIS. This comment is further discussed in Issue 13b of the Responses to Comments (Appendix F) in the FEIS.

You recommended that the preferred alternative seek approval/authorization for 24 to 36 months, rather than 5 years. Participants of the NPAL project agree that this would be a viable alternative if the ATOC project and its associated Marine Mammal Research Programs had not already been conducted. During the ATOC project, the sound sources off Kauai and on Pioneer Seamount transmitted for two years while studies of the effects of these transmissions were conducted. Results from the ATOC MMRPs, summarized in Chapters 1 and 4, demonstrate no overt or obvious short-term changes in behavior, distribution, or abundance in response to source transmissions. All of the effects detected by the MMRPs were subtle and found only after intensive statistical analysis. Therefore, the NPAL project does not feel that another short-term study of 24 to 36 months is necessary, and refer you to Issue 4a of the Responses to Comments (Appendix F) in the FEIS for further discussion.

You recommended that the Navy consult with the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS) to determine whether the marine mammal monitoring program should be broadened to include fish and turtles. The NMFS is a cooperating agency in the development of the EIS for this project, and as such, they have provided input on the target species of the monitoring studies. This comment is further addressed in Issue 17c of the Responses to Comments (Appendix F) in the FEIS.

You suggested that the military applications that may be derived from the proposed research be stated more clearly. The proposed project would advance the understanding of the basic principles of low frequency, long-range acoustic propagation and the effects of environmental variability on signal stability and coherence (see Section 1.1.2). The ultimate objective is to understand the fundamental limits to acoustic signal processing at long range imposed by ocean processes to enable advanced signal processing techniques to capitalize on the three-dimensional character of the underwater sound and noise fields. This comment is further addressed in Issue 2 of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

G-12

AUG 17 2000

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
La Jolla, CA 92093

Dear Dr. Worcester,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory. The National Oceanic and Atmospheric Administration (NOAA) is a trustee for living marine resources, including those covered under the Marine Mammal Protection Act and Endangered Species Act. Of equal importance, NOAA has specific resource management responsibilities under the National Marine Sanctuary Act for its marine Sanctuaries. Therefore, NOAA takes this opportunity through the National Environmental Policy Act (NEPA) to provide you with the attached comments from the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) on the draft EIS document. Comments from the National Marine Fisheries Service, Office of Protected Resources, not completed at this time, will be submitted separately.

In brief, the HIHWNMS would like the Office of Naval Research to focus on short-term effects to whales by continuing monitoring for immediate, acute impacts of the sound transmissions, as well as establishing clear shut-down protocols to ensure that transmissions are stopped should injury or stranding occur. On long-term effects, the HIHWNMS favors any accompanying research that investigates the long-term chronic effects of sound transmissions on humpback whale populations, and supports the proposed aerial surveys. The HIHWNMS contacts are included with the attached comments.

If you have any general questions regarding NOAA's NEPA review of this DEIS, please feel free to contact Steve Kokkinakis of my staff at (202) 482-5181.

Sincerely,

Susan B. Fruchter

Susan B. Fruchter
NEPA Coordinator

Enclosure

cc: Tom Eisen, HI Dept. Land & Natural Resources
Kathleen Vigness Raposa, Marine Accoustics, Inc.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Silver Spring, Maryland 20910

G-12

MEMORANDUM FOR: Susan B. Fruchter
Chief, NOAA Office of Policy and Strategic Planning

FROM: Daniel J. Basta
Acting Chief, National Marine Sanctuary Program

SUBJECT: Comments on Draft Environmental Impact Statement (DEIS) for the North Pacific Acoustic Laboratory (NPAL)

The National Marine Sanctuary Program, particularly the staff of the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), has reviewed the subject DEIS. We offer the following comments to be included in NOAA's combined comments to the Office of Naval Research (ONR).

1. Long-term effects. The HIHWNMS is in favor of any accompanying research that investigates the long-term chronic effects of the sound transmissions on the humpback whale population, and supports the proposed aerial surveys. Data from other researchers regarding population distribution and abundance should also be compiled and considered in the DEIS.
17a.3 In addition, the HIHWNMS would like to see passive acoustic monitoring used to gather such information. The annual reports, as well as periodic reports, analyzing any long-term trends from this data collection should be made available to the HIHWNMS and the NMFS.
17b.3 Finally, the DEIS should state the intended course of action should changes in populations be detected.

17a.4 17b.2 17d.2
2. Short-term effects. The ONR should continue to monitor for immediate, acute impacts of the sound transmissions. Clear shut-down protocols need to be put in place to ensure that transmissions are stopped should injury or stranding occur. Furthermore, the Hawaii stranding network should meet and finalize protocols prior to the initiation of transmissions. These protocols should be made available to the HIHWNMS and NMFS for comment prior to finalization.

6c.
3. Fate of the cable. As noted in the DEIS, a portion of the power cable runs across the HIHWNMS. The DEIS states that the cable will be left in place at the end of the useful life of the NPAL. The HIHWNMS requests that the fate of that portion of the cable that transits the NMS be determined at the end of the life of the project. At this point in time we are

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unable to evaluate whether it is more appropriate to abandon or remove the cable in the future.

Thank you for considering our comments. Should you have any additional questions, please contact Naomi McIntosh, (808-397-2651) in Hawaii, or John Armor (301-7130-3155 x117), in our Silver Spring office.

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Susan B. Fruchter, NEPA Coordinator
United States Department of Commerce
Office of the Under Secretary for Oceans and Atmosphere
Washington, D.C. 20230

Dear Ms. Fruchter:

Thank you for your comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that the monitoring program should include passive acoustic monitoring. The Kauai ATOC MMRP did not find any overt or obvious short-term changes in the singing behavior of humpback whales in the vicinity of the sound source (see the summary of MMRP results in Chapters 1 and 4). In addition, no statistically significant changes in the underwater sound output from humpback whales in one of the frequency bands in which they vocalize was found in the vicinity of the Kauai source. Therefore, it is estimated that the potential for effects from masking would be minimal, and further passive acoustic studies associated with the Kauai source would not be an efficient use of project resources. This comment is further addressed in Issue 17a.2 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You commented that the annual reports should be made available to the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) and the National Marine Fisheries Service (NMFS). The annual report would be submitted to NMFS as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the HIHWNMS. This information is included in the revised Section 5.2 and in Issue 17b.3 of the Responses to Comments (Appendix F) in the FEIS.

You commented that the project should continue to monitor for immediate, acute effects. This would occur, and details of the protocol are included in the revised Section 5.2 and in Issue 17a.1 of the Responses to Comments (Appendix F) in the FEIS. This comment is addressed in Issue 17a.4 of the Responses to Comments (Appendix F) in the FEIS.

You commented that clear shut-down protocols should be developed. Protocols similar to those used during the ATOC project would be followed for the review, suspension, and termination of the NPAL project. These protocols are detailed in the revised Section 5.2 and in Issue 17a.1 of the Responses to Comments (Appendix F) in the FEIS. This comment is addressed in Issue 17b.2 of the Responses to Comments (Appendix F) in the FEIS.

You also commented that the Hawaii stranding network should meet and finalize protocols prior to the initiation of transmissions, and recommended including NMFS and HIHWNMS in the deliberations. Coordination between the NPAL project, Mr. Don Heacock (DLNR Aquatic Resources), and Ms. Margaret Dupree (NMFS-Honolulu) would occur prior to the initiation of transmissions. During those communications, appropriate contact information would be conveyed in the unlikely event that a peculiar stranding event or trend occurs during the NPAL project. This comment is addressed in Issue 17d.2 of the Responses to Comments (Appendix F) in the FEIS.

You requested that the fate of the portion of the cable transiting the HIHWNMS be determined at the end of the proposed project. A decision on the fate of the entire cable is tied to DLNR action on the current NPAL proposal to reuse the cable, as well as Scripps's success in obtaining other necessary authorizations for the NPAL project. Grant funds from the ATOC project have been set aside to remove the cable if the necessary authorizations are not secured. However, grant funds will have expired before the end of the NPAL project and no replacement funding is available. Therefore, the fate of the cable must be determined at this time. This comment is addressed in Issue 6c of the Responses to Comments (Appendix F) in the FEIS. For further related considerations affecting decisions about the cable, see Response to Comment Issue 6b.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

BENJAMIN J. CAYETANO
GOVERNOR

G-13

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HAR-EP
1003.01

July 10, 2000

Dr. Peter Worcester
Scripps Institution of Oceanography
University of California, San Diego
9500 Gilman Drive
IGPP 0225
La Jolla, California 92093

Dear Dr. Worcester:

Subject: North Pacific Acoustic Laboratory Draft Environmental Impact Statement

Thank you for providing the subject document for our review and comment.

While the proposed project should not impact commercial harbor operations, the Department of Transportation, as a member of the Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council, is concerned over possible effects of the acoustic tests on humpback whales. If you have not yet done so, please forward a copy of the Draft Environmental Impact Statement to:

Ms. Naomi McIntosh
Hawaiian Islands Humpback Whale National Marine Sanctuary
6700 Kalanianaole Highway, No. 104
Honolulu, Hawaii 96813

If there are any questions, please call Mr. Glenn Soma, Harbors Division Planner, in Honolulu at (808) 587-2503.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Kazu Hayashida
Director of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Hayashida,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. Your comment has been noted, and we have forwarded copies of the DEIS to Ms. Naomi McIntosh at the Hawaiian Islands Humpback Whale National Marine Sanctuary as you requested.

If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

G-9

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

In Reply Refer to: LLLW

JUL 24 2000

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP0225
La Jolla, CA 92093

Re: The Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory

Dear Dr. Worcester:

The U.S. Fish and Wildlife Service (Service) has reviewed the May 2000 Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory (DEIS) which was received in this office on June 12, 2000. The project is sponsored by the Office of Naval Research. The proposed project involves the continued operation for five additional years of the low frequency sound source previously installed for the Acoustic Thermometry of Ocean Climate project north of Kauai, Hawaii, by the North Pacific Acoustic Laboratory, a U.S. Navy Office of Naval Research. The research project would combine a second phase of research on the feasibility and value of large-scale acoustic thermometry, long-range underwater sound transmission studies, and marine mammal monitoring and studies. This letter has been prepared under the authority of and in accordance with provisions of the National Environmental Policy Act of 1969 [42 USC 4321 *et seq.*; 83 Stat. 852], as amended, the Fish and Wildlife Coordination Act of 1934 [16 USC 661 *et seq.*; 48 Stat. 401], as amended, the Endangered Species Act of 1973 [16 USC 1531 *et seq.*; 87 Stat. 884], as amended, and other authorities mandating Service concern for environmental values. Based on these authorities the Service offers the following comments for your consideration.

4C The Service still stands by its previous recommendation that operations avoid the primary breeding seasons of both sea turtles and marine mammals to reduce adverse project-related impacts to their successful reproduction. We also strongly disagree with the alternative to relocate the sound source at Midway due to the sensitive nature of the Midway Atoll National Wildlife Refuge. We also continue to recommend that the National Marine Fisheries Service be contacted for recommendations concerning resources under their jurisdiction.

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The Service appreciates the opportunity to provide this early technical assistance. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Lorena Wada by telephone at (808)541-3441 or by facsimile transmission at (808)541-3470.

Sincerely,

for Paul Henson
Field Supervisor

cc: NMFS-PIAO, Honolulu
USEPA, Honolulu
DOFAW, Hawaii
DAR, Hawaii
CZMP, Hawaii
Mr. Gary Gill, OEQC, Honolulu
Mr. Tom Eisen, DLNR, Hawaii
Marine Acoustics, Inc.

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Paul Henson, Field Supervisor
United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 3-122
Box 50088
Honolulu, HI 96850

Dear Mr. Henson:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the point raised in your letter.

You recommended that operations avoid primary breeding seasons of sea turtles and marine mammals. The migratory habits of the sea turtle species most likely to pass through the source sound fields (leatherback, loggerhead, olive ridley, and green sea turtles) are less well-known than the humpback whales' and thus it would be difficult to alter transmission times to avoid their presence (see Section 2.1.3.1). Restricting source transmissions to seasons when humpback whales are not present would severely reduce the utility of both the acoustic thermometry and long-range propagation studies, however, as well as make it essentially impossible to study the potential long-term effects of low frequency sound transmissions on marine life. Since neither the California nor the Kauai ATOC MMRP found any overt or obvious short-term changes in the abundance or distribution of marine mammals in response to the transmissions of the ATOC sound sources (see further discussion in Section 4.2.1.2.1), it is not anticipated that overt or obvious short-term changes in abundance or distribution would result from continued use of the ATOC sound source. We refer you to Issue 4c of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for further discussion of this issue.

We also noted your position of strongly disagreeing with the alternative to relocate the sound source at Midway due to the sensitive nature of the Midway Atoll National Wildlife Refuge. It is recognized that Hawaiian monk seals, a severely endangered species, use the beaches of Midway Island for breeding and pupping, and that activities associated with the installation of a power cable may disrupt their behavior (see Section 4.2.1.1).

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

G-7

24 July, 2000

To: University of California, San Diego
Scripps Institution of Oceanography

From: Pacific Missile Range Facility
P. O. Box 128
Kekaha, Hi 96752

REVIEW COMMENTS ON DEIS FOR NORTH PACIFIC ACOUSTIC LABORATORY
May 2000

3a	1.	Pg. ES-1, para 1/2	It is confusing because we state that Scripps is the action proponent, but ONR is identified in the 1st paragraph. The reader would be confused who the action proponent really is.
	2.	Pg 1-1, para 1	Comment see item 1.
	3.	Pg 1-18, para 5	Navy/DoD does not apply for CDUA permits. We do not want to set a precedent for a CDUA requirements.
18d.4	4.	Pg 5-1, Distribution list	Change name of Commanding Officer for Pacific Missile Range Facility to CAPT Brian W. Hoss. Also, add P.O. Box 129 to address.
18d.5	5.	Pg C-2, Public Library List	The following libraries are listed twice: Lihue Public Library, Lanai Public & School Library, Hanapepe Public Library, Molokai Public Library, Koloa Public & School Library, Waimea Public Library

Robert Inouye
Environmental Engineer

8083354683
Jul-24-00 03:32pm From-PUBLIC WORKS OFFICE 8083354683 T-492 P 01/02 F-587 G-7

FACSMILE TRANSMISSION COVER SHEET

Pacific Missile Range Facility
Public Works Department
P. O. Box 128
Kekaha, HI 96752-0128

DATE: 24 Jul 2000
SUBJECT: Review Comments NPAL DEIS
Total Number of Pages Including Cover Sheet: 2

TO: Peter Worcester
Agency: UC San Diego
Name: Scripps
Code:

FROM: R. Inouye
Agency: Public Works Dept.
Name:
Code:

Telephone Numbers: Autovon (315) 471-6213
Commercial (808) 335-4213
Facsmile Numbers: Autovon (315) 471-6683
Commercial (808) 335-4683

Remarks: Dr Worcester,
My review comments are attached.

Aloha,
Robert Inouye

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Robert Inouye, Environmental Engineer
Pacific Missile Range Facility
P. O. Box 128
Kekana, HI 96752

Dear Mr. Inouye:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the FEIS clarify that ONR is not applying for state approval or permits (specifically see pages ES-1, paragraph 1 and 2; p. 1-1, paragraph 1; p. 1-18, paragraph 5 of the DEIS). ONR is not applying for state approval or permits. ONR is the lead agency for purposes of NEPA. Scripps is the entity which will carry out the research activity and is the applicant for the various permits. As applicant to the Hawaii Department of Land and Natural Resources for a Conservation District Use Permit, Scripps is the "applicant" under the Hawaii EIS Law, and DLNR is the "accepting agency." We refer you to Issue 3a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for the associated phrases indicating that Scripps, and not the Navy, is applying for state approval or permits in the locations you specified. However, two locations in the DEIS that were not cited were edited in the FEIS to clarify for the reader that Scripps is the entity pursuing a LOA for the proposed project (see edits to 1st paragraph, Section 1.3.2; 1st paragraph, Section 6.1.2; or Issue 3a of the Responses to Comments for the details).

You pointed out that the Commanding Officer for Pacific Missile Range Facility and his address should be edited. You also pointed out that six libraries in the Public Library Distribution List were listed twice. These corrections were made in the FEIS, as described in Issue 18d.4 and 18d.5, respectively, of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

BENJAMIN J. CAYETANO
GOVERNOR

G-4

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

June 28, 2000

Mr. Tim Johns, Chair
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

Subject: Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory

Thank you for the opportunity to review the subject document. We have the following comments.

1. Please include a concise discussion of the following in the executive summary of the EIS:

Issue 18a A) Unresolved Issues
Issue 3c B) Compatibility with Land Use Plans and Policies
C) Listing of Permits or approvals

2. In accordance with section 11-200-20(d) of Hawaii Administrative Rules, please sign and date the original copy of the draft or final EIS and indicate that the statement and all ancillary documents were prepared under the signatory's direction or supervision and that the information submitted, to the best of the signatory's knowledge fully addresses document content requirements as set forth in sections 11-200-17 and 11-200-18, as appropriate.

7b. 3. Please disclose the amount of public funds that will be expended for this project.

18a. 4. Please provide a summary of the unresolved issues, including a discussion of how such issues will be resolved.

G-4

Mr. Johns
Page 2

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Genevieve Salmonson
Director

c: ✓Scripps Institution of Oceanography
Marine Acoustics, Inc.

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson:

Thank you for your June 28, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that a discussion of unresolved issues and how such issues will be resolved be included in the Executive Summary and in the DEIS. A discussion of unresolved issues and how such issues will be resolved was included in Section 4.5.11 of the DEIS. To include a discussion of this topic in the Executive Summary, a new section titled "Unresolved Issues" was added after the "Potential Environmental Effects" section, and we refer you to either Issue 18a of the Responses to Comments (Appendix F) or the Executive Summary in the Final Environmental Impact Statement (FEIS) for this new section.

You also requested that the proposed project's compatibility with land use plans and policies, and a listing of permits and approvals be included in the Executive Summary. To do so, a new section titled "Environmental Impact Analysis" was added after the "Purpose and Need for the Proposed Action" section in the Executive Summary. We refer you to either Issue 3c of the Responses to Comments (Appendix F) or the Executive Summary in the FEIS for this new section.

Finally, you requested that the amount of public funds that would be expended for this project be disclosed. It is anticipated that roughly $125,000 per year would be available for the operation of the source, and that of that amount, $50,000 per year would be expended on the associated marine mammal monitoring studies. In addition, Scripps and APL-UW anticipate receiving funding from ONR to operate the acoustic receivers, to process and archive the receptions, to analyze the data collected (from previous phases of the NPAL Project as well as from the proposed phase), and to prepare publications on the results. This information is also included in Issue 7b of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

G-8

MARINE MAMMAL COMMISSION
4340 East-West Highway, Room 905
Bethesda, MD 20814

24 July 2000

Peter F. Worcester, Ph.D.
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive IGPP 0225
La Jolla, CA 92093

Dear Dr. Worcester:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Draft Environmental Impact Statement (DEIS) for the North Pacific Acoustic Laboratory, formally the Acoustic Thermometry of Ocean Climate Project, Phase II. We herewith provide comments on and suggestions for improving those parts of the DEIS concerning marine mammals.

The Commission concurs that the best available information suggests that the preferred alternative -- continued operation of the ATOC sound source off the north shore of Kauai -- is unlikely to have biologically significant short-term effects on any species or population of marine mammal. However, the data are insufficient to allow one to be certain of that or to be confident that there will be no long-term effects. The Commission also concurs that (1) installation and operation of an ATOC sound source off the Midway Islands could have direct and indirect effects on monk seals; (2) continued operation of the sound source off the north coast of Kauai is likely to result in the unintentional taking of small numbers of marine mammals, particularly humpback whales and sperm whales; and (3) as mentioned above, available information is insufficient to be confident that operation of the Kauai sound source, over the next five years, will not have long-term effects on the distribution, abundance, or productivity of humpback whales or other cetaceans that inhabit areas where they could be exposed to the sound transmissions. The Commission therefore believes it is essential that a monitoring program capable of detecting possible project-related changes in the distribution, abundance, or productivity of marine mammals be carried out as part of the project and that the final environmental impact statement should indicate changes in marine mammal distributions, abundance, or productivity that, if observed, would trigger a review, suspension, and termination of the project.

17a.1

With regard to the last point, the DEIS indicates in section 5.2 that "[a] total of four aerial surveys would be conducted during each humpback whale season..." and that "[c]oordination with the local Marine Mammal Stranding Network will be conducted to detect any long-term trends." There is no indication of how the aerial surveys would be conducted or the area(s) that would be surveyed. Likewise, there is no indication of the kinds of changes in distribution, abundance, or strandings that would be viewed as causes for concern. For example, it would be helpful for the Final Environmental Impact Statement (FEIS) to specifically state what levels of change the monitoring program is designed to detect, e.g., 10 percent or 25 percent changes in distribution or abundance. Further, the FEIS should provide sufficient information on the survey and study design to allow reviewers to evaluate the power of the study to detect such changes. Also, how big an area will be considered the potential response zone? Since the source will be operating every four days, what will be the baseline of seasonal control data from which possible changes will be compared? If the monitoring program will be used to mitigate impacts should such effects be observed, the FEIS should specify exactly how long analyses will take before results are available for altering the transmission schedule. Without such information, it is not possible to judge the likely utility of the monitoring program that is contemplated.

17b.2

The Commission also believes that it would be useful to review the results of the monitoring program annually. In this regard, we note that several independent research groups have been conducting studies of humpback whales and other marine mammals in Hawaiian waters for several decades and that representatives of many of these groups meet each year to review and consider ways to coordinate their activities. <u>The Commission recommends</u> that you consult with the National Marine Fisheries Service to determine whether these coordinating meetings could be used to obtain independent expert views on the merits and results of the monitoring program ultimately carried out as part of the project.

17b.3

Specific Comments

Page ES-3 (the Proposed Action): Here and elsewhere the DEIS indicates that "[t]he Preferred Alternative involves the continued operation for five additional years of the LF sound source (including the seabed power cable) previously installed off the north shore of Kauai, Hawaii, for use in ATOC research."

8b.2 If the principal investigators or other researchers are likely to want to continue operating or to replace the source after five years, this should be noted and reflected in the assessment of possible long-term cumulative effects.

Page ES-4 (Alternate Project Site): The last sentence in this section states that "...limited baseline data on the marine animals in the vicinity of Midway Island would limit the study of potential long-term effects from the acoustic transmissions." As noted in the next and later sections of the DEIS, it is not known how installation and operation of a sound source off the Midway Islands would affect the small monk seal breeding colony on the Islands. Given the uncertainty, the Commission believes that detailed studies of the hearing, at-sea movements and diving behavior, and behavioral responses to low frequency sound of monk seals would be required before a determination could be made as to whether installation and operation of the sound source off the Midway Islands would further jeopardize the continued existence of the Hawaiian monk seal, or damage or destroy habitats critical to its survival. Until such information is available, it would be impossible, in the Commission's view, to make meaningful judgments as to whether installation and operation of the source at Midway could be carried out in accordance with the provisions of the Endangered Species Act and the National Environmental Policy Act.

9b.4 **Page ES-5, par. 4:** The text should make it clear that the risk continuum treats each minute of transmission as a ping, not the whole 20 minutes of transmission.

9b.1 **Page ES-6, Figure ES-1:** Here and elsewhere the DEIS refers to "Non-injurious Harassment." The term is not defined and presumably is referring to "Level B Harassment" as defined in the Marine Mammal Protection Act. To avoid possible misinterpretation, the term either should be defined or replaced with the term "Level B Harassment" wherever it occurs in the impact statement.

18d.2 **Page ES-6, par. 1:** The last sentence in this paragraph states that "[t]hese results [results of simulation studies done with the Acoustic Integration Model] demonstrate that only humpback whales near Kauai have a chance for disturbance of a biologically important behavior, and no TTS effects are expected with any of the species at either site [Kauai or Midway]." In fact, the modeling results suggest, rather than demonstrate, that only humpback whales are likely to be disturbed in biologically

significant ways and do so only if the assumptions inherent in the model are valid. Here and elsewhere the text should be clarified to point out that the simulation model suggests, rather than demonstrates, that only humpback whales near the Kauai source are likely to be subject to biologically important disturbance, provided the assumptions used in the simulations are valid (see below).

Page ES-7, Tables ES-1 and ES-2: The data portrayed here and elsewhere in the DEIS appear to be based on two assumptions, at least one of which almost certainly is not valid. The first assumption is that a received sound level below 120dB will not disturb a biologically important behavior of any of the listed species. The second assumption is that the listed species are distributed uniformly or randomly throughout their ranges in the North Pacific so that the number of animals likely to be exposed to sound levels between 120 to 180dB can be estimated by dividing total population size by total range to obtain a density estimate (e.g., humpback whales, sperm whales, monk seals per square nmi) and then multiplying the area, in nmi², where received sound levels are expected to be between 120 to 180dB by the density estimate to obtain an estimate of the number of individuals from the various species likely to be in the area where they can be exposed to sound levels between 120 to 180dB.

9a It is highly unlikely that the second assumption is valid. That is, at least some species likely are distributed in patches, rather than uniformly or randomly, throughout their range. Further, the sizes and locations of the patches are likely to vary both temporally and spatially. If, as indicated in section 3.2.2.1, for example, the North Pacific humpback whale population numbers approximately 6,000 individuals and about 4,000 of these animals visit the main Hawaiian Islands annually, substantially more than 0.01% of the population could be exposed to received levels from the Kauai source between 120 to 180dB if part or all of the visitors move from site to site while in the Hawaiian Islands area. Researchers familiar with the seasonal distribution, abundance, and movement patterns of the various species in the Hawaiian Islands area should be consulted to obtain more realistic estimates of the numbers of the various species that could be exposed to received transmission levels between 120 to 180dB.

9c.1 Also, given the uncertainty concerning the possible long-term cumulative effects of the transmissions on survival and productivity, it might be preferable to relate the estimates of the numbers of animals expected to be exposed to the various sound levels to the estimates of the potential biological removal (PBR) level, as well as to the estimates of the total size, of the potentially affected stocks. The rationale for such an assessment is provided in the recent National Research Council report entitled "Marine Mammals and Low-Frequency Sound."

18b. **Page ES-8, par.1:** The text states that "[t]he measured hearing threshold for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) is only slightly lower than the maximum levels to which these three species could be exposed." The maximum exposure level assumably will be near the 195 dB source level. On page 4-35 the text says that in a series of experiments on green turtles, maximum sensitivity at 70 Hz was "...about 70dB in air (approximately 132 dB in water)." The comment on page ES-8 appears incorrect.

3d. **Page ES-9 (Mitigation and Monitoring):** Among other things, the introduction to this section states that "[s]ince the California and Hawaii ATOC MMRPs detected only subtle effects found after intensive statistical analyses, the need to conduct further marine mammal monitoring studies is to advance the understanding of the potential for long-term effects from the acoustic transmissions." Although not stated explicitly, this and other similar statements in the DEIS imply that it is not known from the observed behavioral effects whether the proposed action could have long-term cumulative effects on survival or productivity. If, as seems to be the case, the proposed monitoring studies are intended to meet one of the requirements necessary to obtain a "small take" exemption in accordance with section 101(a)(5)(A) of the Marine Mammal Protection Act, this and similar statements elsewhere in the DEIS would be more accurate if they were revised to read something like "[b]ecause the California and Hawaii ATOC MMRPs detected only subtle effects found after intensive statistical analyses, there is a need to conduct further marine mammal monitoring studies to verify that the acoustic transmissions do not have long-term cumulative effects on the distribution, survival, or productivity of the potentially affected marine mammals."

16b. **Page ES-10 (Mitigation Measure 4):** As noted here and elsewhere in the DEIS, one of the proposed mitigation measures is to "ramp-up" the power source over a period of five minutes. It should be noted that, while it is reasonable to assume that most marine mammals will move away from the sound source as it is

ramped-up if they find the sound painful or annoying, studies necessary to validate this assumption have yet to be done.

Page ES-10 (Monitoring Measures 1 and 2): It is not clear what is meant by the term "M3 studies." As noted earlier, information concerning the available baseline data and the design of these two monitoring measures are needed to allow reasonable judgments to be made regarding their likely usefulness.

18e.1 **Page 1-13 (*Behavioral Measures*):** The second sentence in this paragraph states that "[i]ntensive statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; Frankel and Clark, 1999)." Page 8-9 in the Literature Cited section lists two 1999 papers by Frankel and Clark: one published in an unidentified volume of the Canadian Journal of Zoology, and the other in preparation. It is not clear which of these papers reports the results of the statistical analyses. Further, the conclusion that continued operation of the Kauai source is unlikely to have a significant effect on the distribution or abundance of humpback whales in the area appears to be based upon data and analyses set forth in the second paper, which has not yet been published. Also, a number of the other citations in the DEIS are to abstracts of papers which have neither been published nor subjected to peer-review. In such cases, the actual data and analyses should be described so that readers can make their own judgments as to their applicability.

Page 1-13, par. 5: The second sentence in this paragraph would be more accurate if the words "[b]ioacoustic experts" were deleted and the citation at the end of the sentence was moved to the beginning so that the sentence begins "Frankel and Clark (1999 [a or b]) concluded that...."

9c.2 **Page 1-16 (Marine Mammal Protection Act):** Among other things, this paragraph states that "[w]hile the intensive statistical analyses of Kauai MMRP data revealed some subtle changes in the behavior of humpback whales in response to the ATOC-like sounds and transmissions of the ATOC Kauai source, the suggested effects do not support a request for a LOA." The sentence can be interpreted in two ways: (1) that the data from the MMRP suggested that the effects are not negligible and could not support a request for a letter of authorization; or (2) that the observed effects did not constitute "taking" as defined in the Marine Mammal Protection Act so that no taking authorization is needed. Both interpretations appear incorrect. The final environmental impact statement should make it clear that, while any effects on the distribution, survival, or productivity of the potentially affected marine mammal stocks are expected to be negligible, some taking by Level B harassment is likely to occur and it is not known whether such taking could have long-term effects on the distribution, survival, or productivity of any of the potentially affected marine mammal stocks.

8b.3

Page 2-11 (Figure 2.1-5): It is not clear why the X axis of this figure is labeled "0-0-1-1...." Also, it appears from this figure that the estimates in the text of received sound levels at different distances from the source are mean or model estimates and that, under certain conditions, sound levels may be greater than estimated at the various distances from the source. The final environmental impact statement should explain the environmental conditions that could cause sound focusing and the distances at which sound levels from the ATOC transmissions could be above both 120 and 180dB beyond the calculated mean or model distances.

18c.2

Page 3-5, last sentence: This sentence reads "[a] similar measurement [to one reported in Frankel and Clark, 1998], conducted during the fall of 1997 off Kauai, found that the mean ambient noise level, before whales arrived, was 96dB re 1μPa (Frankel and Clark submitted)." There is no listing in the Literature Cited section to "Frankel and Clark, submitted." As noted earlier, the actual data and analyses should be described in cases where the cited sources are not peer-reviewed or available to readers.

18d.1

Page 3-7 (Species Screening): The second paragraph in this section indicates that one of the criteria used to decide what species would be considered in the DEIS was whether the species is capable of being physically affected by LF sound. The term "physically affected" can be interpreted in several ways -- *e.g.*, only those species that could be killed or whose organs could be physically damaged by low-frequency sound were considered, or that all species whose distribution, survival, or productivity could be affected by low-frequency sound were considered. It appears that, for marine mammals at least, all species that potentially could be affected by the sound transmissions were considered. If this was not the case for sea turtles, fishes, etc., clarification would be useful.

9a.

Pages 3-10 to 3-15 (Humpback Whales): As noted earlier, using density estimates to estimate the number of animals that may be present annually or seasonally in part of a species' range may underestimate or overestimate presence if distributions are not random or uniform and animals are not sedentary. It is our understanding that photo-identification studies suggest that at least some of the humpback whales that winter in the Hawaiian Islands area move around and between the Islands during the season. If our understanding is correct, a larger proportion of the population than estimated could move during the winter months through the area where animals could be exposed to received sound levels greater than 120dB. This section of the impact statement should be expanded to summarize what is known about the movements of humpback whales in the Hawaiian Islands area during the winter months. The sections of the environmental impact statement assessing possible impacts should be revised as necessary to provide a more accurate assessment of the number of animals that could be exposed to sound levels greater than 120dB. If there is substantial uncertainties concerning the movement patterns of different age and sex classes, the uncertainties should be noted and factored into the assessment of possible impacts.

9d.

Pages 3-20 and 21 (Sperm Whales): This section does not, but should, summarize what is known about the hearing range and sensitivity of sperm whales, the nature and uses of sounds known to be produced by sperm whales, and how sperm whale vocalizations and behavior have been observed to change in response to various anthropogenic sounds. If available, similar data should be provided in the subsequent sections concerning false killer whales, pygmy killer whales, pilot whales, beaked whales, bottlenose dolphins, spinner dolphins, rough-tooth dolphins, spotted dolphins, and monk seals.

11

Pages 3-24 and 25 (Pinnipeds): As currently written, this section does not incorporate the most up-to-date information on the status, habitat requirements and habitat use patterns of Hawaiian monk seals. For example, radio-tagging and other studies done in the last five years have shown that monk seals may move between islands and spend long periods of time at sea. The head of the National Marine Fisheries Service's Hawaiian Monk Seal Research Program should be consulted to obtain the most up-to-date information on the demography and dynamics of Hawaiian monk seals, particularly the breeding colony on the Midway Islands.

9d. **Pages 4-7 and 8 (Masking):** As noted here, the likelihood of masking will be determined, among other things, by the frequency range of the sound transmissions relative to the frequency range of the sounds produced and used by marine mammals for different purposes. Thus, this section of the environmental impact statement would be much more informative and useful if it were expanded to describe the particular marine mammal vocalizations that fall within and could be masked by the frequencies of the ATOC sound transmissions.

17a.2 On a related matter, it would seem that the hydrophone arrays and processing equipment used to detect and analyze the ATOC transmissions should be capable of detecting and possibly determining the source location of cetacean vocalizations in at least the frequency band of the ATOC transmissions. If it has not already been done, <u>the Marine Mammal Commission recommends</u> that scientists with broad knowledge of the form and function of cetacean vocalizations, such as Drs. William Watkins at Woods Hole Oceanographic Institution and Christopher Clark at Cornell University, be consulted to determine if monitoring and comparison of vocalizations before, during, and after ATOC transmissions could help to resolve the uncertainties concerning masking and possible related behavioral disruptions. If the consultations indicate that such monitoring would be possible and useful, <u>the Marine Mammal Commission further recommends</u> that an appropriate vocalization monitoring program be designed and included as part of the proposed action.

17a.1 **Page 4-8 (Scientific Uncertainty):** The last sentence in this section states that "[a]s an integral part of the proposed action, the Marine Mammal Monitoring Studies would attempt to fill several of the gaps in available information concerning potential long-term effects." As noted earlier, the proposed Marine Mammal Monitoring Studies are not described in sufficient detail to judge whether or to what extent they are likely to contribute to resolving uncertainties concerning potential long-term effects. The final environmental impact statement should provide descriptions of the proposed studies in sufficient detail to allow judgments to be made as to how they will contribute to resolving uncertainties concerning long-term effects.

On a related point, the third sentence in the second paragraph in this section states that "[p]otential impacts on biological resources are limited by the relatively temporary nature of the NPAL experimental activities, which will span at most a five-year period of transmissions, and the limited duty

cycle of the sound source (on 2-8 percent of the time, off the remaining 92-98 percent)." The sentence appears to state unequivocally that operation of the ATOC sound source off Kauai will be terminated at the conclusion of this five-year period. If there is any possibility that the sound source may be operated beyond five years, or be replaced with a similar source that will be operated beyond five years, either the possibility should be noted or the implication that transmissions will occur for no more than five years should be removed.

18e.3 **Pages 4-9 and 10 (*Abundance and distribution*):** This section references reports by Calambokidis *et al.* (1998) and Mobley *et al.* (1999b) as sources of information showing that no overt or obvious short-term changes in the abundance or distribution of marine mammals were found during the ATOC marine mammal research program. The referenced 1998 report by Calambokidis *et al.* apparently is to an abstract of a paper presented at the biennial meeting of the Marine Mammal Society in Monaco in January 1998. The referenced 1999 report by Mobley *et al.* appears to be an unpublished report to the principal investigators of the Hawaii ATOC program. In the former case, only those people who attended the presentation in Monaco had the opportunity to see the actual data and analyses referred to in the DEIS. In the latter case, it is not clear whether the report is publicly available. In both cases, it seems unlikely that the data and analyses were subject to independent peer-review. As noted earlier, it would be more appropriate in such cases to provide summaries or descriptions of the actual data and analyses, rather than reference documents that are not readily available to the public and have not been peer-reviewed.

14b.2 **Page 4-9 (*Abundance and distribution*):** The DEIS concludes that there were no significant changes in the abundance of humpback and sperm whales from the control periods when the source was not operating, to the experimental periods when it was. This stands in direct contrast to the published review of these studies in Popper *et al.* (2000) which concludes "[a]erial surveys revealed that humpback whales were significantly further from the source when it was on than when it was off. A similar pattern was found in sperm whales, but the statistical significance was complicated by seasonal differences in distribution (Calambokidis 1999)." [p.30].

Page 4-10 (*Behavioral measures*): This paragraph indicates that no overt or obvious short-term changes in the behavior of humpback whales or elephant seals were observed in response to the playback of ATOC-like sounds or to transmissions of the ATOC sound sources. It indicates that "[i]n 1996, the behavioral responses of humpback whales to the playback of ATOC-like signals (maximum received level of 130dB) were studied." In the context of the paragraph, the quoted sentence appears to suggest that neither humpback whales nor elephant seals were ever exposed to received levels greater than 130dB. If this is the case, there would be no justification for concluding, as seems to have been done, that responses would be similar to sound levels up to 180dB. This and other sections of the impact statement should be expanded, as necessary, to clarify the estimates of the sound levels to which animals were exposed during the playback experiments and ATOC transmissions, and how they responded to the received sound levels. If few if any animals were observed when exposed to estimated sound levels above 150 and 180dB, the uncertainties regarding responses to these sound levels should be noted.

14a.1

Page 4-17, par. 4: The first sentence in this paragraph states that "[w]hile there is no guarantee that marine mammal behavioral responses exhibit patterns similar to human hearing, the human model is the best objective foundation for an assessment." The second sentence states that "[t]hus, the 10 $\log_{10}(N)$ formula is considered appropriate for assessing the risk to a marine mammal for TTS and prolonged disturbance of biologically important behavior from coherent LF sound like the NPAL sound source transmissions." Given that there is no guarantee (evidence) that marine mammal behavioral responses to sound are similar to human hearing responses, there is no reason to believe that the referenced formula is appropriate for assessing the risks to marine mammals for either TTS or disturbance of biologically important behavior. Thus, the second sentence in this paragraph would be accurate if the words "considered appropriate" were changed to "the best available."

18d.2

Page 4-18, par. 3: This paragraph argues that using a smooth, continuous function that relates received sound levels to biological risk greatly reduces the potential for misleading results. The argument is valid only if the assumptions upon which it is based are valid -- *e.g.*, response is curvilinear, rather than liner, and there are no thresholds where response does not occur until the threshold is reached. This point should be made clear in the final impact statement.

9b.3

Page 4-18, last par.: The fourth sentence in this paragraph states that "[t]he risk continuum estimates that 95 percent of

18d.2

the marine mammals exposed to a single ping of LF sound at a received level of 180dB could incur TTS." The word "estimates" presumably should be "assumes."

Page 4-19 (Figure 4.2-1) and Page 4-20, par.1: It is not but should be explained why it is estimated or assumed that 2.5% of animals exposed to single ping equivalents of 150dB, and 50% of animals exposed to single ping equivalents of 165dB, would experience "prolonged disturbance of biologically important behavior."

9b.3

Page 4-20, par. 5: Among other things, this paragraph indicates that, in order to be affected significantly by a low-frequency sound, an animal must be able to hear the sound, and must incur a prolonged reaction to a biologically significant behavior. It is not clear what is meant by "a prolonged reaction." For example, it is not clear whether an animal that swims onto a beach or is less attentive to possible predators, because it is startled, confused, or panicked by a sound, would meet these criteria. Therefore, clarification seems necessary.

9b.2

Pages 4-28 and 29 (Tables 4-2.5 and 4.2-6): As noted earlier, these tables will underestimate the percentages of marine mammal populations potentially affected by the sound transmissions at the preferred and alternative sites if (1) animals are distributed in patches, rather than uniformly or randomly; or (2) animals move through the area around the sound source so that more than the number observed during the sampling periods may be exposed to received sound levels greater than 120dB.

9a

Pages 4-30 to 4-32 (Potential for Masking): As noted earlier, the final environmental impact statement should provide an assessment of the nature and presumed functions of marine mammal vocalizations in the frequency range of the ATOC sound transmissions.

Page 4-33 (*Monitoring Measure 1*): As noted earlier, the DEIS does not provide sufficient information to determine whether this proposed monitoring measure is likely to be capable of meeting the stated objective. The final environmental impact statement should provide more detailed descriptions of both the study design and the available baseline information.

17a.1

Page 5-1, par.3: As noted earlier, it appears likely that operation of the ATOC sound source off either Kauai or the Midway

Islands would result in the "taking" of marine mammals as defined in the Marine Mammal Protection Act and that, while the short-term effects on individual survival and productivity are likely to be negligible, there is uncertainty as to whether there may be significant long-term effects on the distribution, size, or productivity of the potentially affected stocks. Thus, it would appear that taking authorization under the Marine Mammal Protection Act is necessary and that the authorization must include a requirement for monitoring sufficient to verify that there are no long-term adverse effects on the distribution, size, or productivity of the potentially affected stocks.

16b.

Page 5-2 (*Mitigation Measures 4*): As noted earlier, it should be recognized that there is no evidence indicating that ramp-up of the sound source will in fact cause animals to move away from the source before transmission begins to occur at the maximum power level. If feasible, the monitoring program should be expanded to verify the assumption that ramp-up causes animals to move away from areas where they could be harmed by the sound transmissions.

17a.1

Pages 5-2 and 5-3 (Monitoring to Prevent Long-Term Effects to Marine Mammals): Neither here nor elsewhere does the DEIS provide sufficient information to make judgments regarding the adequacy of the design and likely results of the monitoring program being proposed as part of the preferred alternative. The final environmental impact statement should provide a description of the proposed monitoring program in sufficient detail to allow judgments to be made regarding its capability for detecting long-term effects on the distribution, size, or productivity of the potentially affected species, particularly humpback whales and sperm whales.

18e.3

Section 8 (Literature Cited): As noted earlier, a number of the references cited in the text and listed in this section are not readily available to the public or do not contain sufficient information to enable readers to make judgments concerning the reliability of the data, data analyses, or resulting conclusions. For example, many of the references are to abstracts of papers presented at the biennial conferences of the Marine Mammal Society. Also, a number of the references are incomplete -- see for example, the previously noted reference to Frankel and Clark (1999a) and the references to Gaskin (1972 and 1982), den Hartog and Van Nierop (1984), Herman *et al.* (1980), Hoyt (1981), and Nature Conservancy Council (1979). As a general rule, the Commission believes it is inappropriate to cite abstracts and

documents that are not readily available to the public as sources of information used to formulate or support conclusions set forth in environmental impact assessments. In cases where data or analyses are known to exist, but have not been peer-reviewed or published, it would be more appropriate to check with the principal investigator to insure that the data, analyses, conclusions, etc. are being reported accurately, and to cite the source as a personal communication, rather than an abstract, unpublished manuscript, etc.

SUMMARY

In summary, the DEIS provides a reasonably through summary of available information concerning the demography, dynamics, and status of marine mammal species and populations that could be affected by continued operation of the ATOC sound source offshore of Kauai. Likewise, it provides support for concluding that, while the best available data suggest that continued operation of the source is unlikely to have significant adverse effects on the survival or productivity of any marine mammal, the available information is insufficient to be confident that there will be no long-term effects on the distribution, size, or productivity of any of the potentially affected marine mammal stocks. It is worth noting that with regard to a conclusion of the Quick-Look Report of the Hawaii ATOC-MMRP (Frankel and Clark, 1998b) that states "[t]here were no acute or short-term effects of the ATOC transmission on marine mammals" , Popper *et al.* (2000) concluded that:

> The Committee questions whether a conclusion this broad can be reached at this time using the data provided. The report does, in fact, present evidence for some short-term behavioral changes in response to the ATOC sound source by humpback whales. Even more important, the Committee questions the ability of the MMRP to show the absence of any response...[p.33].

Therefore, taking authorization can and should be obtained in accordance with both the Marine Mammal Protection Act and the Endangered Species Act, provided a monitoring program is in place to verify that there are no non-negligible effects on the distribution, size, or productivity of the potentially affected stocks. As noted above, the final environmental impact statement should describe the proposed monitoring program in sufficient detail to allow the Commission and others to judge the likelihood that it will be capable of detecting possible long-term effects on the distribution, size, and productivity of marine mammal populations, particularly populations of humpback whales and sperm whales, that occur seasonally or throughout the year in the Hawaiian Islands area.

I hope that these comments and suggestions are helpful. If you have questions about any of them, please let me know.

Sincerely,

John R. Twiss, Jr.
Executive Director

cc: Ms. Penelope D. Dalton
Mr. Thomas Eisen
Ms. Kathleen Vigness Raposa

Popper, A.N. *et al.* 2000. Marine Mammals and Low-Frequency Sound: Progress since 1994. Committee to Review Results of ATOC's Marine Mammal Research Program, Ocean Studies Board, Commission on Geosciences, Environment, and Resources, National Research Council. National Academy Press, Washington, DC, p. 146

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December 15, 2000

John R. Twiss, Jr., Executive Director
Marine Mammal Commission
4340 East-West Highway, Room 905
Bethesda, MD 20814

Dear Mr. Twiss:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the Final Environmental Impact Statement (FEIS) include sufficient details of the monitoring program to assess whether the program will be capable of detecting possible project-related changes in distribution, abundance, or productivity. We extensively expanded Section 5.2 to address the level of detail requested during the public comment period, and we refer you to either this section or Issue 17a.1 of the Responses to Comments (Appendix F) in the FEIS.

You also requested that the FEIS state how long analyses would take before results would be available for altering the transmission schedule. Protocols similar to those implemented during the ATOC project would be followed during the NPAL project. Details of these protocols were included in the revised Section 5.2, and we refer you to either this section or Issue 17b.2 of the Responses to Comments (Appendix F) in the FEIS.

You recommended an external, independent review of the monitoring program annually. An annual report would be submitted to the National Marine Fisheries Service (NMFS) as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the Hawaiian Islands Humpback Whale National Marine Sanctuary. For further discussion, we refer you to either the revised Section 5.2 or Issue 17b.3 of the Responses to Comments (Appendix F) in the FEIS.

You commented that if the Kauai source may continue to operate beyond the 5 years specified in the proposed action, this should be noted and reflected in the assessment of possible long-term cumulative effects. Without a quantitative assessment of the role that acoustic thermometry can play in an integrated ocean observing system, it is unknown whether it would be worthwhile for the Kauai source, or another similar source at a different location, to operate beyond the five years specified in the proposed action (see Section 1.3.1.2). Another consideration, as discussed in Section 2.1.1.1, is that "all components [of the source] have a design life in excess of 10 years with a minimum guaranteed design life specification of three years." Since the source was placed off Kauai in late July, 1997, and the projected end period of the proposed five year authorization would be approximately early 2006, it is highly possible that the source may not be functional and available for further operations. Finally, the results from the ATOC MMRPs were designed to address potential short-term effects, while the marine mammal monitoring and studies included as part of the proposed project are designed to address potential long-term effects. Therefore, if the proposed project is conducted, a more accurate estimate of the potential for long-term cumulative effects could be made. For further discussion, we refer you to Issue 8b.2 of the Responses to Comments (Appendix F) in the FEIS.

You also commented that the text should make clear that the risk continuum treats each minute of transmission as a ping, not the whole 20-minutes of transmission (see page ES-5, paragraph 4). We agreed that it could be clearer that the risk continuum is designed to evaluate pings of one minute duration. However, we also felt it was necessary to explain that the data inputted into the risk continuum (i.e., the single ping equivalents) were the sum of the acoustic energy that an animal received over the entire 20-min transmission, or 6 20-min transmissions if evaluating potential effects for a day of transmissions. Therefore, the output of the risk continuum does consider the whole 20-minutes of transmission, or 120 minutes if evaluating one day of transmissions. We refer you to either the cited paragraph in the Executive Summary or Issue 9b.4 of the Responses to Comments (Appendix F) in the FEIS for further detail.

You commented that the term "non-injurious harassment" was not defined, and requested that the term either be defined, or replaced with "Level B Harassment." You also requested that the term "prolonged reaction" be further defined. It is agreed that the terms "non-injurious harassment" and "prolonged reaction" were not adequately defined in the DEIS, and so these terms have been replaced in the FEIS in all places that they are found with "a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding, and migration, which have a potential to impact on the reproductive success of the animals." We refer you to Issues 9b.1 and 9b.2, respectively, of the Responses to Comments (Appendix F) for the specific locations where these two terms were replaced in the FEIS.

You suggested several word changes: p. 4-17, paragraph 4, sentence "Thus, the 10 $\log_{10}(N)$ formula is considered appropriate for assessing..." suggest change "considered appropriate" to "the best available"; p. 4-18, last paragraph, sentence "The risk continuum estimates that..." suggest change "estimates" to "assumes"; p. ES-6, paragraph 1, sentence "These results demonstrate that only humpback whales near Kauai have a chance for disturbance..." suggest change "demonstrated" to "suggest." All suggested changes were made, as described in Issue 18d.2 of the Responses to Comments (Appendix F) in the FEIS.

You commented that an invalid assumption was included in the take analysis (that animals are distributed uniformly or randomly throughout their ranges in the North Pacific). The take analysis did not include the assumption that animals are distributed uniformly or randomly throughout their ranges in the North Pacific. You also suggested that a summary of humpback whale movement around the Hawaiian Islands during the winter months be included in Chapter 3, and to revise take calculations in Chapter 4 as appropriate. Take estimates were made over two scales: one transmission (i.e., 20 minutes) and one day of transmissions (i.e., 24 hours). Estimation of potential effects on longer time scales can be made from the data provided. Further discussion of these comments is included in Issue 9a of the Responses to Comments (Appendix F) in the FEIS.

You suggested to relate the estimate of the number of animals expected to be exposed to various sound levels to the estimates of the potential biological removal (PBR) level, as well as to estimates of the total size, of the potentially affected stocks. PBR, as the name implies, relates to biological removal of animals from the population, whether through mortality or serious injury. It is not anticipated that the proposed project would result in either mortality or serious injury, and therefore it is inappropriate to relate the estimates of the number of animals expected to be exposed to various sound levels to PBR levels. This comment is further addressed in Issue 9c.1 of the Responses to Comments (Appendix F) in the FEIS.

You commented that on page ES-8, paragraph 1, there is an incorrect comment about the maximum level of sea turtle exposure. You further state that the maximum exposure level for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) assumably will be near the 195 dB source level, with maximum sensitivity for these species estimated at 132 dB on page 4-35. Prior to the cited sentence in paragraph 1 on page ES-8, it is stated that the maximum dive depths for leatherbacks are > 1000 m (3281 ft), but that no other species of sea turtle are known to dive > 500 m (1591 ft). Therefore, the maximum exposure level for green, olive ridley, loggerhead, and hawksbill turtle would not be near the 195 dB source level, but rather approximately 145 dB if the turtle were to dive directly over the sound source. Thus, the statement that the measured hearing threshold for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) is only slightly lower than the maximum levels to which these species could be exposed is correct. This comment is addressed in Issue 18b of the Responses to Comments (Appendix F) in the FEIS.

You commented that statements in the DEIS appear to indicate that it is not known from the observed behavioral effects whether the proposed action could have long-term cumulative effects on survival or productivity. However, you state that you believe that the proposed monitoring studies are intended to meet one of the requirements necessary to obtain a "small take" exemption under the MMPA; therefore, these statements should be revised to be more accurate. When the ATOC MMRPs were developed, it was agreed that the results obtained would be limited to the detection of short-term effects, and that the issue of the potential for long-term effects could not be addressed during the two years of studies. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. However, one of the main purposes of the proposed marine mammal monitoring and studies is to conduct studies on the possible long-term effects from the sound transmissions on marine life (as stated in Chapter 1). The work that would be conducted as part of the marine mammal monitoring and studies would also be used to meet one of the requirements necessary to obtain a small take exemption under the MMPA (as described in further detail in Section 5.2). This comment is addressed in Issue 3d of the Responses to Comments (Appendix F) in the FEIS.

You commented that studies to validate ramp-up as a mitigation measure are necessary. While it is recognized that ramp-up may not be an effective mitigation tool, until such time as there is an indication that it is not effective, Scripps, the Navy, and NMFS prefer to err on the side of caution and to incorporate ramp-up into mitigation programs whenever possible. It should also be noted that estimates of potential effects included in the DEIS were not reduced to account for the effectiveness of ramp-up as a mitigation measure. This comment is further addressed in Issue 16b of the Responses to Comments (Appendix F) in the FEIS.

You made the following comments: 1) 2 papers by Frankel and Clark, 1999 mentioned on page 1-13; 2) "Frankel and Clark, submitted" cited on page 3-5 but not included in Literature Cited; 3) it is not appropriate to cite unpublished reports that are not readily available for public review, and suggest that for non-peer-reviewed papers and abstracts, the actual data and analyses are described. The Frankel and Clark citations were updated in the FEIS to reflect the new status of these scientific papers, thereby eliminating the confusion you noted. In addition, every attempt was made to replace references to materials that are not readily available with technical reports that could be found in a library or are readily available. We refer you to Issue 18c of the Responses to Comments (Appendix F) in the FEIS for further details.

You commented that in Section 1.3.2, the FEIS make clear that Level B Harassment is likely to occur and that it is not known whether such taking could have long-term effects. Edits were made to Section 1.3.2 and Section 6.1.2 to clarify this issue for the reader, and we refer you to either these sections or Issue 9c.2 of the Responses to Comments (Appendix F) in the FEIS for the details.

You asked that the FEIS explain the x-axis on Figure 2.1-5, and clarify the information included in the DEIS on the transmission characteristics of the sound source (i.e., difference between Figure 2.1-5 and the transmission loss work done as part of the MMRP). Figure 2.1-5 was corrected in the FEIS so that the full x-axis labels are displayed. Edits were made to Section 2.1.1.2 to clarify the transmission characteristics of the sound source, and we refer you to either this section or Issue 8b.3 of the Responses to Comments (Appendix F) in the FEIS for the details.

You suggested that in the section on species screening (Section 3.2.1), the term "physically affected" be clarified. Section 3.2.1 was edited to try to clarify the concept of acoustic impedance mismatches further for the reader. Please see either this section or Issue 18d.1 of the Responses to Comments (Appendix F) in the FEIS for the corresponding edits.

You also suggested that the FEIS contain a summary of the known hearing range and sensitivity, nature and uses of sounds produced, and how vocalizations and behaviors change in response to sounds for all odontocetes, and, in the masking section (Section 4.2.1.2), include marine mammal vocalizations that fall within and could be masked by NPAL. Figures were constructed that summarize the known frequencies of sounds produced by mysticetes (Figure 3.2-1) and odontocetes (Figure 3.2-3). A paragraph summarizing the known hearing range and sensitivity of mysticetes was included in Section 3.2.2.1. A table (Table 3.2-2) and a paragraph summarizing the known hearing range and sensitivity of odontocetes was included in Section 3.2.2.2. Section 4.2.1.2.1 was revised to include discussion of the marine mammal species that may be masked by NPAL. Please see either these sections or Issue 9d of the Responses to Comments (Appendix F) in the FEIS for the details.

You recommended that the most up-to-date information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal be incorporated into the FEIS. This information, along with data on Hawaiian monk seal hearing sensitivity, was included in the revised Section 3.2.2.3, and we refer you to either this section or Issue 11 of the Responses to Comments (Appendix F) in the FEIS.

You suggested using the hydrophone arrays and processing equipment that detect and analyze the source transmissions to gather information on population distribution and abundance. The arrays that receive the source transmissions are located at distances on the order of 1000 to 5000 km (540-2700 nm) from the Kauai source. At such distances, it is inappropriate to correlate changes in a population's distribution and abundance with the Kauai source transmissions. Please see Issue 17a.2 of the Responses to Comments (Appendix F) in the FEIS for full discussion of this comment.

You commented that the statement that there were no significant changes in abundance is in marked contrast to the changes in distance from the source reported in Popper et al., 2000. The commenter is confusing two separate measures of behavioral response, that of distributional shift and of change in abundance. As stated in the DEIS, there were no significant changes in abundance for any species. However, intensive statistical analyses of aerial survey data showed some subtle shifts in the distribution of humpback (and possibly sperm) whales away from the Pioneer Seamount source during transmission periods. This comment is addressed in Issue 14b.2 of the Responses to Comments (Appendix F) in the FEIS.

You requested that on p. 4-10 of the DEIS, in the *Behavioral Measures* paragraphs that the received level that animals were exposed to during the MMRP experiments be clarified. Edits were made to the cited paragraph, and we refer you to either this section or Issue 14a.1 of the Responses to Comments (Appendix F) in the FEIS.

You requested that the curvilinear shape of risk continuum and its underlying assumptions be clarified, and that 2.5% of animals exposed to a single ping equivalent at 150 dB, 50% of animals exposed to a single ping equivalent at 165 dB would experience prolonged disturbance of biologically important behavior be further explained in the FEIS. Edits were made to the Section 4.2.1.2.1, and we refer you to either this section or Issue 9b.3 of the Responses to Comments (Appendix F) in the FEIS for the full discussion.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

G-15

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

August 16, 2000

00-112/epo

Dr. Peter Worcester
Research Oceanographer
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, California 92093

Dear Dr. Worcester:

Subject: Draft Environmental Impact Statement (DEIS)
North Pacific Acoustic Laboratory
Kauai, Hawaii

Thank you for allowing us to review and comment on the subject document. We do not have any comments to offer at this time.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: OEQC
DLNR
Marine Acoustics, Inc.

G-3

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

July 14, 2000

Dr. Peter Worester
University Of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, California 92093

LOG NO:25779 ✓
DOC NO: 0007NM04

Dear Dr. Worester:

SUBJECT: **National Historic Preservation Act Review, Section 106 Compliance--Draft EIS North Pacific Laboratory and Appendix B and D (UCSD-Scripps Institution of Oceanography) Kauai**

Thank you for the submission of the DEIS. We agree with the DEIS, that no known shipwrecks exist in the project area. Since no construction will take place on land and, existing buildings will be used, then the project will have no adverse effect on significant historic sites. If subsurface activity is required, then mitigation will be required. If the underwater work, discovers inadvertent historic sites, all work will stop in the immediate area. The State Historic Preservation Office should be contacted at (808) 742-7033, so that appropriate mitigation action can be taken. Therefore, we concur with your "no effect" determinations for this project.

If you have any questions, please call Nancy McMahon 742-7033.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Officer

NM:dnm

c: Tom Eisen, DLNR
Kathleen Vigness Raposa, Marine Acoustics, Inc. 809 Aquidneck Ave, Middeltown, RI 02842
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910

G-5

DEPARTMENT OF WATER

County of Kauai

"Water has no Substitute – Conserve It!"

June 22, 2000

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Dr. Worcester:

Subject: Addendum to the Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory

The Department of Water, County of Kauai has no comments to make at the present time.

Sincerely,

for/ Ernest Lau
Manager and Chief Engineer

cc: Tom Eisen
Department of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96809

Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Avenue
Middletown, RI 02842

MAT:san
D:\san\docs\d&c\matia\Draft_EIS_North_Pacific_Acoustic_Laboratory

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

G-6

DEPARTMENT OF WATER

County of Kauai

"Water has no Substitute – Conserve It!"

June 27, 2000

University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Dr. Worcester:

Subject: Draft Environmental Impact Statement (DEIS) for North Pacific Acoustic Laboratory, formerly the Acoustic Thermometry of Ocean Climate Project, Phase II, Location Kauai, Hawaii

We have no comments to this DEIS.

Sincerely,

for/ Ernest Y. W. Lau
Manager & Chief Engineer

cc: OEQC
DLNR, Tom Eisen
Marine Acoustics, Inc., Kathleen Vigness Raposa

KA/san
D:\san\docs\wrp\aok\ea-undrwtr_acoustics

— 4398 Pua Loke Street, Lihue, Kauai, Hawaii or P. O. Box 1706, Lihue, HI 96766-5706 —
Phone No. (808) 245-5400 – Administration FAX No. (808) 246-8628 – Engineering/Fiscal/Shop FAX No. (808) 245-5813

G-14

DEPARTMENT OF THE ARMY
U S ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

June 23, 2000

Civil Works Technical Branch

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive, IGPP 0225
La Jolla, California 92093

Dear Dr. Worcester:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory Phase II Project. We do not have any additional comments to offer beyond those previously provided in our letter dated June 16, 2000.

If you require additional information, please feel free to contact Mr. William Lennan of our Regulatory Branch at (808) 438-4060 and refer to file number 200000214.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

G-10

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4529 • FAX (808) 523-4730

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI, JR
DEPUTY DIRECTOR

July 21, 2000

TPD6/00-02776R/02856R
TPD6/00-03218R

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, California 92093

Dear Dr. Worcester:

Subject: North Pacific Acoustic Laboratory

In response to your letters, the draft environmental impact statement and two addenda prepared for the subject project were reviewed. We do not have any comments regarding these documents.

Should you have any questions regarding this matter, please contact Faith Miyamoto of the Transportation Planning Division at (808) 527-6976.

Sincerely,

Cheryl D. Soon

CHERYL D. SOON
Director

cc: Mr. Tom Eisen, Department of Land and Natural Resources
Ms. Kathleen Vigness Raposa, Marine Acoustics, Inc.

06/22/00 16:05 IGPP → 510 496 3311 NO.738 P02

G-2

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

June 16, 2000

Regulatory Branch

Dr. Peter Worchester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive, IGPP 0225
La Jolla, CA 92093

Dear Dr. Worchester:

This letter responds to your request for a review of the Draft Environmental Impact Statement (DEIS) titled North Pacific Acoustic Laboratory, dated May 2000. Based on the information provided in the DEIS I have determined that a Department of the Army permit will not be required for this project if the Kauai preferred alternative is selected, since there will be no construction in the navigable Waters of the United States. If however the Midway Atoll alternative is selected, a Department of the Army permit will be required from the U.S. Army Corps of Engineers, Honolulu Engineer District for any in-water construction, including laying cable.

If you have any questions concerning this matter, please contact William Lennan of my staff at (808)438-6986 or FAX (808)438-4060 and reference File No. 200000214.

Sincerely,

for George P. Young, P.E.
Chief, Regulatory Branch

Copies Furnished:
Office of Environmental Quality Control, 235 South Beretania, Suite 702, Honolulu, Hawaii 96813
Department of Land and Natural Resources, P.O. Box 621, Honolulu, Hawaii 96809, Attn: Tom Eisen
Marine Acoustics, Inc., 809 Aquidneck Avenue, Middletown, RI 02842, Attn: Kathleen Vigness Raposa

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O-9

LIFE OF THE LAND

Ua Mau Ke Ea O Ka 'Aina I Ka Pono
Hawai'i's own local Community Action Group
Protecting our Fragile Natural & Cultural Resources
through Research, Education, Advocacy & Litigation

July 23, 2000

DLNR
1151 Punchbowl
Honolulu, HI 96813

NOAA, NMFS
1315 East-West Highway
Silver Spring, MD 20910

OEQC
235 S Beretania, Room 702
Honolulu, HI 96813

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02878

UCSD
Scripps Institute of Oceanography
9500 Gilman Drive
LaJolla, CA 92093-0225

re: DEIS for the North Pacific Acoustic Laboratory (NPAL) aka Acoustic Thermometry of Ocean Climate (ATOC)

Aloha,

1. What specific conditions were placed on the ATOC project, by DLNR?

2. What specific conditions were placed on the ATOC project, by other agencies?

3. How do you comply or not comply with each condition?

4. Specifically, which conditions did you violate and why?

5. Why should DLNR impose more conditions if you were unable or unwilling to comply with previous conditions?

6. Did Scripps started the ATOC process without first writing an EIS and applying for a permit? Why?

7. Was the cable initially laid without a permit?

8. Was the applicant required to remove the cable after the permit expired? Was the cable removed?

* 76 North King Street * Suite 203 * Honolulu, Hawai'i 96817 * phone: 533-3454 * fax: 533-0993 *
* email: <lifeoftheland@hotmail.com> *

"At the end of the five-year period, the seabed power cable would be abandoned in place, to avoid disturbing sensitive military instrumentation in the vicinity and the environmental impacts associated with removal. The source would be abandoned in place as well, unless it appeared to still be in sufficiently good condition to warrant recovery." (ES-3-4).

9. If the goal is to "avoid disturbing sensitive military instrumentation", why implement NPAL at this site?

10. How do "the environmental impacts associated with removal" of the cable compare to the environmental impacts associated with laying the cable? 6b.

11. How do "the environmental impacts associated with removal" of the cable compare to the environmental impacts associated with using the cable?

12. Should environmental issues be resolved utilizing cost equations: "The source would be abandoned ... unless ... in sufficiently good condition" to make the applicant some money?

13. Can the existing navy cables serve the same purpose as the NPAL cable? 5a.

"The needs to study long-range underwater sound transmission include: Improvement in the understanding of the basic principles of LF, long-range underwater sound transmission (i.e., acoustic propagation) in the ocean." (ES-2)

14. Is this a buzzword for communication with submarines and/or the detection of submarines? 2

"Little information on hearing exists for marine fish species in the vicinity of the proposed sites ... It is speculated that in order for damage to occur ..." (ES-8)

15. How many dead fish would be needed to change your views? 12

"The No Action Alternative would not have any socioeconomic effects." (ES-10)

16. Wouldn't employing people to remove cable have a positive socioeconomic effect? 7c

17. How much money has been spent on (a) ATOC; (b) NPAL? 7b

18. What is the military role in the project? 2

Mahalo,
Henry Curtis
Henry Curtis
Executive Director

UNIVERSITY OF CALIFORNIA, SAN DIEGO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO   SANTA BARBARA • SANTA CRUZ

CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)   LA JOLLA, CALIFORNIA 92093 0225

December 20, 2000

Mr. Henry Curtis
Executive Director, Life of the Land
76 North King Street, Suite 203
Honolulu, HI 96817

Dear Mr. Curtis,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the questions in your letter:

1. What specific conditions were placed on the ATOC project, by DLNR?

The ATOC Project received two permits from DLNR allowing the use of state-owned submerged state lands offshore Kauai for the subsea cable and associated project operations, including an after-the-fact Conservation District Use permit and a revocable permit. The permit conditions include:

- Comply with all statues, ordinances, rules and regulations of the Federal, State and County governments, the Hawaii Administrative Rules and the applicable Department of Health Administrative Rules.
- Approval for use of state lands was for three years following the DLNR Board approval date; new permitting would be required after the expiration date; if the project is terminated, the subsea cable needed to be removed within six months.
- Submit copies of all Marine Mammal Research Program (MMRP) monitoring reports to DLNR's Division of Aquatic Resources and enter into negotiations with the Division of Aquatic Resources to determine an appropriate role for them within the MMRP, which included having a DLNR representative participate as an observer on the MMRP Advisory Board.
- Perform all mitigation measures set forth in the ATOC Kauai Final Environmental Impact Statement (FEIS) and the National Marine Fisheries Service (NMFS) Scientific Research Permit.
- The Board reserved the right to amend the conditions and stop the project if any unanticipated adverse ecological results occurred.

Scripps also received a "Permit to Engage in Certain Prohibited Activities in the Waters of the State of Hawaii" from the DLNR Division of Aquatic Resources, which authorized the activities allowed under the NMFS permit. This permit required 48 hours advance notice of any field activities.

2. What specific conditions were placed on the ATOC project by other agencies?

Other permits that the ATOC project received are listed below, with their pertinent conditions:

National Marine Fisheries Service Scientific Research Permit (SRP)

- This permit allowed the taking of specified species and numbers of marine mammals and sea turtles by the means and only for the specific purposes described in the application and accompanying documents.
- NMFS approval was required for all individuals identified to carry out the research.
- The activities conducted under the permit had to be in accordance with the approved MMRP protocols.
- NMFS was sole arbiter of whether a given activity was within the scope of the authorization.
- The activities authorized by the permit could be conducted through December 31, 1999, unless terminated by NMFS. The permit could not be extended beyond the expiration date.
- If acute effects, such as injury or mortality of listed species were observed, then source shutdown procedures were to be initiated immediately.
- Any source transmissions were under the control of, or with the full knowledge and concurrence of the MMRP researchers.
- Two weeks written notice was required prior to the conduct of any proposed research or source transmissions.
- Annual reports were required, as well as a "Quick Look" report and bimonthly reports.
- There were restrictions on photography/filming activities.

Hawaii Coastal Zone Management (CZM) Program Federal Consistency Certification

- Following the initial MMRP Pilot Study, subsequent activities required CZM approval.
- At no time were the sound transmissions to exceed an 8% duty cycle during the MMRP Pilot Study and for 2 months during the monitoring phase, and a 2% duty cycle for the remainder of the program.
- The "Source Shutdown Guidelines" had to be adhered to.
- The ATOC facilities must be removed at the end of the program.
- Renewals or amendments of the SRP were subject to CZM approval.

Department of Army Corps of Engineers Provisional Permit

- Extreme care must be taken to avoid placing or dragging anchors on live coral reefs,
- Inform the Coast Guard and the Honolulu office at least one week prior to the installation of scientific devices.

3. How do you comply or not comply with each condition?

Scripps has complied with all of the conditions of the various permits.

4. Specifically, which conditions did you violate and why?

Scripps did not violate any of the conditions of the permits.

5. Why should DLNR impose more conditions if you were unable or unwilling to comply with previous conditions?

As indicated above, Scripps and the ATOC project have not violated any of the permit conditions.

6. Did Scripps start the ATOC process without first writing an EIS and applying for a permit? Why?

The cable was laid by the in the Navy in 1993. Prior to the installation of the source and the initiation of transmissions, the ATOC project prepared an EIS and underwent a complete environmental review, applying for and receiving all necessary permits.

7. Was the cable initially laid without a permit?

Yes, the cable was laid in 1993. An after-the-fact permit Conservation District Use Permit was issued in April 1996.

8. Was the applicant required to remove the cable after the permit expired? Was the cable removed?

The ATOC project as originally proposed included plans for removal of the cable and sound source, and these plans were reflected in the application for the original conservation district use permit (CDUP). The CDUP required removal of the cable within 6 months after termination of the research project, which was then expected to span 2 years.

Although the original permit requires removal of the power cable, the environmental review process associated with the proposed reuse of the sound source and cable for the NPAL project allows for a reassessment of the environmental impacts associated with cable removal, using data collected during the ATOC project. In order to complete the environmental review process associated with the new Conservation District Use application, Scripps has received amendments to the permits from DLNR that allow until September 30, 2001, to remove the cable and the sound source.

9. "At the end of the five-year period, the seabed power cable would be abandoned in place, to avoid disturbing sensitive military instrumentation in the vicinity and the environmental impacts associated with removal. The source would be abandoned in place as well, unless it appeared to still be in sufficiently good condition to warrant recovery." (ES-3-4). If the goal is to "avoid disturbing sensitive military instrumentation", why implement NPAL at this site?

The proposed action is a reuse of the sound source and cable installed off the north shore of Kauai in order to carry out the objectives outlined in the EIS. Questions relating to the removal of the cable are addressed in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The Pacific Missile Range Facility (PMRF) has conducted Remotely Operated Vehicle (ROV) surveys of the ATOC cable, as well as other cables on the west and northwest sides of Kauai, out to depths of about 300 feet. In sandy regions the ATOC cable was found to be buried under sand and barely visible. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable in other regions, especially in areas where the seafloor is primarily sand. The ATOC cable was also found to have coral growing on it to depths of approximately 200 ft (61 meters) in regions where it is not buried in sand. Therefore, removal of the cable could result in damage to this coral.

An additional consideration is the intervening installation by Pacific Missile Range Facility (PMRF) of sensitive cable and instrumentation facilities overlying the ATOC cable along approximately one-third of its length. Because the seabed power cable and the sound source are already in place, their reuse would not disturb the PMRF facilities.

10. How do "the environmental impacts associated with removal" of the cable compare to the environmental impacts associated with laying the cable?

As noted above, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor (Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) and Sections 2.1.1.1 and 4.1.1.1 of the FEIS)

The Kauai ATOC FEIS (1995) analyzed the potential impacts associated with the installation of the sound source and cable at Kauai and concluded that the "physical installations associated with the project are relatively minor and generally benign from an environmental standpoint" (Section 4.2.1.1, ATOC Kauai FEIS).

11. How do "the environmental impacts associated with removal" of the cable compare to the environmental impacts associated with using the cable?

As noted above, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor (see Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) and Sections 2.1.1.1 and 4.1.1.1 of the FEIS).

The EIS provides an expansive analysis of the proposed action's potential environmental effects.

Use of the cable to power the sound source would not have any adverse effects on the physical environment (Section 4.1.1.3 of the FEIS).

With regard to marine mammals, the EIS concludes that the sound transmissions are not anticipated to cause a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal (see Issue 9c of the Responses to Comments (Appendix F) in the FEIS). It also concludes that the information gained through the ATOC MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals (see Issue 15b of the Responses to Comments (Appendix F) in the FEIS). The project itself is intended to fill information gaps and reduce uncertainty concerning the possible long-term effects of low frequency sounds on marine animals. The benefits of the proposed project could not be fully realized by any of the other alternatives proposed (see Issue 18a of the Responses to Comments (Appendix F) in the FEIS).

With regard to fish, the EIS concludes that there is no indication that the proposed project would reduce the quality and/or quantity of essential fish habitat (see Issue 12 of the Responses to Comments (Appendix F) in the FEIS).

12. Should environmental issues be resolved utilizing cost equations: "The source would be abandoned... unless ... in sufficiently good condition" to make the applicant some money?

The decision to abandon or recover the source does not involve environmental issues, because no adverse impacts on the environment would occur should the source be left in place at the conclusion of the project (Section 4.1.1.1 of the DEIS).

13. Can the existing navy cables serve the same purpose as the NPAL cable?

No sound sources are currently deployed that would meet the purpose and need of the proposed project like the sound source and cable presently in place off the north shore of Kauai (see Issue 5a of the Responses to Comments (Appendix F) in the FEIS).

14. "The needs to study long-range underwater sound transmission include: Improvement in the understanding of the basic principles of LF, long-range underwater sound transmission (i.e., acoustic propagation) in the ocean." Is this a buzzword for communication with submarines and/or the detection of submarines?

As indicated in Issue 2 of the Responses to Comments (Appendix F), and as stated in Section 1.1.2 of the FEIS, a full understanding of long-range underwater sound transmission is important for all users of underwater sound since sound is used for such basic tasks as measuring ocean depth, navigating, communicating, and locating underwater objects, including submarines. The proposed project would advance the understanding of the basic principles of low frequency, long-range acoustic propagation and the effects of environmental variability on signal stability and coherence. The ultimate objective is to understand the fundamental limits to acoustic signal processing at long range imposed by ocean processes to enable advanced signal processing techniques to capitalize on the three-dimensional character of the underwater sound and noise fields.

15. "Little information on hearing exists for marine fish species in the vicinity of the proposed sites... It is speculated that in order for damage to occur..." (ES-8). How many dead fish would be needed to change your views?

Issue 12 of the Responses to Comments (Appendix F) in the FEIS elaborates on the statement quoted. As indicated in the Section 4.2.1.2.3 in the FEIS, although little information on hearing exists for the particular marine fish species in the vicinity of the proposed site, sufficient research on fish and their hearing mechanisms allows fish species to be grouped into two categories to estimate potential effects: "specialists" that have specializations that enhance their hearing sensitivity, and "nonspecialists" that do not possess such capabilities. It is speculated that in order for extensive damage to occur, sound levels of 220 to 240 dB (RL) would be needed to injure the ears of nonspecialists. The comparable level for a hearing specialist might be on the order of 50 dB lower. Therefore, the risk of physical harm or injury would be at received levels at or above 180 dB. For the NPAL project, proportionally few fish are expected to be exposed to levels >180 dB, which would occur within a radius of approximately 5 m (18 ft) from the source. In addition, the proposed source site would comprise only a small portion of the range for any fish species. In light of this, plus the low duty cycle and intermittent nature of transmissions, it is concluded that although threshold shifts might occur in a few hearing specialists that are deep divers, the impact on fish populations should be minimal.

16. "The No Action Alternative would not have any socioeconomic effects." (ES-10). Wouldn't employing people to remove the cable have a positive socioeconomic effect?

The No Action Alternative would not have any socioeconomic effects on the Hawaiian Islands because the resources necessary to remove the source and cable north of Kauai are highly specialized equipment that would need to be chartered from the mainland (Issue 7c of the Responses to Comments (Appendix F) in the FEIS). However, as stated in Sections 4.3 and 4.4., the Preferred Alternative would have a minor positive effect on the economic and social environment through the increased economic activity due to payrolls and support expenditures for the 5 to 10 scientists, most from Hawaii marine science educational institutions, who would be involved in aerial surveys as part of the Marine Mammal Monitoring and Studies.

17. How much money has been spent on (a) ATOC; (b) NPAL?

The ATOC project has spent all of its $40M, except for approximately $430K, which is being held in reserve for the removal of the Kauai cable and source.

As indicated in Issue 7b of the Responses to Comments (Appendix F) in the FEIS, it is anticipated that roughly $125,000 per year in NPAL funding would be available for the operation of the source, and that of that amount, $50,000 per year would be expended on the associated marine mammal monitoring studies. No NPAL funds have been spent on the operation of the source to date, other than those needed for the environmental compliance process. In addition to the funding required to operate the source, Scripps and APL-UW anticipate receiving funding from ONR to operate the acoustic receivers, to process and archive the receptions, to analyze the data collected (from previous phases of the NPAL Project as well as from the proposed phase), and to prepare publications on the results.

18. What is the military role in the project?

The Office of Naval Research (ONR) is funding this basic research project, which will be carried out by Scripps Institution of Oceanography, University of California, San Diego, and by the Applied Physics Laboratory of the University of Washington (see Issue 2 of the Responses to Comments (Appendix F) in the FEIS).

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-5

Lovelink

University of California, SanDiego
Scripps Institute of Oceanography
9500 Gilman Drive IGPP 0225
La Jolla California 92093

2000 July 23

Dear Peter Worcester,

Attached is a letter of concern which I have become aware of and I am passing on to you together with this personal appeal for your department to show the intelligence, spirit and courage that will enable you to take hold of the present crisis that is happening to our local ocean and its inhabitants. I am referring to the ATOC sonar naval tests off the coast of Kauai, Hawaii.

Lovelink is a children's art for peace project which was created between New York and Moscow in 1986 (during the Cold War and prior to the fall of the iron curtain). Lovelink and its children's art event was hosted by Pacific Missile Range Facility, Kauai in 1996. Lovelink is facilitating a relationship with global security forces internationally in combination with environmental and social nonprofits because it cares about the wellbeing of children. I can send you more information on request.

My appeal for you to take hold of the ATOC matter is not only based on the specific and unnecessary hurt caused by this regional project and its breach of good promise by both the party of request and the party of permit but it is also based on the accumulative and mounting global cultural, military and scientific environmental pounding, AND NOT ONLY THIS BUT EVALUATED IN THE OTHER REAL CONTEXTS OF: the history of evidentiary abuse (the extent of which continues to the passage of absolute elimination of what you have been educated to recognize as biological life), and by contrast, the light of evolving design freely submitted to you and in the interest of children. Please restore the damages incurred.

Aloha and love,

Michael Daly
Founder, Art and Project Director

Po Box 1629 Hanalei Hawaii . 96714 Phone 808 826 6404 Fax 808 826 0274

LOVELINK 000723

FORM LETTER ATTACHMENT:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6a. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero. Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

15b. 14a.2 11

9d. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

14a. Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

END

O-5

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093 0225

December 19, 2000

Michael Daly
Lovelink
P.O. Box 1629
Hanalei, HI 96714

Dear Mr. Daly,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Next, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. . The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also commented that the monk seal data used in the DEIS was incomplete, that the ATOC MMRP was poorly designed for observing monk seals and recommended that we use updated information. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS. This information is also included in Issue 11 of the Responses to Comments.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

O-11

HANALEI COMMUNITY ASSOCIATION
Post Office Box 789
Hanalei, HI 96714

July 21, 2000

University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

COMMENTS ON DRAFT EIS FOR THE NORTH PACIFIC ACOUSTIC LABORATORY (Formerly ATOC)

Members of the Hanalei Community Association have met and discussed the Draft Environmental Impact Statement for the proposed NPAL project and have the following comments.

Deficiencies in Content

Our members are very familiar with environmental laws affecting projects in Hawaii. The Addendum to the Draft EIS for the NPAL project includes a very thorough analysis of the DEIS by the Natural Resources Defense Council (August 13, 1999). Rather than regurgitate those same concerns, we would like to incorporate their letter into our comments. We are anxious to learn how these concerns will be addressed in the Final EIS.

Specific Concerns

1. Cable – The undersea cable was installed in October 1993 (without a permit). Regarding the cable, the EIS states that:
   - "the natural processes such as sediment drift are likely to have buried the cable"
   - "the cable may be lying on the seafloor surface in some areas buried 1" to 1 foot in others"
   - the cable "can be expected to be even more deeply buried..."
   - "Breaking it out is detrimental in every respect." (p. 2-5)

Issue 6

These are unsubstantiated, vague statements and assumptions. The DEIS should contain concrete scientific information about the current state of the cable. (e.g., investigate to determine if the cable is "well-buried").

O-11

At the time the original after-the-fact Conservation District Use Permit was granted by the State of Hawaii, Board of Land and Natural Resources, representations were made by the applicant that the cable would be removed at the end of the pilot project (ATOC). We are now concerned that since 1993, that PMRF has installed seven cables on top of the ATOC cable, potentially foreclosing future options.

2. Monitoring Program – So far, the monitoring program has been limited to humpback whales. The impacts on whales during ATOC was measured by doing a survey in 1994, when sounds were not transmitted, and another in the 1998 season, when there were more whale sightings than in 1994. Concluding that there is little impact on humpback whales based on two observations is inadequate.

One of the three goals of the project is to "conduct studies on the possible long-term effects from the sound transmissions on marine life" yet the DEIS devotes only 2 ½ pages to "Mitigation and Monitoring" (1-7). The project proposes to conduct four aerial surveys (of whales) during each of the five whale seasons of the project. A more detailed description should be included in the Final EIS that fully discloses the extent monitoring and mitigation to be carried out. 17a.1

17c. In addition, the DEIS doesn't describe how monitoring of other mammals will occur (monk seal, turtles, dolphins, etc. p. 3-10). The Final EIS should contain this information.

17e. The Final EIS should also disclose how much money, staff time, equipment, etc. will be expended on the mitigation and monitoring part of the proposed project.

When the ATOC project was proposed, there were several well-attended community meetings. We look forward to receiving a copy of the Final EIS, so that the community can further discuss the issues and their concerns.

Sincerely yours,

BMoberm for
Diane Daniells
HCA President

c: Department of Land & Natural Resources
Attn: Tom Eisen

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Diane Daniells, President
Hanalei Community Association
P.O. Box 789
Hanalei, HI 96714

Dear Ms. Daniells:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the EIS contain concrete scientific information about the current state of the cable. Section 4.1.1.1 of the Final Environmental Impact Statement (FEIS) was edited to include additional information obtained from the Pacific Missile Range Facility (PMRF), and we refer you to either this section or Issue 6a of the Responses to Comments (Appendix F) in the FEIS for the further details. Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You requested that the FEIS contain further detail on the monitoring program. We extensively expanded Section 5.2 to address the level of detail requested during the public comment period, and we refer you to either this section or Issue 17a.1 of the Responses to Comments in the FEIS.

You requested that the FEIS include information on how monitoring of other mammals (monk seals, sea turtles, dolphins, etc.) would occur. While humpback whales would be the target species of the proposed aerial surveys, all marine mammal and sea turtle species that are sighted would be recorded in the data log, as was the case for the 1993-1998 ATOC MMRP aerial surveys (see Table 3.2-1 for the list all species seen during the flights). This issue is further addressed in Issue 17c of the Responses to Comments in the FEIS.

Finally, you requested that the FEIS disclose the amount of funds, staff time, equipment, etc. that would be expended on monitoring and mitigation as part of the proposed project. A total of approximately $300,000 would be expended on the Marine Mammal Monitoring and Studies.

This would include approximately $50,000 for the baseline aerial surveys to be conducted of the area off the north shore of Kauai during the 2001 humpback winter breeding season, and $50,000 per year (of the $125,000 per year budget) for the 5 years the source would be transmitting to conduct aerial surveys of the area around Kauai and Niihau (see the response to Issue 17a Comment 1 for a detailed description of the aerial survey protocol). This comment is addressed in Issue 17e of the Responses to Comments in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-3 WDCS

Whale and Dolphin Conservation Society

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Bath BA1 2BT
UK

Tel: (01225) 334511
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Email:info@wdcs.org
www.wdcs.org

Dr Peter Worcester
University of California, San Diego
Scripps Institute of Oceanography
9500 Gilman Drive, IGPP 0225
La Jolla, CA 92093
USA

24th July 2000

Dear Dr Worcester,

Comments on the Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory (NPAL), formerly the Acoustic Thermometry of Ocean Climate Project, north of Kauai, Hawaii

I am writing from the Whale and Dolphin Conservation Society (WDCS), an international organisation focused on the global conservation and protection of cetaceans and the marine environment.

Following are WDCS's comments about the request for continued operation for five additional years, of the Low Frequency (LF) sound source (including the seabed power cable) previously installed off the north shore of Kauai, Hawaii, for the use in Acoustic Thermometry of Ocean Climate (ATOC). This project is now referred to as the North Pacific Acoustic Laboratory (NPAL) phase II. Due to the limited time available for comment, the text following highlight our major concerns only.

WDCS is primarily concerned that Scripps Institute of Oceanography is failing to recognise the likely full impacts of their actions on the marine environment. In particular we would like to raise our concerns for the highly endangered Hawaiian monk seal, which is noted by the IUCN Seal Specialist Group as being very sensitive to human disturbance (Reijnders *et al.* 1993), and, this species lives only in the Hawaiian Islands. Of the five species of turtles found near the Hawaiian Islands, the Hawksbill and leatherback turtle are listed as endangered and the Olive ridley, loggerhead and green sea turtles as threatened, yet page 2-16 of the DEIS states that it would be difficult to alter transmission times to avoid their presence as their migratory habits are less well-known than that of humpback whales using the area.

10. Researchers now based at WDCS began highlighting their concerns about human-induced sound in the marine environment many years ago, e.g. 'Whales and the Military' (Simmonds and Lopez-Jurado, 1991). I would like to bring this paper to your attention, noting that it is missing from the cited literature in the Draft Environmental Impact Statement (DEIS). Another important paper missing from those cited in the DEIS is Frantzis (1998).

We have continued to raise such concerns in appropriate international fora, including, for example, at recent meetings of the Scientific Committee of the International Whaling Commission (IWC), and acoustic pollution is now recognised as environmental pollution and a serious threat to cetaceans. Indeed, for species that rely heavily on sound for their normal

O-3

functioning, we believe that a highly precautionary approach must be taken with respect to the development of powerful new marine noise sources.

I note below some specific comments about the DEIS, which WDCS hopes will help you to identify this project as unsuitable for further development, particularly in such a sensitive marine environment.

In **Section 1.2.2 ATOC: Marine Mammal Research Program (MMRP) Results**, the fact that some effects shown from cetaceans, during LF transmissions, were not recognised until laboratory analysis had been completed, does not detract from their significance. Nor does it mean they can be overlooked. On the contrary, it just proves to us how difficult it is to assess biologically meaningful information in species that we know so little about.

Frankel and Clark (1998) state that subtle responses from humpback whales were obtained from ATOC-like signals at received sound levels of up to approximately 130 dB re 1μPa. Yet, in another report on the ATOC website (Frankel and Clark, 1997), they conclude that there are no acute or short-term effects from ATOC transmissions. Noting the logarithmic scale used, the 130-dB value, which includes a response (and therefore affects the humpback whales) is actually much smaller than that being proposed for transmission in this new DEIS.

Other research that has been conducted as part of the ATOC experiment, has showed that humpback whales and sperm whales, at least, were affected. Calambokidis *et al.* (1998) found that humpbacks and sperm whales were generally seen farther from the sound source during experimental versus control surveys.

9b.3

Further, WDCS does not believe that the findings of Au *et al.* (1997) for 2 captive odontocetes, that are quoted in the DEIS (page 1-13), can be taken to be simply representative of other species of toothed whales. Nor can they simply be applied to baleen whales. Audiograms are not available for many species of cetacean, and this includes all mysticetes.

8b.4

In **Section 2.1.1.2 Transmission Characteristics**, the diagram on page 2-9 highlights the deepest known humpback dive as being at 240 metres. Sperm whales and some species of beaked whales are found in the waters around Hawaii, and both are known to be deep divers. Considering how sensitive to sound, particularly at low frequencies, beaked whales appear to be, this needs to be considered further. Noting that sperm whales were shown to be affected by previous ATOC experiments, has any research been conducted on the depths of their dives around the proposed NPAL area?

On page 2-10 it is stated that the received level a humpback whale would experience at a dive of 240 m, directly above the source, is the same as the received level it would experience at a distance of 100 m from another vocalising humpback whale. This, however, should not be taken to mean that such noise is of no concern. Recently published results (Miller *et al.* 2000), for example, have shown that the length of humpback whale songs have been affected by man-made noise. LFA sonar that was directed at singing males showed that, on average, songs were 29% longer during the playbacks. We believe this may have important implications for the reproductive activity of humpback whales that cannot simply be ignored.

Section 2.1.3.1 Restrict Source Transmission Times states that transmissions during the humpback breeding season are needed to advance the understanding of the potential for long-term effects on marine life from LF acoustic transmissions. *Yet mitigation measure 2* requires that increases in duty cycle would not occur during the peak humpback breeding season. How will this be reconciled?

O-3

2.1.4. Alternative project site: The criteria for the identification of an alternative site refer to a suitable location as an area with low potential for environmental consequences and with minimal abundance of marine life that might possibly be adversely affected by LF sound. Why wasn't this considered essential in the initial decision about where to position the ATOC source?

13a.

Section 4.1 covers the **potential effects on the physical environment** but it fails to consider the impact that these cumulative disruptions together might have. It also fails to acknowledge that biologically important areas should be protected (including from disturbance), and that marine animals may not have the option to move away. Although **Section 4.1.2.2 Underwater Noise** states that no cumulative impacts are anticipated with the transmission of individual regional acoustic projects over the next five years, it also adds that military activity would not generate a sound field greater than 180 dB within 22 km of any coastline. Yet effects have been proven, from some species of mysticete tested, at lower levels than this.

9b.3

A technical report entitled 'Marine Vertebrates and Low Frequency Sound' by Croll *et al.* (1999) states, firstly, that baleen whales could suffer temporary auditory damage at noise levels as low as 120 dB and, secondly, that physiological effects could occur well before 180 dB. This seems to have been totally disregarded in the DEIS. The DEIS, however, states that there is no risk at <120 dB (page 4-20). This goes against numerous pieces of previous research conducted on cetaceans and anthropogenic noise (mainly industrial), of which Richardson *et al.* (1995) is just one example. This section also includes a reference to captive acoustic studies on bottlenose dolphins by Ridgway *et al* (1997). These may not be relevant to mysticetes.

Repeated exposure, we fear could lead to, at least, gradual hearing loss and permanent threshold shift (PTS). Ketten (1998) states 'It has been established that repeated exposures to TTS level stimuli without adequate recovery periods can induce permanent, acute threshold shifts.'

In ***Scientific uncertainty*** on page 4-8 it is noted that the results of the MMRP demonstrate no overt or obvious short-term changes in abundance, distribution or behaviour but this omits to say that only a very limited number of species were considered. It also states that few species dive to great depths in the study area, but it isn't the number of species that is important here, it is the probability that those animals that do will suffer.

18e.3

Page 4-21 includes comments from the Low Frequency Sound Scientific Research Program (LFS SRP), conducted by the US Navy. The LFS SRP was a series of three short-term studies. Results from this programme, as far as we are aware, have not yet been finalised, and therefore we consider it premature to consider these as conclusive evidence.

In the summary paragraph of this section on page 4-22, it is noted that '*No two individuals will react to exposure in the same way.*' We agree with this statement and believe that this to be fundamental when considering such short-term research.

The hearing of few cetacean have been studied in detail at all and, for many, studies of low frequency hearing have not been conducted. One species that has been the focus of such tests is the sperm whale, and despite their cessation of vocalisations during tests, it is not yet known why this happens, or its significance.

16b.

Page 4-63 notes that '*the five minute ramp-up period would give all mobile marine animals the opportunity to depart the immediate area of the source*'. As far as we are aware, there is no research that supports this statement, we cannot assume that animals can, or will, leave a specific area even if sound levels are damaging.

O-3

17a.1 Section 5 entitled **Mitigation and Monitoring** is disappointing. Not only is it the smallest and vaguest section in the DEIS, but it seems that monitoring is only to be conducted by aerial surveys. Further, there is no indication of the duration of these studies. There is no detail included about how monitoring will be conducted or how it might take into account all the relevant important biological functions needed to assess the long-term impacts of deploying NPAL for a further 5 years.

Specifically in this section, we believe several of the mitigation measures to be potentially erroneous or misleading.

16a. *Mitigation Measure 1* (and 3) – the benefits of operating '*at the minimum duty cycle (power level) necessary to support the large-scale acoustic thermometry and long-range propagation objectives*' is surely an economic decision, although it is presented as one designed for the welfare or conservation of the species involved.

Mitigation measure 2 – '*Any increases in the duty cycle... will not occur during the peak humpback season*' Is this an admission that one species at least will indeed be affected at the population level?

16b. *Mitigation measure 4* – '*Transmissions..would be preceded by a 5-minute ramp-up of the source power*' Yet there is no evidence that we are aware of, that shows that 'warning' the animals by slowly increasing the sound allows them to leave an area. (Indeed, one which might be of fundamental importance and vital to their biological survival.)

Mitigation measure 7 – '*For the Preferred Alternative and the Midway Alternative, the source cable, and possibly the sound source, would not be removed at the end of the experiment*' Yet, an argument used against the no-action Alternative is that removal of the equipment would have to follow and would upset the now settled marine environment around it.

In Section 6.3 entitled **Humpback Whale Recovery Plan** the DEIS states '*The Recovery Plan recommends goals and actions for: (1) maintaining and enhancing the habitats of humpback whales..*' Further, '*goal 1.3111 focuses on the need to reduce "noise disturbance" in Hawaiian waters.*'

8b.1 The DEIS comments that the proposed project would involve short-term increase in underwater sound in the area. We do not consider 5 years to be short-term.

In summary, and further to our earlier submissions on similar US schemes, WDCS is deeply concerned that use of LF sounds in the world's oceans may lead to:

- Changes in the distribution and abundance of prey species which will lead to a decline in the feasibility of cetacean survival
- Reduced viability of individual cetaceans and disruption, in particular, of their breeding, which is likely to lead to reduced viability of populations
- Disruption of vital biological behaviours, such as feeding, breeding and communications among conspecifics
- Stress, both psychological and physiological, that is likely to have negative physiological consequences, such as lead to increased vulnerability to disease
- Temporary or permanent hearing loss or impairment
- Death, resulting from internal tissue trauma, loss of hearing or stress-induced disease

O-3

WDCS believes that, based on the above comments, the NPAL DEIS is wholly inadequate. Further, any research conducted on marine mammals should be independent and give primary consideration to the welfare and conservation of the species involved.

Much further research must be concluded before projects such as this are allowed to continue, the current information available are inadequate and the risks posed to marine life by LF pollution are unacceptable. Noise pollution is an increasing, and seemingly unrecognised and underestimated, human impact on the marine environment.

I look forward to receiving a response from you.

Yours sincerely

Sarah Dolman
Science Officer
sarahd@wdcs.org

CC: John Nakagawa, Hawaii Coastal Zone Management Program
Kathleen Vigness Raposa, Office of Naval Research
Tom Eisen, Department of Land and Natural Resources
Genevieve Salmonson, Director, Office of Environmental Quality Control (OEQC)

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Sarah Dolman, Science Officer
Whale and Dolphin Conservation Society
Alexander House
James Street West
Bath RA1 2BT
United Kingdom

Dear Ms. Dolman:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested including information on strandings related to military sonar (e.g., Simmonds and Lopez-Jurado, 1991; Frantzis, 1998). The referenced sonars have signal and operational characteristics very different from those of the Kauai source. In a review of the California stranding data while the Pioneer Seamount ATOC source was operational, there are no significant changes in the number, frequency, or species composition during that time period, and we refer you to Issue 10 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for a full discussion of this issue.

You stated that you do not believe that the findings of Au et al. (1997) quoted in the DEIS on page 1-13 can be taken to be representative of other species of toothed whales. You also stated that Croll et al. (1999) and Richardson et al. (1995) include statements that effects could occur at levels below those cited in this DEIS. The research on which the risk continuum for this LF sound source is based is described in detail in the subsection titled "Determination of Risk Function" under the "Risk Continuum Analysis" subsection of Section 4.2.1.2.1, and the commenter is referred to that section for the explanation of the assumptions underlying the risk assessment. The work of Au et al. (1997) on page 1-13 specifically mentions that "the hearing sensitivity of two species of dolphins...was measured behaviorally." Neither here, nor later in the discussion of Chapter 4, are these results extrapolated to all species of odontocetes (e.g., sperm whales). However, Au et al. (1997) summarizes additional studies of hearing sensitivity of other small odontocetes, the results of which demonstrate a trend of relative insensitivity to low-frequency sounds. Therefore, given the best available data, it is assumed that small odontocetes whose auditory systems are adapted for high ultrasonic frequencies would experience similar reactions to those observed by Au et al. (1997). This comment is addressed in Issue 9b.3 of the Responses to Comments (Appendix F) in the FEIS.

You questioned why beaked whales or sperm whales were not included in Figure 2.1-4. Humpback whales were shown in this figure because they are known to frequent the region where the sound source is located. Therefore, they could potentially pass within the immediate vicinity of the sound source while it is transmitting. Beaked or sperm whales were not shown in this figure because they are typically distributed in regions where the water depths are greater than those where the sound source is located (Mobley et al., 1999b), and therefore it is unlikely that they would be within the immediate vicinity of the sound source. Furthermore, it is more probable that humpback whales are sensitive to the NPAL transmissions than either beaked or sperm whales. No odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds. Results from the California ATOC MMRP suggest that there was a possible shift in distribution of sperm whales away from the source while it was transmitting, but that was detected only after intensive statistical analysis and no overt or obvious short-terms changes in distribution or abundance were observed during either the California or the Kauai ATOC MMRPs. We refer you to Issue 8b.4 of the Responses to Comments (Appendix F) in the FEIS for further discussion.

You stated that Section 4.1 covers the potential effects on the physical environment, but fails to consider the impact these cumulative disruptions may have together. Potential cumulative effects on the physical environment are included in the EIS in Section 4.1.2. No modifications to the EIS were necessary. This comment is addressed in Issue 13a of the Responses to Comments (Appendix F) in the FEIS.

You stated that the LFS SRP was a series of three short-term studies whose results have not been finalized, and it is therefore premature to consider these as conclusive evidence. We recognize that most of the results have not been published in peer-review journals, and we referenced the technical report which is readily available for public review. This comment is addressed in Issue 18e.3 of the Responses to Comments (Appendix F) in the FEIS.

You stated that there is no research that demonstrates that animals can, or will, leave a specific area even if sound levels are damaging. While it is recognized that ramp-up may not be an effective mitigation tool, until such time as there is an indication that it is not effective, Scripps, the Navy, and NMFS prefer to err on the side of caution and to incorporate ramp-up into mitigation programs whenever possible. The Minerals Management Service has contracted for studies on ramp-up effectiveness, so it is possible that this issue may be resolved in the near future. It should be noted that estimates of potential effects included in the DEIS were not reduced to account for the effectiveness of ramp-up as a mitigation measure. This comment is addressed in Issue 16b of the Responses to Comments (Appendix F) in the FEIS.

You requested that sufficient details of the monitoring program be included to assess whether the program will be capable of detecting possible project-related changes in distribution, abundance, or productivity. We extensively expanded Section 5.2 to address the level of detail requested during the public comment period, and we refer you to either this section or Issue 17a.1 of the Responses to Comments in the FEIS.

You stated that you believe mitigation measures 1 and 3 are erroneous and misleading because they are an economic decision and are not included for the welfare or conservation of the species involved. Scripps and ONR disagree with this comment. The proposed transmission schedule meets the purpose and needs described in the DEIS; however, by restricting the duty cycle to 2 percent for 10 months and 8 percent for 2 months each year, the project is limited in the amount of data that can be collected. If considerations for the project design were limited to the scientific aspects of the project, increased duty cycles would be preferred. Section 2.1.3.2 of the DEIS discusses the considerations that were made for a source level necessary to meet the purpose and need of the proposed project. By constructing a 20-min signal, the energy of the transmission is spread over time, at much lower source levels, than if the signals were sent as short, loud pulses of the same total energy. If considerations for the project design were limited to the scientific aspects of the project, increased source levels would be preferred to give improved signal-to-noise ratios at the receivers. The acoustic source is capable of transmitting at higher power levels than those used during ATOC and proposed for NPAL. This comment is addressed in Issue 16a of the Responses to Comments (Appendix F) in the FEIS.

You quoted the DEIS's statement that "the proposed project would involve short-term increase in underwater sound," and said you did not consider 5 years to be short-term. We agree with your comment that 5 years is not short-term. The "short-term increase" was meant to refer to the 2-8 percent duty cycle, not the proposed duration of the project. We clarified this for the reader, and refer you to either Section 6.3 or Issue 8b.1 of the Responses to Comments (Appendix F) in the FEIS for the corresponding edits.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-7
O-1

FAX4FREE.COM

fax cover

to: Tom Eisen

fax #: 808 5870455 O-1 Identical letter sent by Cheryl Magill

subject: ATOC

from: Elinor A Gunter O-7

company: Stop LFAS Worldwide Network

date: Monday, July 24, 2000 12:49:08 PM Pacific Time

message:

0-7
0-1

http://connect.to/faxes

Transmit the message you see on this page.

FREE FAX
for
Members of the
Stop LFAS Worldwide Network

Kindly direct your attention to the following message:

6b. CABLE?

WE DON'T NEED NO STINKING CABLE!

Please Remove Your Garbage

5a. AND AS FOR ATOC
OR WHATEVER ELSE YOU'RE CALLING IT THESE DAYS - WHY NOT USE THERMOMETERS INSTEAD?

·This Message Is Addressed to the Following:

1) Office of Naval Research
c/o Kathleen Vigness Raposa

0-7
0-1

Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Attn: Kathleen Vigness Raposa
Fax: (401) 847-7864

2) Department of Land and Natural Resources
Attn: Tom Eisen
1151 Punchbowl Street
Honolulu, HI 96813

Attn: Tom Eisen
Fax: (808) 587-0455

3) State of Hawaii
Office of Environmental Quality Control (OEQC)
Attn: Genevieve Salmonson, Director
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Attn: Genevieve Salmonson, Director
Fax: (808) 586-4186

4) University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Attn: Peter Worcester
Fax: (858) 534-6251

> <<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>> <

Additionally, this message may also be forwarded to:

John Nakagawa, Hawaii Coastal Zone Management Program
P.O. Box 2359 Honolulu, Hawaii 96804
Fax: 808-587-2899
email: jnakagaw@dbedt.hawaii.gov
Phone: 808-587-2878

...and other interested parties.

> <<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>>@<<:::::>> <

Note: This message is being hurried to your office because of the imposed deadline for faxed comments which is the end of the day on Monday, 7/24, 11:59 p.m. local time (HST).

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Multiple Pollution Concerns Now Associated with ATOC

The ATOC legacy continues as concerned environmentalists observe that proponents of the ATOC transmissions once again expose themselves as forerunners of self-serving attitudes in the newly emerging field of Acoustic Arrogance. The multi-disciplined experts in Acoustic Arrogance insist on the following standards of care:

1. Public Policy:

6a.

'romise no adverse impact at the beginning, but if they give you a hard time - just refuse to pick-up your trash. Leave the cable. That'll teach 'em.

2. Historic Time Lines:

Ignore the historic decline of species such as Sea Otters near the California transmitter at Pioneer Sea Mount & make it look like this was due to something else. Disease, maybe? Sure, that's why they swam inland through Elkhorn Slough. It certainly wasn't to get away from the noise!

11

3. Habitat Protection:

What's the loss of a few MONK SEALS between friends?

4. Whale Migration Routes:

If it wasn't for Low Frequency Sound, we'd never get any relief from all those tourists who come to see those pesky whales.

7a.

5. Other Sonar Devices & Damage Evidence:

Won't be available until after we push our documentation through for approval. (Hurry before they extrude that California Cable!)

13a

6. Potential Damage to Divers:

Transmit at night and they'll never know how close they came to being fried!

7. Community Outreach:

Just tell them it's safe.

15a.

8. Evidence of Changed Singing Patterns in Humpback Whales:

O-7
O-1

So?

9. Responsibility of Navy researchers during massive whale strandings in Bahamas in March of this year:

10.

Hey, you can't prove we did it!

10. Growing body of evidence relating sonar exposures to adverse impacts on cetaceans:

From an engineering point of view, we'd like to see those tolerance levels improve. In other words, they'll get used to it.

11. Recent Federal Court Outcomes: The LFS SRP finding regarding Humpback Whale impacts led a federal judge to make the following comment in a recent opinion: "Despite the above outcome [i.e. the dismissal of the case on legal grounds], the Court notes and expresses its concern that, according to an independent study sponsored by the Navy, low frequency sonar tests do indeed affect marine life. Although the researchers are not sure whether the tests have a harmful impact, they recommend at the very minimum that the Navy should avoid active breeding areas when performing tests. Further, the Court notes that the article states that whales breed and calf off Hawaii in the winter and spring before migrating north to the Gulf of Alaska. Following these recommendations would seem to have a severe impact on any testing off Hawaii." Order Denying Plaintiffs' Motion to Set Aside Order and to Consolidate Reopened Case with Pending Case; Order Granting Motion to Dismiss; CIV. No. 98-232 ACK; CIV. No. 00-00166 ACK-BMK dated July 10, 2000 at page 3 citing to "Navy study indicates sonar has effect on whales" Honolulu Advertiser, June 22, 2000 at A3.

The response from the Experts in Acoustic Arrogance is clearly to ignore the judge's comments and to continue processing paperwork which will allow their programs to continue.

Those to whom this message is addressed are now in the final phase of their initiation into the elite group of individuals who determine the level of destruction that the ocean acoustic environment will endure.

Warning: If you stand in the way of those who are pushing ATOC/NPAL through, you may never be able to call yourself an Expert in Acoustic Arrogance.

Remember, what ATOC really stands for is:

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OCEAN
CREATURES!

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 19, 2000

TO: Elinor Gunter
Cheryl Magill

Dear Ms. Gunter and Ms. Magill,

Thank you for your comments regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your comment letters.

First you indicated that the cable should be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We have addressed your comment regarding the use of thermometers as an alternative in Issue 5a. As indicated in our response, one of the purposes of the project is to study long-range propagation, therefore, it is necessary to have a controlled sound source that transmits a known waveform designed for that purpose.

You also indicated some concern for monk seals. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also mentioned the potential effect that the project might have on the tourism and whale-watching industry. We have responded to this concern in Issue 7a of the Responses to Comments (Appendix F) and included additional information in Section 3.4.1 of the FEIS. Additional information on the cumulative effects can be found in the DEIS in Section 4.1.2.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas, and the reports of other strandings in areas close to other military activities. As discussed in Issues 10 and 15a, since the referenced sonars have signal and operational characteristics very different from those of the Kauai source, it is not appropriate for this EIS to analyze those strandings. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-10

SIERRA CLUB
Kaua'i Group of the Hawai'i Chapter
Post Office Box 3418
Lihu'e, Kaua'i, Hawai'i 96766

July 21, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Roposa;

The Kaua'i Group of the Sierra Club would like to express the following concerns regarding the NPAL (formely ATOC) Draft Environmental Impact Statement.

Our primary concern regards the effects of the project on marine life, especially but not limited to endangered species, off the north coast of Kaua`i. (Species needn't be endangered to deserve humane treatment.)

15a Chapter Four of the DEIS repeatedly states that effects are expected to be minimal or not significant on humpback whales, monk seals, green and other turtles, fish, etc. We find these claims to be implausible and unscientific given the paucity of data available on the effects of sound on these creatures. As the DEIS states, "There is a lack of information regarding large whales because they are difficult to study. In many areas, potential effects must be inferred from incomplete data." (p. 4-6) The same can be said of monk seals and other creatures. The data, for example on humpbacks, the most studied group, only looks at short term, gross physical movement. Here some statistically significant effects are noted, but there is not even sufficient knowledge by the researchers to know what these effects actually signify. Instead, the effects are described as "subtle" and assumed to be minimally significant. This is dealing with data on the basis of assumption rather than knowledge, and is not scientifically sound. 15a

15b On the whole the DEIS too often makes the implicit (and unscientific) move from "we don't have data to prove this" to claiming that "no significant effect exist." The Environmental Impact Statement needs to offer much more complete research data before minimal or no impact claims can be substantiate. This is particularly true of long term, cumulative and indirect, effects on all potentially affected species. There is special need of this for the monk seals, which are the most endangered species, are known to use underwater vocalizations, and also are presently breeding on Kauai and Ni`ihau (which the DEIS fails to consider). 15b

At a public hearing on Kaua`i (July) the researchers present seemed to argue that the lack

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O-10

SIERRA CLUB
Kaua'i Group of the Hawai'i Chapter
Post Office Box 3418
Lihu'e, Kaua'i, Hawai'i 96766

of data on whales was why the testing should continue. This is fallacious reasoning, a kind of equivocation on what is at issue that begs the questions of whether or not the tests should be done. The burden of proof is to show that there is no harm before the tests are conducted. There are other forms of research available to do this, some of which is in the process of being done (e.g. at Woods Hole). Also, a typical protocol of research would be to study the auditory organs and then the physiological responses to a range of acoustics before behavioral studies of responses to potentially harmful sounds. 17a.3

Ironically one of the rationales for the NPAL/ATOC testing is supposedly to gain data on global warming. Despite another five years of testing being insufficient to accomplish this, the irony is that it is the same attitude of *lack of restraint* towards potentially harming creatures and damaging the environment that underlies both NPAL testing and global warming.

We strongly urge the Navy to discontinue its NPAL testing, to remove its underwater cable and transmitter, and the State of Hawai`i Department of Land and Natural Resources not to renew or extend its Conservation District Permit for NPAL testing.

Sincerely yours,

Monte S. Hull, Ph.D.
Conservation Co-Chair,
Kaua`i Group, Sierra Club

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093 0225

December 15, 2000

Dr. Monte S. Hull, Conservation Co-chair
Kauai Group of the Hawaii Chapter of Sierra Club
P.O. Box 3412
Lihue, HI 96766

Dear Dr. Hull:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that there is a general lack of scientific knowledge regarding the impacts o sound on marine mammals, and that this is particularly true of long term, cumulative, and indirect effects. While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, an extensive investigation into the potential effects of the Kauai sound source was conducted during the ATOC MMRPs, whose results are summarized in Chapters 1 and 4. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. The purpose and need for the proposed marine mammal monitoring and studies is to conduct research on the possible long-term effects from the sound transmissions on marine life. These comments are further addressed in Issues 15a and 15b, respectively, of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You recommended studying auditory organs, then the physiological responses to a range of acoustics before conducting behavioral studies of responses to potentially harmful sounds. It is an ideal sequence to be able to investigate auditory organs, then the physiological responses to a range of acoustics before conducting behavioral studies of responses to potentially harmful sounds. However, to collect auditory organs requires relatively recently deceased specimens, and physiological tests require captive animals, both of which are rare occurrences for most marine mammals. Furthermore, studies conducted as part of the ATOC MMRPs demonstrated that all of the detected effects were subtle and found only after intensive statistical analyses.

Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population. This comment is addressed in Issue 17a.3 of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-12

Citizens Opposing Active Sonar Technology
C.O.A.S.T.
PO BOX 82, Kula, HI 96790
sonar@mauihouse.com

With support and endorsement by the following individuals and organizations:

Animal Welfare Institute

Bobbie Sandoz
Noted author and dolphin expert

Cetacean Society International

Conservation Society

Earth Island Institute

Erich Pica
Economics Analyst Friends of the Earth

In Defense of Animals

International Wildlife Coalition

Julie Jacobson
Member, Hawaii County Council

Ocean Mammal Institute

The Oceania Project

Orca Quest

Progressive Animal Welfare Society (PAWS)

Sea Shepherd

Whale Rescue Team

The Ocean Mammal Institute is hosting an LFAS Symposium at the College of the Atlantic at Bar Harbor, August 14 and 15. The purpose of this symposium is to bring together Navy personnel, Congressional Representatives, environmental groups, citizens and the media in order to clarify and address the very controversial issues surrounding LFAS.

7/26.

Jul 31 10 57 '00

Dear Mr. Eisen

Please accept the enclosed material as one way of expressing why we are so vehemently opposed to any testing or deployment of Surtass LFA sonar.

The video is only 10 minutes long — please give us that much of your time during the current review period.

Mahalo,

Pamela Polland
808/878-3220

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Ms. Pamela Polland
Citizens Opposing Active Sonar Technology
P.O. Box 88
Kula, HI 96790

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Polland,

We have received a copy of your letter to Tom Eisen at the Department of Land & Natural Resources (DLNR) regarding the U.S. Navy Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar. Your comment was received by the North Pacific Acoustic Laboratory (NPAL) project, which is not affiliated with the Navy LFA Program.

NPAL, formerly known as the Acoustic Thermometry of Ocean Climate (ATOC) Project Phase II, is a basic scientific research program that proposes to retain in place and reuse the power cable and sound source installed north of Kauai for an additional five years in order to 1) perform the second phase of research on the feasibility and value of large-scale acoustic thermometry; 2) study the behavior of sound transmissions in the ocean over long distances; and 3) conduct studies on the possible long-term effects from the sound transmissions on marine life. The source is located on the seafloor at a depth of 807 meters (2648 ft.), approximately 8 nautical miles (14.8 km) north of Kauai at 22°20.94'N, 159° 34.18'W.

The NPAL project is funded by the Office of Naval Research (ONR) and will be carried out by Scripps Institution of Oceanography, University of California San Diego, in conjunction with the Applied Physics Laboratory of the University of Washington.

The Final Environmental Impact Statement for the NPAL project is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

O-2

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road • Crawford 317 • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

July 21, 2000
RE: 0704

Dr. Peter Worcester
University of California, San Diego
Scripps Institute of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Dr. Worcester:

North Pacific Acoustic Laboratory (NPAL)
Draft Environmental Impact Statement
Offshore, Kauai

The Scripps Institute of Oceanography of the University of California, San Diego proposes five additional years of use of an existing sound source and seabed power cable which was originally installed for the Acoustic Thermometry of Ocean Climate (ATOC) project off of the northern end of the island of Kauai. The purposes of the NPAL study are to perform the second phase of feasibility studies on large-scale acoustic thermometry, to study the behavior of long-distance sound transmission, and to study possible long-term effects of the sound transmissions on marine life.

This review was conducted with the assistance of George Curtis, Affiliate faculty, University of Hawaii at Hilo; Hans-Jurgen Krock, Ocean Engineering; and Sherri Hiraoka, Environmental Center.

General Comments

1 The large number of comment letters expressing concern over this NPAL project seems to indicate that the significance of the research being conducted has not been convincingly conveyed to the public. Many lay people may not appreciate the ocean's role in global weather and climate, and the importance of understanding the heat dynamics of the ocean. Perhaps more emphasis could be placed on this method of measuring ocean temperatures as one of the best tools we have in understanding the heat structure of the ocean. By explaining in lay terms how this may be an effective way of making the best possible decisions regarding global energy questions, the public may be more willing to at least approach this subject with an open mind.

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Dr. Worcester
July 21, 2000
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If the ATOC measurements are definitive in demonstrating the occurrence of anthropogenic global warming, then any result from this project may have great impact on future management decisions. For example, the detrimental environmental and economic effects of global warming, if in fact proven, may make for a very strong case for the movement away from fossil fuels and toward renewable energy sources. The resulting fair economic comparison with renewable energy sources such as Ocean Thermal Energy Conversion (OTEC), may then lead to large scale development of environmentally benign energy systems. Therefore, there seems to be an indication that many people do not understand the potential place your project has in our ability to make practical global management decisions.

ATOC measurements taken over a period of time are also likely to be useful in describing the dynamics of the tide related internal wave phenomenon prominent around the Hawaiian Ridge. This will provide a tie between the thermal structure of the ocean and the large scale mixing and transport of water masses. A better understanding of these processes will allow more accurate projections of climate change and rates of response to human activities.

Description of Proposed Action and Alternatives

18d.6 All sound values in the EIS are made to the water-standard, as opposed to the air-standard. Most lay people have no concept of the water-standard. Therefore, a reference should be made up front between the air and water standards (74 dB) to ensure that the public realizes that there is a difference. This may also relieve some of the confusion of the public who may see or hear other reports which compare sound levels to a jet plane, which is really not an accurate example for water references.

Transmission Characteristics

4b. The rationale for selection of a 20-minute transmission time is not particularly clear. How was this duration determined? Is this length of time necessary for your purposes? Would it be possible to reduce the duration of the transmissions to further reduce the risk of impacts to marine organisms?

4c. The project includes the possibility of an 8 percent duty cycle for up to two months out of each year. Although the 8 percent duty cycle will not occur during peak humpback whale season, we suggest that any 8 percent transmission be restricted to months during which the minimum number of whales are present in Hawaiian waters, perhaps September-November, unless this period is shown to negatively impact other endangered or threatened species such as the sea turtles.

Existing Noise Setting

8a.1 One of our reviewers suggested that there had been some type of an ambient noise database study undertaken in years past for waters off Kauai as part of the Pacific Missile Range Facility (PMRF)operations. The acronym for the project was believed to be "*ANADS*". It might be useful for the NPAL team to contact PMRF about this research on the chance that such a database, if it does exist, might be useful for your long-term temperature studies. This research, since it was conducted on Kauai, may provide for more accurate measurements of the study area.

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July 21, 2000
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Potential Direct and Indirect Effects on the Physical Environment

We concur with the determination that abandonment of the cable in place is the best decision and suggest that this mitigation measure be adopted. Section 4.1.1.1 (page 4-2) quotes Myers, et al. (1996) as saying, "a cable that is well buried on a favorable bottom and left undisturbed will probably last many years. Breaking it out is detrimental in every respect." Also stated is the probability of the cable being buried by both sand and coral growth and the laying of Navy cables over the ATOC cable. Consequently, abandonment of the ATOC power cable, and possibly the source, is a suggested mitigation measure of NPAL. However, we note that there is discussion in the EIS that examines cable removal. The potential disturbance caused by the removal may not only disturb the coral reef community which may have developed on the cable, but it may also cause nearby corals to become smothered by disturbed sand.

We note that there is an underwater communications cable at Hanauma Bay which seems to have little impact on the surrounding environment. The cable was placed there by GTE/Hawaiian Telephone in the 1950's and remains in the water even though it is no longer in use.

Potential Effects on the Biological Environment

17a.1 The purposes of the proposed NPAL project include studying the long-term effects of the sound transmission on marine life. Several possible effects on marine organisms are discussed in section 4.2.1.2 Underwater Sound (pages 4-6 to 4-8), including Direct Damage to Hearing Receptors, Permanent Threshold Shift, Temporary Threshold Shift, Behavioral Disruption and
17b.2 Habituation, and Masking. Which of these potential effects will be studied, which mammals will be emphasized, and how will those studies be conducted? What is proposed to be done if observed effects of the sound transmissions are determined to be detrimental?

17a.2 Animal abundance and distribution were selected as the emphasis of the Marine Mammal Monitoring Studies. Is this the extent of the long-term studies on marine life? It may be beneficial to develop a partnership with the Navy at Barking Sands to monitor vocalizations before, during, and after the NPAL transmissions to collect the most complete data possible. Observations after the NPAL transmissions are completed may be a useful indicator in determining the extent of the project's impacts on the whales and could provide significant information for possible future studies on either marine mammal behavior or temperature studies in the southern hemisphere.

4.c It is noted that the Humpback whales, *Megaptera novaeangliae* are the only seasonal visitor to the Hawaiian Islands. They are however, the most sighted species of whales in and around the state by a wide margin. Could testing be stopped or curtailed while the whales are in residence in the water around the Hawaiian Islands? Could the test be a shorter duration during the time when the humpbacks are in Hawaiian waters?

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Dr. Worcester
July 21, 2000
Page 4

On page 1-7, the last sentence, you state that the information from the Marine Mammal Monitoring Studies would be provided annually to the National Marine Fisheries Service (NMFS) for review. Would it be possible to have another, non-governmental outside reviewer of the marine mammal data, perhaps the Hawaii Institute of Marine Biology or the Waikiki Aquarium. Some members of Hawaii's activist community may feel that the NMFS may not objectively review the data. 17b.3

Definition of Acronym

Please define the acronym HIFT, used on page 4-31 when discussing behavioral sensitivity to low-frequency sounds. We were unable to find the meaning of the acronym.

Conclusion

The draft EIS was well written and it was apparent that considerable effort was made to explain the technical components of the project in a manner that the general public could understand. Nevertheless, the discussion in the some of the sections relating to acoustic modeling and risk analysis involved terminology and concepts not readily grasped by those not directly familiar with acoustical research. Thus, it would be helpful to further clarify these sections, perhaps with the use of simplified analogies. Such clarification is important because while many concerns are valid, a lack of full understanding of the technical aspects may lead to inappropriate concerns. Furthermore, we suggest that an additional paragraph be added to the final EIS to call attention to the full implications of this research to the global environment. We appreciate your consideration of our comments, the efforts you have taken to mitigate impacts to marine life, and the endeavors you have made to study those impacts for future reference. 18d.7

Thank you for the opportunity to comment on this Draft Environmental Impact Statement.

Sincerely,

Peter Rappa
Environmental Review Coordinator

cc: Tom Eisen, DLNR
Kathleen Vigness Raposa, Marine Acoustics, Inc.
OEQC
James Moncur, WRRC
George Curtis, UH Hilo
Hans-Jurgen Krock, Ocean Engineering
Sherri Hiraoka, Environmental Center

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Peter Rappa, Environmental Review Coordinator
University of Hawaii at M_noa, Environmental Center
2550 Campus Road, Crawford 317
Honolulu, HI 96822

Dear Mr. Rappa:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that the significance of the ocean climate research is not conveyed in the DEIS. We felt that Section 1.1 adequately conveyed the value of the three research thrusts that are mutually supporting, forming a coherent and integrated whole. Section 1.1.1 further details the ocean climate research, explaining how the ocean plays an integral role in determining the planet's weather and climate, and the objective of the proposed research to quantitatively assess the feasibility of using acoustic thermometry in an integrated ocean observing system for ocean weather and climate. This comment is further addressed in Issue 1 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You suggested that the FEIS explain the difference between air and water standards for sound values early on in the text to avoid confusion. We added a paragraph at the end of the introduction to the Executive Summary and to Chapter 1 to encourage readers unfamiliar with underwater sound to read Appendix A prior to reviewing the EIS. This comment is addressed in Issue 18d.6 of the Responses to Comments (Appendix F) in the FEIS.

You commented that the rationale for selecting a 20-minute transmission duration could be clearer in the FEIS. We agreed that while the rationale for a 20-minute transmission duration was included in Section 2.1.3.2 of the DEIS, it would benefit the reader to also include that information in Section 2.1.1.2 which discusses the transmission characteristics of the proposed project. We refer you to either the revised Section 2.1.1.2 or Issue 4b of the Responses to Comments (Appendix F) in the FEIS for the corresponding edits.

You recommended that the proposed 8 percent transmissions be restricted to months during which the minimum number of whales are present in Hawaiian waters, perhaps September through November, and recommended that operations avoid the primary breeding season of the humpback whale. Since humpback whales are sighted more than an order of magnitude more frequently than any other species (see Table 3.2-1) and their migration to Hawaiian waters is relatively well known, the 8 percent duty cycle would not occur during the peak humpback season (January - April). However, further restricting the 8 percent duty cycle transmissions to specific months each year would limit the potential results of both the acoustic thermometry and long-range propagation studies, and would not meet the purpose and need of the proposed project. Restricting source transmissions to seasons when humpback whales are not present would severely reduce the utility of both the acoustic thermometry and long-range propagation studies, however, as well as make it essentially impossible to study the potential long-term effects of low frequency sound transmissions on marine life. Since neither the California nor the Kauai ATOC MMRP found any overt or obvious short-term changes in the abundance or distribution of marine mammals in response to the transmissions of the ATOC sound sources (see further discussion in Section 4.2.1.2.1), it is not anticipated that overt or obvious short-term changes in abundance or distribution would result from continued use of the ATOC sound source. We refer you to Issue 4c of the Responses to Comments (Appendix F) in the Final Environmental Impact (FEIS) for further discussion of this issue.

You suggested contacting Pacific Missile Range Facility (PMRF) to determine if a study of ambient noise (possible acronym "ANADS") was undertaken and if it would be useful for this project. We contacted PMRF, and the system mentioned is Ambient Noise And Data System (ANADS). ANADS measured the amount of noise radiated from passing Navy ships, not the ambient noise off PMRF. In addition, ANADS measurements concluded at PMRF in the early 1980s, so any measurements made are out-of-date. Therefore, this database would not be a useful resource for this project. This comment is addressed in Issue 8a.1 of the Responses to Comments (Appendix F) in the FEIS.

You also suggested that it may be possible to develop a partnership with PMRF to monitor vocalizations on their arrays before, during, and after NPAL transmissions to collect data on potential effects. The facilities of PMRF are located in an area where the received levels from the Kauai source are too low to study the potential acoustic impact of source transmissions on marine mammals. The potential for masking was studied during the Kauai ATOC MMRP, and is included in the summary of the MMRP results in Chapters 1 and 4. We refer you to these chapters or Issue 17a.2 of the Responses to Comments (Appendix F) in the FEIS for further discussion.

You requested that the FEIS contain further detail on the monitoring program. We extensively expanded Section 5.2 to address the level of detail requested during the public comment period, and we refer you to either this section or Issue 17a.1 of the Responses to Comments in the FEIS. You also requested that details of what would be done if the observed effects of the transmissions were determined to be detrimental be included in the FEIS. Protocols similar to those used during the ATOC project would be followed for the review, suspension, and termination of the NPAL project. These protocols are detailed in the revised Section 5.2 and in Issue 17a.1 of the Responses to Comments (Appendix F) in the FEIS. This comment is addressed in Issue 17b.2 of the Responses to Comments (Appendix F) in the FEIS.

You recommended an external, independent review of the monitoring program annually. The annual report would be submitted to NMFS as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the Hawaiian Islands Humpback Whale National Marine Sanctuary. This information is included in the revised Section 5.2 and in Issue 17b.3 of the Responses to Comments (Appendix F) in the FEIS.

You requested that the FEIS further clarify the sections relating to acoustic modeling and risk analysis for the general public. Revisions were made to the sections on acoustic modeling and risk analysis as part of the response to other comments. These modifications were aimed at clarifying these sections for the reader. This comment is addressed in Issue 18d.7 of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

07/24/2000 MON 16:42 FAX 001/001

O-8

PACIFIC WHALE FOUNDATION

July 23, 2000

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093
Fax: (858) 534-6251

Dear Dr. Worcester:

I am writing to provide comments on the DEIS, prepared for the NPAL proposal in Hawaii.

17c. In our letter of September 15, 1999, we expressed concerns that a true multiple species marine mammal monitoring plan is needed, given the many protected species inhabiting this region (but not yet part of your current, narrow, research program). I repeat that concern.

15a. I also repeat our serious concerns over lack of scientific knowledge regarding impacts of sound on marine mammals, in our comments on the Navy's SURTASS LFA Sonar DEIS.

18c. I would like to add a new concern that your program overlooks the impacts of NPAL on marine ecosystems structure and function, and that it could potentially have complex and cascading impacts that will spread throughout marine ecosystems in Hawaii and beyond. For instance, NPAL may negatively affect the abundance and biomass of the fishes that are the prey of monk seals. Any such effect gravely impacts many protected species of cetaceans.

12 The probable fact that your observational work is being driven by MMPA, ESA, and NEPA, does not relieve you, I believe, from a new duty laid out in the Sustainable Fisheries Act (Magnuson-Stevens Act), to refrain from destroying essential fish habitat (EFH). I have a concern that disruptive sound emissions will indeed negatively impact fish assemblages; as noted, this could in turn alter ecosystem structure and function, which affects marine biodiversity at critical levels of genome, species, habitat. As your own DEIS acknowledges at ES-8, "Little information on hearing exists for marine fishes . . . ." That so, I believe much further scientific investigation is first needed, into effects of sound on fishes & ecosystems.

1. Finally, I would appreciate assurances that if the project does nonetheless proceed despite such concerns, only the stated NPAL climate-related scientific research would be undertaken with this equipment.

Yours sincerely,

Dr. Robert Wilder
Director, Conservation Programs

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Dr. Robert Wilder
Director, Conservation Programs
Pacific Whale Foundation
101 North Kihei Road
Kihei, HI 96753

Dear Dr. Wilder:

Thank you for your July 23, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that a true multiple species marine mammal monitoring program is needed. It should be noted that while humpback whales are the target species of the proposed aerial surveys, all marine mammal and sea turtle species that are sighted are recorded in the data log, as was the case for the 1993-1998 ATOC MMRP aerial surveys (see Table 3.2-1 for the list of all species seen during the flights). We refer you to Issues 17c of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for further discussion of this issue.

You commented that there is a general lack of scientific knowledge regarding the impacts of sound on marine mammals. While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, an extensive investigation into the potential effects of the Kauai sound source was conducted during the ATOC MMRPs, and we refer you to the summary of results in Chapters 1 and 4, and to Issue 15a of the Responses to Comments (Appendix F) in the FEIS for more details It should also be noted that the proposed project would include marine mammal monitoring and studies to continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects.

You stated that the DEIS overlooked the potential impacts on the marine ecosystems structure and function (e.g., the effect on the abundance and biomass of fish that are the prey of monk seals). The potential direct, indirect and cumulative effects on fish were included in the DEIS in Sections 4.2.1.2.3 and 4.2.2.1.3, along with discussion of potential effects on Essential Fish Habitat (EFH) in Section 4.2.5. In addition, any potential indirect effects on monk seals, and other marine mammals, were included in Section 4.2.1.2.1. This comment is addressed in Issue 18c of the Responses to Comments (Appendix F) in the FEIS.

You commented that the NPAL project is required to address the potential effects of sound on fishes and ecosystems, as well as any effects on fish under the Magnuson-Stevens Act. The NPAL DEIS did address the potential effects of sound on fishes and ecosystems in Section 4.2.1.2.3. Potential effects on fish under the Magnuson-Stevens Act were addressed in Section 4.2.5 of the DEIS. This comment is addressed in Issue 12 of the Responses to Comments (Appendix F) in the FEIS.

Finally, you recommended that, if the project proceeds, only the climate-related research be conducted. The proposed project has three research thrusts that are mutually supporting, forming a coherent and integrated whole. This recommendation is further discussion in Issue 1 of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

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Total pages: 3

July 23, 2000

Dr. Peter Worcester
Scripps Institution of Oceanography
University of California, San Diego
9500 Gilman Drive, IGPP 0225
La Jolla, CA, 92039 USA

Dear Dr. Worcester,

I am writing to provide comments on the Draft Environmental Impact Statement (DEIS) for the North Pacific Acoustic Laboratory (NPAL) project. I have a number of concerns regarding the DEIS related to the monitoring measures (Section 5.2 in the DEIS). The monitoring program as outlined consists of: 1) four aerial surveys annually (all within the humpback whale season – January to April); and 2) coordination with the local marine mammal stranding network to detect long-term trends.

17a.1 In terms of aerial surveys, presumably each of the four surveys would involve one flight in the site area (see Mobley et al. 1999). Such a limited number of surveys is insufficient to provide a rigorous evaluation of humpback whale abundance or distribution in the area. Since humpback whale numbers fluctuate throughout the breeding season, and the exact timing of migration to the Hawaiian breeding grounds varies from year to year, having only four surveys could easily result in missing the time of peak numbers in any particular year (note that this could "document" either an increase or a decrease in numbers regardless of whether such a change actually occurs). In order to minimize such possibilities and to adequately describe changes in abundance and distribution, aerial surveys should be run at least an average of once per week during the humpback breeding season, rather than the once per month as stated.

17c.1 More importantly, the number, methods and schedule of such surveys does not allow for a rigorous assessment of the potential for long-term impact on other protected species which utilize the area year-round. I wrote last year as part of the scoping process for this DEIS, and commented on the need to monitor potential impacts on other protected species (including sperm whales and various dolphin species, as well as sea turtles). With the variability of reactions to sound sources between species that has been documented (e.g., compare bowhead whales to humpback whales), it is inappropriate to say that since no response was detected by one species of cetacean that no response will occur for another, untested, species of cetacean. Given the year-round presence of species such as bottlenose, spotted and spinner in the area, and the relative lack of information on population sizes or trends (see Table 4.2-3), clearly such surveys would have to be done year-round, and the protocols used would have to be geared for the species of interest (e.g., humpback whale aerial surveys are typically flown at higher altitudes than dolphin aerial surveys). For small cetaceans, surveys flown at higher altitudes will result in a greater proportion of animals being missed, as well as lead to problems associated with mis-identification of species. In addition, small cetaceans can easily be missed in sub-optimal sighting conditions, and unless surveys are run frequently enough to account for sub-optimal conditions, it will not be possible to rigorously estimate numbers or examine distribution patterns, nonetheless detect changes in numbers or distribution which might be related to operation of the sound source. Surveys also need to be designed taking into account the behaviour of the species involved (e.g., spinner dolphins frequently spend the day close to shore, where they may be missed by aerial surveys which do not include very near-shore areas, as is often the case in the Hawaiian Islands, given the steep cliffs found in many areas). It should also be noted that aerial surveys are likely to under-estimate population sizes unless correction factors are developed to account for animals missed while diving. For example in Hawaiian waters, three years of surveys by Mobley et al (1999) between the islands of Maui and Lanai documented only one sighting each of bottlenose dolphins and spotted dolphins between these two islands, while boat-based surveys by Baird et al. (2000) in one year documented that both species are quite common in the same area. To give you an idea of the possible discrepancy between boat-based and aerial surveys for estimation populations of odontocetes, compare results for bottlenose dolphins from Table 4.2-3 (41 individuals in an area of approximately 4,800 square nautical miles – see map on page 4-25) with those obtained off Maui/Lanai (approximately 100 individuals from a 293 square nautical mile area; Baird et al. in prep). As stated in Table 4.2-3, bottlenose dolphins appear to be "found in similar densities over all water depths", thus the differences in depths in these two areas should not be responsible for the differences in numbers. It is true that aerial surveys are only producing spot estimates, while the mark-recapture methods used in the boat-based surveys produce estimates of the total population using an area, yet the 16-fold difference in these densities is a cause for concern. If the NPAL monitoring program is supposed to be able to assess odontocete abundance and distribution (as well as long-term changes in both of these) with any sort of precision, clearly four aerial surveys each year will be insufficient to do this.

16b. The Hawaii "marine mammal stranding network" is also listed as part of the monitoring program. After starting (in 1987) and running (for seven years) a cetacean stranding network in British Columbia, I am quite familiar with the use of stranding networks to monitor marine mammals (see e.g., Baird, 1994). Compared to stranding networks elsewhere in North America, the Hawaii "network" (in terms of monitoring cetaceans) is largely ineffective due to a lack of public awareness and, more importantly, a lack of coordination efforts with local organizations and residents by the National Marine Fisheries Service. I believe a large proportion of cetacean strandings which do occur in Hawaii are not reported or investigated, and as such this network could not be used to adequately detect long-term trends. As well, species which regularly strand in Hawaii are not necessarily those which are most common in the area (see Nitta 1991; Mazzuca et al. 1999), and thus using strandings to monitor long-term trends in numbers is not necessarily appropriate.

8b.4 In terms of the dive depths used in the exposure models, assuming that humpback whales dive to a maximum of 186 m (Table 4.2-2) is likely incorrect. Time-depth recorders deployed on humpback whales in the relatively shallow (ie., less than 200 m) waters between Maui and Lanai in the spring of 2000 indicated regular dives below 100 meters, with a maximum dive

depth recorded to 177 m (Baird unpublished), in only 63 hours of data collection. Given the average rates of descent and ascent documented, combined with dive durations, it is theoretically possible for humpbacks to dive to over 700 meters, so potential exposure to higher sound pressure levels is possible.

Sincerely,

Dr. R.W. Baird
Post-doctoral Fellow, Dalhousie University

References

Baird, R.W. 1994. A program to monitor the status of small cetaceans in British Columbia. Pages 117-125 in Proceedings of the Pacific Ecozone Workshop, February 2, 1994. Institute of Ocean Sciences, Sidney, B.C.

Baird, R.W., A.M. Gorgone, A.D. Ligon and S.K. Hooker. 2000. Odontocete population assessment in the four-island area, Hawaii: a preliminary summary of results from 1999. Presentation to the NMFS Pacific Scientific Review Group, Maui, HI. Available at: http://is.dal.ca/~whitelab/rwb/SRG.pdf

Baird, R.W. A.M. Gorgone, A.D. Ligon and S.K. Hooker. In prep. An assessment of the population size of bottlenose dolphins off Maui, Hawaii in 1999.

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cc: Marine Acoustics Inc.
DLNR

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Dr. Robin Baird
2 Supance Court
French's Road
Cambridge, CB4 3LB
England

Dear Dr. Baird:

Thank you for your July 23, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented on the number of aerial surveys to be conducted each humpback season, and the frequency with which the surveys would be flown. We have modified the proposed monitoring program in light of these concerns, and are proposing to fly 8 aerial surveys during the humpback season at an interval of 8 days (to correspond with the NPAL transmissions). We have extensively expanded Section 5.2 to address the level of detail requested during the public comment period, and we refer you to either this section or Issue 17a.1 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for further information.

You also commented that the number, methods and schedule of suggested surveys do not allow for a rigorous assessment of the potential for long-term impacts on other protected species that utilize the area year-round. While humpback whales are the target species of these aerial surveys, all marine mammal and sea turtle species that are sighted are recorded in the data log, as was the case for the 1993-1998 ATOC MMRP aerial surveys (see Table 3.2-1 of the DEIS for a list of all species seen during the flights). This comment is further addressed in Issue 17c of the Responses to Comments (Appendix F) in the FEIS.

You stated that in terms of monitoring cetaceans, the Hawaii stranding network is ineffective due to a lack of public awareness and a lack of coordination with local organizations and residents by NMFS. In addition, species that regularly strand are not the most common species in the area, and thus using strandings to monitor long-term trends in numbers is not necessarily appropriate. Marine mammal stranding data available in California showed no significant changes during the period when the ATOC Pioneer Seamount source was operating (see data included as part of response to Issue 10). The Hawaii stranding network is therefore not the primary method being proposed to investigate the potential for long-term effects. However, in the unlikely event that a peculiar stranding event or trend does occur, it would benefit all parties, i.e., the NPAL project, the local Kauai contact (Mr. Don Heacock of DLNR Aquatic Resources), and the NMFS-Honolulu contact (Ms. Margaret Dupree), if previous communication had already occurred. This comment is addressed in Issue 17d.1 of the Responses to Comments (Appendix F) in the FEIS.

You stated that assuming that humpback whales dive to a maximum of 186 m is likely incorrect, and cited the average rates of descent and ascent documented during unpublished work by Baird, suggesting it is theoretically possible for humpbacks to dive to over 700 meters, so potential exposure to higher sound levels is possible. This comment is addressed in Issue 8b.4 of the Responses to Comments (Appendix F) in the FEIS. As stated by Baird et al. (2000), if the recorded dives are restricted to include only those whales found in waters deeper than 100 m and only those dives greater than one body length, 89% of the dives recorded are still less than 100 m. Therefore, the maximum dive depth used in the figure, as substantiated by the research of Hamilton et al. (1997), is the best available data, and the estimated exposure levels represent typical scenarios for humpback whales distributed off the north shore of Kauai.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

JUL-24-00 11:00 BOB+PAT BASHAM TEL:509-738-6509 P:02

I-121

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6b First, I request that the cable and transmitter be fully removed, as required by the original permit after the completion of the project.

15b. Second, I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. I am especially concerned about Whales and Dolphins.

Third, as stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. I find it totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawaii.

Sincerely,

Dr. Robert Basham

Dr. Robert Basham
3479 River Path
San Antonio, TX 78230

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Dr. Robert Basham
3479 River Path
San Antonio, TX 78230

Dear Dr. Basham,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Second, you expressed concerns regarding the safety of endangered species, especially whales and dolphins. This comment is addressed in Issue 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, the results from the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) suggest that the proposed project would not result in biologically significant acute or short-term effects, however we plan to continue to monitor for these effects, as well as to study the potential for long-term effects due to the continued operation of the sound source. In fact, one of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments: Issues 6a, 6b, 15a, 15b

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Page 1 of 4
F-3

July 20, 2000

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Attn: Peter Worcester
Fax: (858) 534-6251

Dear Mr. Worcester:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

15b.
14a.2

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

10.

II) There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

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The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy

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maneuvers

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

6a.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawaii.

Sincerely,

Jacqueline Baum-Pence
7229 Capps Crossing Rd.
Grizzly Flat, CA. 95636

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093 0225

December 13, 2000

Jacqueline Baum-Pence
7229 Capps Crossing Road
Grizzly Flat, CA 95636

Dear Ms. Baum-Pence,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, in a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998, there are no significant changes in the number, frequency, or species composition of strandings during that period.

Finally, you requested that the cable and transmitter be removed from the seafloor, and that data on the condition of the cable be provided. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 10, 14a, 15b

I-156

July 22, 2000

Hawaiian Wildlife Tours
P.O. Box 681
Kilauea, HI 96754

Dr. Peter Worcester
University of California, San Diego
Scripps Institution of Oceanography
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Comments on Draft Environmental Impact Statement: North Pacific Acoustic Laboratory

7a Section 3.4.1 dealing with affects on the tourist industry is very outdated and incomplete with respect to the whale watching and tour boat industry on Kauai. Since moving from Hanalei, the industry has been using larger boats and extending their range of operations. A study was recently completed for the Hawaiian Islands Humpback Whale National Marine Sanctuary of the whale watching industry in Hawaii. I suggest that you include that information in the EIS. If the NPAL has an impact on the distribution and abundance of marine mammals around Kauai, then it could seriously impact this segment of the tourist industry. If the M3 studies show negative impacts upon the local whale populations, how will the NPAL modify or stop its operations in a timely manner? What protocols have been established for terminating the experiment? 17a.

This May the Navy began conducting RIMPAC exercises in the Hawaiian Islands, especially around Kauai's PMRF. Three days later a pygmy sperm whale beached itself on the Na Pali Coast and died. This occurred within the area of the ATOC cables and adjacent to the PMRF Shallow Water Training Range Cables. If a correlation between marine strandings and NPAL operations occurs, will NPAL immediately modify or stop its operations? 17a

8a. On page 4-4 and later you state the "Limited military activities occur in the vicinity of the Kauai Source", yet we know that the military conducts extensive surface and underwater testing using facilities of PMRF. I guess it depends on how you define "vicinity". The US Navy has just (7/8/2000) applied for permission to deploy LFAS in ocean waters around the Hawaiian Islands. The noise generated by these activities would add significantly to potentially dangerous ambient noise. The military's activities are not adequately addressed in this EIS.

6a. The SWTR cables are an example of military use of marine resources implemented without State of Hawaii permits. Those cables, in addition to the ATOC cables, add up to considerable debris on the ocean bottom. The CDUP issued by the State of Hawaii BLNR for ATOC required the removal of the submarine cables. You have provided no scientific evidence or photo documentation of the condition of the cables on the sea floor. You have no data to substantiate your claim that "If left unrecovered on the seafloor, the source and cable would have no effect on the benthic environment". Benthic structures can cause significant scouring of the ocean floor when currents are present. Stating (pg. ES-4) that the cable is "likely to have buried" or that removal is "likely to disrupt the environment" is not sufficient to justify the leaving of your debris on the ocean floor. As mentioned at your scoping meeting in Hanalei, submarine or robotic video recording of portions of the 20 nm of cable and the source equipment will reveal their condition. Although portions of the ATOC cable lie entangled with the SWTR cables, the ATOC cable could be cut in that area and the remaining <20 nm of cable removed and recycled. Don't use our ocean as your dumping ground.

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11

Your information about monk seals around Kauai (pg. 3-24) is very incomplete and outdated. So far this year, at least 12 different monk seals have been observed on Kauai. Since 1988 the DLNR has recorded six monk seal pups have been born on Kauai, three in the past year alone. How many additional births have taken place is unknown. What is the effect of the proposed NPAL sound on pups in utero? These seals are observed all along the Na Pali coast, but perhaps not from the air since they so closely mimic beach rocks. The aerial surveys done by Dr. Mobely do not even cover nearshore areas, thus monk seals were not adequately sampled.

9c.

Why were monk seals not included in Table 4.2-3 for Kauai on "AIM Input for Distribution, Abundance, and Density" and also in Tables ES-1 and 4-2.5 of "Percentages of Marine Mammal Populations Potentially Affected by the Preferred Alternative"? An incidental take permit must be obtained for monk seals, as well as for the whales.

14b.

Finally, I am not confident that the correlation's between ATOC testing and marine mammal responses, or the lack thereof, were of sufficient scope to delineate long term and chronic effects upon humpback whales. The crude behavioral responses that were measured by sightings from great distances might not have been relevant to physiological and psychological changes to the whales.

I would like to reiterate my position that if any response is noted by M3, then NPAL should stop operations immediately.

Thank you for the opportunity to comment on the draft EIS. I look forward to seeing your responses in the final EIS.

Sincerely,

Carl J. Berg, Ph.D.

cc: OEQC
DLNR
Marine Acoustics, Inc.

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Dr. Carl Berg
Hawaiian Wildlife Tours
P. O. Box 681
Kilauea, HI 96754

Dear Dr. Berg:

Thank you for your July 22, 2000 comment letter and your participation in our public meetings on Kauai concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

You stated that Section 3.4.1 was outdated, and suggested contacting the Hawaiian Islands Humpback Whale National Marine Sanctuary for a recent study on the whale watching industry in Hawaii. A copy of the report by Dan Utech (1999), "Valuing Hawaii's Humpback Whales: The Economic Impact of Humpbacks on Hawaii's Ocean Tour Boat Industry", was obtained from the HIHWNMS. Data from this report were used to revise the part of Section 3.4.1 that addressed the whale watching and tour boat industry on Kauai. Please see that section or Issue 7a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for further details.

You asked that the EIS indicate the level of changes that, if observed, would trigger a review, suspension, and termination of the project, and to determine how long analyses would take before results would be available for altering the transmission schedule. Protocols similar to those used during the ATOC project would be followed for the review, suspension, and termination of the NPAL project, and we refer you to either Issue 17a or the revised Section 5.2 for additional information.

You also asked about the protocol for responding to stranded animals. This issue is addressed in Issue 17d and Issue 17a of the Responses to Comments, and in the revised Section 5.2 of the FEIS. Coordination between the NPAL project, the local Kauai contact (Mr. Don Heacock of DLNR Aquatic Resources), and the NMFS-Honolulu contact (Ms. Margaret Dupree) would occur prior to the initiation of transmissions. During those communications, appropriate contact information would be conveyed in the unlikely event that a peculiar stranding event or trend occurs during the NPAL project, You stated that it is inaccurate to state that "limited military activities occur in the vicinity of the Kauai source" with PMRF doing extensive surface and underwater testing. It is agreed that the phrase "military activities" should be further clarified, and we refer you to the modifications in Section 4.1.2.2 or Issue 8a.2 of the Responses to Comments in the FEIS.

You commented that no scientific evidence or photo documentation of the condition of the cables on the sea floor was provided in the DEIS. We have responded to this comment in Issue 6a and 6b of the Responses to Comments in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. As indicated in Issue 6a, in consultation with the Pacific Missile Range Facility (PMRF), they have provided additional information on the status of the ATOC cable, and of other cables in the area. Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You recommended including Hawaiian monk seals in the modeling for the Kauai site. In response, monk seals were added to the take analysis for the Preferred Alternative, and we refer you to Issue 9c.3 or Chapter 4 and the Executive Summary of the FEIS for further details.

You state that you are not confident that the correlation between ATOC testing and marine mammal responses, or lack thereof, were of sufficient scope to delineate long-term and chronic effects on humpback whales. This comment is addressed in Issue 14b.4 of the Responses to Comments in the FEIS. The research conducted under the ATOC MMRPs was not designed to address long-term or chronic effects on any species, and was never stated as such. This is the main purpose of the marine mammal monitoring and studies proposed as part of the NPAL project.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-175
F-3

DENNIS A. BOARDMAN
Attorney at Law
6025 NE 16th St.
Portland, OR 97211

July 28, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6a. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

15b.
14a.2

11. Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance

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11 from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals living in the waters of Hawai'i.

9d. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

14a. Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

10. There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

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Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

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The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

D A Boardman
Dennis A. Boardman

cc: Tom Eisen / Hawai'i DLNR
Genevieve Salmonson / Director Hawai'i OEQC
Peter Worcester / UCSD, Scripps Institute of Oceanography
David W. Blane / Director Hawai'i Office of Planning
Hawaii CZM Program

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Dennis A. Boardman
Attorney at Law
6025 NE 16th Street
Portland, OR 97211

Dear Mr. Boardman,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Next, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also indicated that the monk seal data used in the DEIS was incomplete and that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals. In response, we have incorporated additional on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

Finally, you also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings during that period.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 10, 11, 14a, 14b, 15a, 15b

I-116

[1710 Destry Lane]
[Cottonwood, Az. 86326]

[7/21/2000]

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Peter,
I sent this letter to Kathleen Raposa & would like you to know of our concern for the wonderful cetaceans of our beautiful planet.

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

15b
14a.2

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to

11 observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions. 14a.2

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,
Love + Respect

Gena Bouquet
Gena Bouquet

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Gena Bouquet
1710 Destry Lane
Cottonwood, AZ 86326

Dear Ms. Bouquet,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Next, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also indicated that the monk seal data used in the DEIS was incomplete and that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection

"Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-91

808-949-0551

July 21, 2000

Lara Butler

5648 koapana rd, ◆ kapaa, HI 96746

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15a 15b Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. 9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution.

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140a No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Please help us to make the powers that be take responsibility for destroying our enviroment. The whales and marine life have been there longer then we and should be respected.

Sincerely,

Lara Butler

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Lara Butler
5648 Keapana Road
Kapaa, HI 96746

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Butler,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a, 15b

I-134

Helen & Colleen Carr 808-949-0551
P.O. Box 217, Big Oak Flat, CA 95305

July 24, 2000

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles. Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward. Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests. The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions. As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. In my opinion, until limited testing has been done to determine the danger to these priceless mamals of our oceans,the Navy must immediately

15a
15b
11
9d
15a
14a

discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Helen & Colleen Carr

I-134

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093 0225

December 14, 2000

Helen and Colleen Carr
P.O. Box 217
Big Oak Flat, CA 95305

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Helen and Colleen Carr,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a, 15b

I-102

808.949.0551

July 22, 2000

Clarence Ching

64-823 Mamalahoa Highway, ♦ Kamuela, HI 96743

Tom Eisen
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Tom Eisen:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. I am not sure of the depths in which transmissions have been, are being, will be made. 15a This is especially critical because sounds can travel a long ways in certain depths, even from one end of the ocean to the other. What potential distances are your sounds being transmitted to and what are their total affects on all forms of life in those areas? Until these affects are known to a high degree of accuracy, your activities must stop. There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as 15a 15b do endangered and other sea turtles. Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward. Hawaiian monk seals have a remaining population of less than 1300. 11 The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. 9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests. The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or 14a.2 from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions. As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Clarence Ching

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Mr. Clarence Ching
64-823 Mamalahoa Highway
Kamuela, HI 96743

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Ching,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First, you stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

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We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a and 15b

I-46

808-949-0551

July 20, 2000

Ed Coll

POB 2320, ♦ Puhi, HI 96766

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauaʻi.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauaʻi are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15a 15b Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauaʻi in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution.

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14a No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Stop this insanity and destruction of the planet for no other reason than to provide a big fat welfare check to the military/industrial complex. They are wasting enough of my money already!

Sincerely,

Ed Coll

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)   LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Ed Coll
P.O. Box 2320
Puhi, HI 96766

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Coll,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a, 15b

I-100

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Ms. Raposa,

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit. 6a 6b

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero. 15b 14a

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i. 11

Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. 9d

Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests. 15a

FROM : RAY RAIRDON YACHT SALES PHONE NO. : 2062845537 Jul. 22 2000 07:58AM P3

I-100

umpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. onetheless, all that was really studied were phenomena that were visible from shore observation stations or from erial surveys, such as numbers of whales and distribution. No studies were made of their physiological or sychological reactions to these sounds. Without having any information on these kinds of reactions, it was xtremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC ransmissions.

14a

s stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special andate to nurture the species which have become endangered largely through our own negligence, mismanagement, nd abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low requency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Kathryn D Colter

Name: Kathryn D. Colter

Address: 9234 13th Ave NW

City, State Zip: Seattle, WA Country: USA

I continue to be amazed and saddened by the atrocities committed by humans, against animals, in the name and under the guise of research!

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 13, 2000

Ms. Kathryn D. Colter
9234 13th Avenue NW
Seattle, WA

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Colter,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

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We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-169

Isis Conseur
PO Box 1103
Kilauea, Kaua'i, Hawai'i 96754
July 24, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. 15b Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal 14a.2 fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the

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aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

17 An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM hose spill response/ restoration in 1998-9) resulted in a population estimate of a minimum of 16-24 seals on Kaua'i's beaches. This survey/estimate did not include Ni'ihau, although the monk seal population there is believed to be significantly larger. The Ni'ihau seals are able to use Kaua'i's beaches as often as necessary due to the proximity of the two islands and the documented "local" traveling habits of Hawaiian monk seals. Clearly the Ni'ihau monk seal population is also at risk of suffering from NPAL's low frequency transmissions.

It has ~~recently~~ been proven through scientific studies — a collaborative effort between NMFS and the National Geographic Research Division — that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, unknown. It must be assumed however that the hearing of these vocalizations, by other seals or by other species, is intrinsic to their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns.

20 Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

50 Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as
10.2 numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these

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kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely yours,

Isis Conseur

Isis Conseur

cc: Tom Eisen / Hawai'i DLNR

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Isis Conseur
P.O. Box 1103
Kilauea, Kauai, HI 96754

Dear Ms. Conseur,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Next, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You commented that the monk seal data used in the DEIS was incomplete, that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals and recommended that we use updated information. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS. This information is also included in Issue 11 of the Responses to Comments.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6b, 9d, 11, 14a, 14b, 15a, 15b

I-180

Nancy Crom
577 Western Ave.
Albany, NY 12203

July 21, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

15b

14a.2

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

11

I-180

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

14a.2

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and

The US Navy is pushing for a second 5 year permit to blast the undersea environment north of Kaua'i with its high intensity ATOC signals. The Navy originally installed the 25 miles of cable which powers the transmitter in 1995, without first obtaining a state permit. The Hawai'i Board of Land and Natural Resources eventually granted an after-the-fact permit, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor.

The public comment period on the Navy's Draft Environmental Impact Statement (D-EIS) for this project ends MONDAY JULY 24th. Your immediate attention is needed, in the form of a statement commenting on the D-EIS.

ATOC stands for Acoustic Thermometry of Ocean Climate. The program has recently been renamed North Pacific Acoustic Laboratory, or NPAL. It is a Navy project to study 1) ocean temperature, 2) the behavior of sound transmission in the ocean over long distances, and 3) the effects of low frequency sound on marine mammals.

Major concerns exist for the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. This past March, seventeen whales beached themselves in the Bahamas, in close proximity to Navy tests of another low frequency sonar.

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Some of those whales had bleedings eyes, and scientists found that some of them had hemorrhages in or around their ears.

The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Other endangered species which call these waters home include sperm whales and three varieties of sea turtles. Hawaiian monk seals, with a remaining population of less than 1300, are the most endangered species in the region. Long term effects of ATOC/NPAL signals on these species are not known, nor are short term physiological effects, or effects on breeding patterns. 15b 14a.2

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. The California Coastal Commission has wisely acted to stop the Navy's ATOC program in that state's coastal waters. It is time to follow suit in Hawai'i.

Scientists who work with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these animals. Do the researchers studying the reactions of humpback whales to the ATOC/NPAL transmissions have similar protocols? If not, how is it known that these endangered whales have not been subjected to various stresses as a result of being repeatedly exposed to ATOC/NPAL's low frequency rumbles? What is known about the effects of these sounds on pregnant whales and their fetuses? What is known about the long term effects of ATOC/NPAL exposure on new born humpback whale calves? 14a.2 15b.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Nancy Crom

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Nancy Crom
577 Western Avenue
Albany, NY 12203

Dear Ms. Crom,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

Next, you expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You commented that the monk seal data used in the DEIS was incomplete, that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals and recommended that we use updated information. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS. This information is also included in Issue 11 of the Responses to Comments.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection

"Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6b, 9d, 11, 14a, 14b, 15a, 15b

I-125

45 Bardwell Street
So. Hadley, Massachusetts 01075
U.S.A.

July 23, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Avenue
Middletown, Rhode Island 02842

Dear Ms. Raposa,

SUMMARY: I respectfully request that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters around Hawaii.

I am deeply concerned about the adverse environmental impact of the NPAL/ATOC, that human beings, cetaceans, and other life is being harmed by this program in ways we do not yet fully understand. Let's be "safe rather than sorry," and wait until we know thoroughly what the ramifications of our NPAL/ATOC actions are.

5a. If we need a program to detect "hostile" submarines, perhaps–rather than possibly deafening and/or disorienting cetaceans–we should instead be putting our efforts into gaining understanding of how to communicate with cetaceans. They seem to be the underwater "communications" experts and might be willing to teach us a "how to detect submarines" method that is far more elegant and sophisticated than these, the Navy's understandably crude and disruptive first efforts.

Bats taught us sonar for the submarines of World War II. If we don't alienate and/or hurt them, cetaceans might teach us to do harmlessly what the NPAL/ATOC program is doing harmfully.

DISCUSSION:

As to why, in part, I make the above statements, I would like to provide the following additional comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter off the coast of Kaua'i from information that I have gleaned from other sources.

6b. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocan floor. I join with many others to request that the cable and transmitter be fully removed, as required by the original permit.

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Also, there are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species (hawksbill and leatherbacks), and three threatened species (Hawaiian green, olive ridley, and loggerheads) also inhabit these waters. **Long-term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects**, or effects on breeding patterns, or on marine mammal fetuses in utero.

14a.
15b.

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the **ATOC marine mammal research program**, were **poorly designed for observing monk seals.** These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore, monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be **unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.**

11

Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would **not be observable until after the damage was done.**

9d.

Very little is known about beaked whales. They are deep divers who seem to have a **strongly adverse reaction to low frequency sounds**, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. These were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

15a

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, **all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys**, such as numbers of whales or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely **unscientific to jump to the conclusions that there was no response on the part of humpbacks to the ATOC transmissions.**

14a.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own previous negligence, mismanagement, and various forms of environmental abuse.

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It is totally inappropriate and inhumane (and beneath us human beings) to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. We are not the only sentient, ensouled beings on this planet, and we have no right to toy with the health of our fellow beings. We will wish them to extend to us the same courtesy.

We now have a chance to make things better, to make up for our previous harmful mistakes. **Please discontinue the Navy's NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.**

Dear friend, **thank you** for listening and considering, and for using your true wisdom and power for the highest good of ALL beings. We humans are stewards of this beautiful planet and are now awake at last to our responsibilities: we must look out for the interests of All, not just for the narrow interests of a segment of the human population.

May you be Guided to the most loving and balanced solution. May God/Goddess/All That Is bless you.

Sincerely,

Judy Dietel

Judy Dietel
45 Bardwell Street
So. Hadley, Massachusetts 01075

Telephone: 413-545-3815
E-mail: jdietel@econs.umass.edu

cc: Tom Eisen/ Hawai'i, DLNR
Genevieve Salmonson, Director, Hawai'i OEQC
Peter Worcester, UCSP, Scripps Institute of Oceanography
David W. Blane, Director, Hawai'i Office of Planning
Hawai'i CZM Program

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Judy Dietel
45 Bardwell Street
So. Hadley, MA 01075

Dear Ms. Dietel:

Thank you for your July 23, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested a discussion of alternate methods of studying long-range propagation. This issue is addressed in Issue 5a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You also requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of the purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, table and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issues 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 5a, 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-79

Bruce Fehring
P. O. Box 565
Kilauea, HI. 96754
7/21/2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am a resident of Kauai and a concerned, aware citizen writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and 15b. 14a.2 three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were

JUL. 31. 2000 8:13AM EMERALD ISLE PROP. NO. 3314 P. 2

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likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, 14a.2 such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOCprogram and fully remove its cable and transmitter from the waters of Hawai'i.

Yours truly,
Bruce Fehring

cc: Tom Eisen / Hawai'i DLNR
Genevieve Salmonson / Director Hawai'i OEQC
Peter Worcester / UCSD, Scripps Institute of Oceanography
David W. Blane / Director Hawai'i Office of Planning
Hawaii CZM Program

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093 0225

December 14, 2000

Bruce Fehring
P.O. Box 565
Kilauea, HI 96754

Dear Mr. Fehring,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also commented that the monk seal data used in the DEIS was incomplete, that the ATOC MMRP was poorly designed for observing monk seals and recommended that we use updated information. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS. This information is also included in Issue 11 of the Responses to Comments.

I-18

808-949-0551

July 19, 2000

Stephanie Fried

P.O.Box 520, ♦ Waimanalo, HI 96795-0520

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I hope that you will take these comments into serious consideration. I am writing to provide input on the Draft Environmental Impact Statement (DEIS) for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. I strongly urge the Navy to discontinue its ATOC/NPAL experiments in Hawai'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15a 15b Because the short and long term impacts of ATOC/NPAL signals on marine mammals are not known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-18

14a The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Stephanie Fried

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 13, 2000

Ms. Stephanie Fried
P.O. Box 520
Waimanalo, HI 96795-0520

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Fried,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First, you stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issue 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, the results from the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) suggest that the proposed project would not result in biologically significant acute or short-term effects, however we plan to continue to monitor for these effects, as well as to study the potential for long-term effects due to the continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC Marine Mammal Research Program (MMRP) was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

I-181

MARGIE FYFE
455 POINT BREEZE RD.
FLEMINGTON
NEW JERSEY 08822

JUL 24 10 23 AM '00

July 22, 2000

Hello

14a. Please do not allow the navy to use NPAL, as there is much evidence it can harm marine life.

Please help our marine creatures :)

Sincerely
Margie Fyfe

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a, 15b

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Margie Fyfe
455 Point Breeze Road
Flemington, NJ 08822

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Fyfe,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. In your letter, you expressed concern regarding the safety of marine life. We would like to point out that one of purposes of the proposed action is to conduct monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. The NPAL project is also proposing to continue to monitor for short-term or acute effects. We plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP). This issue is discussed in Issue 14a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

We are enclosing a copy of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue14a

July 22, 2000

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive, IGPP 0225
La Jolla, CA 92093

From: Marina Gagliardi
9945 Robbins Dr. #103
Beverly Hills, CA 90212

From: Ron Greenspun
248 Pomona Ave #4
Long Beach, CA 90803

Dear Mr. Worcester,

Requesting that you please use your authority to help stop or at least question the upcoming renewal of the 5-year permit that would authorize the blasting of the undersea environment north of Kauai with high intensity ATOC signals.

10
15a

Surely the beaching of 17 whales this past March in the Bahamas (an area in close proximity to Navy tests of another low-frequency sonar) suggests the serious possibility of harm caused to marine life. What other event could have been responsible for inducing hemorrhaging in and around the ears and the bleeding eyes detected by scientists? There are many other similar reports from California, Hawaii, Australia, the Virgin Islands, San Juan Islands, the Canary Islands and the Mediterranean area near Greece that have occurred in proximity to Navy testing.

How would you feel being exposed to painful sound from which you had no escape? Even possibly non-damaging sound such as an air raid signal or fire drill bell would feel like torture on an ongoing basis.

The waters are home to many creatures (some already endangered) that are part of the delicate balance of the ecology of this planet. We have the moral and practical responsibility in our greater ability to manipulate the environment to steward it properly. Thank you for your urgent attention to this matter.

Sincerely,

Marina Gagliardi

Sincerely,

Ron Greenspun

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Marina Gagliardi
9945 Robbins Drive, #102
Beverly Hills, CA 90212

Ron Greenspun
248 Pomona Avenue #4
Long Beach, CA 90803

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Gagliardi and Mr. Greenspun,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. In your letter, you expressed concern regarding the safety of marine life, based upon the beaching of whales in the Bahamas. We would like to point out that one of purposes of the proposed action is to conduct monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. The NPAL project is also proposing to continue to monitor for short-term or acute effects. We plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP). This issue is discussed in Issue 15a of the Responses to Comments (Appendix F) in the FEIS.

Your letter also raises the issue of sonar exposures and cetacean strandings, and listed a series of events as examples. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

We are enclosing a copy of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments - Issues 10 and 15a

, To fax: (808) 587-0455

p.1 of 2pp

I-105

N.G.Gregory B.Sc., RCST
19, Pembroke Avenue,
Hove, Sussex BN3 5DB
Great Britain
21st July 2000

Department of Land and Natural Resources,
Tom Eisen
PO Box 621
Honolulu HI 96809

Dear Mr. Eisen,

10 I am very concerned about the ATOC or NPAL program. There is a lot of evidence of the extremely harmful effects of low frequency acoustic signals on cetaceans especially at the incredibly high intensities that have been used all over the world, e.g. off the Canary Islands (1985-89) see Nature 1991, the Atlantic U.S. coast (1987), Northern California (1995), the Haro Strait, San Juan Islands (1996), the Mediterranean Sea near Greece (1996), Hawaiian Islands (1998) and more; some details are given below.

This letter provides comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

15b. 14a.2 There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine

p.2 of 2pp

11 mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawaii.

9d. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

14a.2 Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

6b Please do whatever you can to ensure that the Navy acts responsibly and humanely in immediately discontinuing its NPAL/ATOC program and fully removing its cable and transmitter from the waters of Hawaii.

Yours sincerely,

(Mrs.) N. G. Gregory

cc: Kathleen Vigness Raposa/ Office of Naval Research, Marine Acoustics, Inc.

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

N. G. Gregory
19, Pembroke Avenue
Hove, Sussex BN3 5DB
Great Britain

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Gregory,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First, your letter raised the issue of sonar exposures and cetacean strandings, and listed a series of events as examples. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

You also requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 10 11, 14a, 14b, 15a, 15b

7/23/00 11:50 PM 1/1

I-78

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

9d.

Joseph Campbell said that addressing any living thing as "thou" will prohibit you from harming it as you can an object. Was this the real reason the Navy used their cloaking device on dolphin communication research? Regard their uptness. Hear their complex vocalizations. Do you truly doubt they are linguistic? Have you really taken your path so far you dare not now listen to see if they are saying "Thou" to you?
James Harrington
Fort Bragg, CA 95437

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

James Harrington
Fort Bragg, CA 95437

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Harrington,

Thank you for your comment letter regarding the proposed North Pacific Acoustic Laboratory (NPAL) project. We have noted your comment and included additional information on the frequency ranges of sounds produced by marine mammals in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We are enclosing a copy of this issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 9d

July 20, 2000
808-949-0551

Tom Eisen
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Tom Eisen:

Re:Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. No, no no no no to continued underwater sound testing. It's the equivalent of a teenage neighbor that blasts the stereo. It is disturbing, no matter how many so-called tests that try to say otherwise. Noise is noise and it's disruptive. Why do we continue to think our marine world is for man to use freely? We need to be stewards,

6b. not owners. Stop the NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Yours truly,

Kathy Harter
1088 Bishop St., #1301
Honolulu, HI 96813

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Ms. Kathy Harter
1088 Bishop Street, #1301
Honolulu, HI 96813

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Harter,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. Your comment has been noted, and we have responded to your request to remove the cable and transmitter from the seafloor in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We are enclosing a copy of Issues 6a and 6b from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b

I-49

July 20, 2000
808-949-0551

Tom Eisen
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Tom Eisen:

Please inform the proponents of this outstanding research that we'll be proceeding with some preliminary testing of low-frequency, high intensity acoustics on their residential streets at convenient early morning hours, and that we appreciate their generous offer to make it possible.

Yours truly,

charley ice
98-633 kilinoe
aiea, HI 96701

Jul 20 11 24 AM '00

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Mr. Charley Ice
98-633 Kilinoe
Aiea, HI 96701

Dear Mr. Ice,

Thank you for your comment letter regarding the proposed North Pacific Acoustic Laboratory (NPAL) project. Your comment has been noted.

The complete Final Environmental Impact Statement (FEIS) for the NPAL project is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-155

Eva Johanos
Honolulu, Hawaii
July 21, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cableand transmitter located off the coast of Kaua'i.

6a. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. 15b. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. 14a.2 Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d. Fin whale vocalizations are within the NPAL frequency range. It ismtherefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency

I-155

transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

14a Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

10 There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

I-155

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers.

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Eva Johanos

Eva Johanos

cc: Tom Eisen / Hawai'i DLNR
Genevieve Salmonson / Director Hawai'i OEQC
Peter Worcester / UCSD, Scripps Institute of Oceanography
David W. Blane / Director Hawai'i Office of Planning
Hawaii CZM Program

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 14, 2000

Ms. Eva Johanos
Honolulu, HI

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Johanos,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

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Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

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We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

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Finally, you also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

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We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 10, 11, 14a, 15a and 15b

I-177

July 24, 2000

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive, ICPP 0225
La Jolla, CA 92093

Dear Mr. Worcester:

15a I have been reading an e-mail report on the recent effects of sonar testing on the aquatic life around Hawaii and other locations in the world. It is my understanding, based on this and other reports, that sonar or low frequency sound does affect the animals in the environment in which the testing is done. It is hard to believe that anyone could look at all the animals that have died in these waters and deny that their deaths have anything to do with the testing. When an animal uses sonar or low frequency to move through its environment and to communicate with others of its kind, it stands to reason (using plain old "common sense") that the animal would be affected by other sonar or low frequency sounds within its environment. I have attended rock concerts and have noticed how my own hearing has been affected by the extreme volume of the music. I don't need to attend more concerts in order to prove to myself the damaging effects of this volume. Thus, I really don't believe that the navy needs to continue to run sonar tests to prove conclusively whether sonar affects and is responsible for the deaths of so many ocean animals.

The report suggests that I copy and forward (with paraphrasing) the various results of this testing. I trust that I will not need to do so as many others (I hope) will make sure that you receive copies of the pertinent information. It is more my concern that I make my feelings and impressions known. 6b It is my understanding that the navy laid the cable without authorization and was granted permission to do the testing "after the fact" and that the navy is to remove this cable when the testing is done. And now, they want to continue the testing and to leave the cable on the ocean floor where it may cause unknown damage to the environment and the animals that live within it. It is my hope that the navy's request to continue testing and to leave the cable on the ocean floor is denied. It is too late to undo the damage done by recent testing. It is not too late to ensure that no more damage is done. I have grown up in a world in which the oceans are filled with an abundance of life. I wish my children and their children to experience the same. If the navy is allowed to continue their testing, there may be no more dolphins or whales or turtles or seals or...for our future children to enjoy.

Barbara Lee Johnson Barbara Johnson

Barbara Lee Johnson, Barbara Johnson, Arthur Johnson
8 Grandview Court
Huttonville, Ontario Canada
L0J 1B0

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Barbara Lee Johnson, Barbara Johnson, and Arthur Johnson
8 Grandview Court
Huttonville, Ontario
Canada L0J 1B0

Dear Ms. Johnson, Ms. Johnson, and Mr. Johnson:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

You expressed concerns regarding the potential effects of low frequency sound on marine animals. While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, an extensive investigation into the potential effects of the Kauai sound source was conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs), whose results are summarized in Chapter 1. As the results from the MMRPs suggest, the proposed project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. The proposed project would include marine mammal monitoring and studies to continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source. We refer you to Issue 15a of the Responses to Comments (Appendix F) in the FEIS for further discussion of this issue.

You requested that the cable be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We are enclosing a copy of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachment
Issues 6a, 6b, 15a

I-161

Christopher Kehoe
PO Box 1103
Kilauea, Kaua'i, Hawai'i 96754
July 24, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and 15b loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal 14a.2 fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the

I-161

11 aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

11 An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM hose spill response/ restoration in 1998-9) resulted in a population estimate of a minimum of 16-24 seals on Kaua'i's beaches. This survey/estimate did not include Ni'ihau, although the monk seal population there is believed to be significantly larger. The Ni'ihau seals are able to use Kaua'i's beaches as often as necessary due to the proximity of the two islands and the documented "local" traveling habits of Hawaiian monk seals. Clearly the Ni'ihau monk seal population is also at risk of suffering from NPAL's low frequency transmissions.

11 It has recently been proven through scientific studies — a collaborative effort between NMFS and the National Geographic Research Division — that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, unknown. It must be assumed however that the hearing of these vocalizations, by other seals or by other species, is intrinsic to their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns.

12 Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

5a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as
11.2 numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these

I-161

kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely yours,

Christopher Kehoe

Christopher Kehoe

cc: Tom Eisen / Hawai'i DLNR

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 14, 2000

Mr. Christopher Kehoe
P.O. Box 1103
Kilauea, HI 96754

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Kehoe,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

JUL-24-00 16:56 FROM:OTAK Inc. ID:503 636 6395 PAGE 1/1

I-123

July 24, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

The Hawaii Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy

6b now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

15b. I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk.
The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales.

I believe our first concern should be this underwater estuary and its inhabitants. With this in mind, I would prefer the Navy not do their testing in these waters and remove their equipment from this environmentally sensitive area.

Thank you for reviewing my letter,

Donna Kellogg
25955 SW Stafford Rd
Wilsonville, Or 97070-9724

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Donna Kellogg
25955 SW Stafford Road
Wilsonville, OR 97070-9724

Dear Ms. Kellogg:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of the purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context.

We are enclosing a copy of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachment
Issues 6a, 6b, 15b

I-54

808.949.0551

July 20, 2000

Lizbeth Kendall

Pacific Whale Foundation 101 North Kihei Rd, ♦ Kihei, HI 96753

Tom Eisen
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Tom Eisen:

This e-mail is to give my comments and opinion on the Draft Environmental Impact Statement regarding the NPAL program and the continuation of utilizing the ATOC cable and transmitter off the coast of Kaua'i. There are concerns and unknown effects on the endangered and non-endangered cetacean species around the waters of the low frequency NPAL source. Because whales and dolphins have extremely sensitive hearing and they rely on sound for echolocation, mating, and feeding this may make them particulary at high risk. Kaua'i's warm coastal waters are one of the winter breeding and calving grounds for our endangered humpback whales which makes this area an especially dangerous site for experimenting with the NPAL Program. There are other endangered species that also frequent this area which makes it even more dangerous a location for experimenting on the NPAL Program. According the information that I have gathered the effects of ATOC/NPAL signals on marine mammals are unknown, therefore, this experimentataion of live and especially ENDANGERED SPECIES is extremely inapproprate. 15a
It is our obligation to protect the slowly increasing marine mammal species as it has been our lack of understanding that decreased the populations in the first place, not lessen the populations by doing harmful experimentation. I challenge you to look for alternative methods of researching the underwater environment in alignment with the protection of our big cousins. Please revamp the NPAL/ATOC Program to be humane to other creatures or discontinue it altogether. 5a

Sincerely,

Lizbeth Kendall

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LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Lizbeth Kendall
Pacific Whale Foundation
101 North Kihei Road
Kihei, HI 96753

Dear Ms. Kendall:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that the effects of ATOC/NPAL signals on marine mammals are unknown. While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, an extensive investigation into the potential effects of the Kauai sound source was conducted during the ATOC MMRPs, whose results are summarized in Chapters 1 and 4. This comment is further addressed in Issue 15a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You also requested that alternative methods of researching the underwater environment be considered. In order to address three research thrusts of the proposed project, a controlled sound source must be used. Other necessary components of such a research program are discussed in Issue 5a of the Responses to Comments (Appendix F) in the FEIS.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-71

University of California, San Diego
Scripps Institute Of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225,
LaJolla, CA 92093
July 20, 2000

Dear Peter Worcester:

I am writing this letter to provide you with my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai. I will attach some text to support evidence of which you need to be aware.

Today, again, I am outraged by the continuous and unconscionable assault on our environment and the living creatures in it by those who recklessly utilize technologies. Again and again and again, we who are aware of the recklessness of the use of these technologies must speak to those of you who have a voice. How loudly do we need to speak to stop those who are not being responsible for their negative impact on our planet?

As a degreed biologist and educator, I am pleading with you ... any of you who are able to make an impact to do so NOW!

I currently work here in Kauai helping implement a violence prevention program in the schools and community. One of the reasons people get violent is that they feel that they have no voice, that they are not being heard. Right now, I am going to tell you that I am very angry. I am right now going to tell you how I feel about the sound testing in the waters.

15a No one can really know the impact that this technology is having on all life. Sound is very powerful. It can be used positively and it's surely being used negatively. All life in being impacted by the sound that is being sent through the oceans as well as the air. In the hands of people who either are unaware, in denial, do not care, or are purposely creating pain and destruction, this technology is dangerous!

I want you to hear my voice. Just because these people do not see the negative effects of their experiments does not mean that there isn't any. Make them PROVE on themselves that it is not harmful. And let me be one of the observers.

Please make them stop this nonsense one and for all! Please..I have many other things to do with my life than to constantly have to watch out for these end runs! Every time I think that this issue is settled, it comes up again! STOP it once and for all NOW!

My personal experience of actually feeling the whales' agony this past March, when they were assaulted with sound in the Caribbean makes this whole issue very real for me. Now I know that the sound is creating agony for countless other beings as well as myself and I want it's use stopped.

Please understand the seriousness of this situation. Someone in a position to make an impact must stand up. Please...will it be you?

If you would like to talk to me to discuss my personal experience with the whale situation in March of 2000, please DO call me.

Paula Edwards Kreasley A.B Biology
808-826-0345
P.O. Box 1275
Hanalei, Hawaii 96714

Sincerely,

Cc: Kathleen Raposa, Tom Eisen, David Blane, Genevieve Salmonson
Associated Press

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 15, 2000

Paula Edwards Kressley
P.O. Box 1275
Hanalei, HI 96714

Dear Ms. Kressley:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

You commented that there is a general lack of scientific knowledge regarding the impacts of sound on marine mammals. We have responded to this comment in Issue 15a of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. The proposed project would include marine mammal monitoring and studies to continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

We are enclosing a copy of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachment - Issue 15a

FROM : Joan Levy   FAX NO. : 808+823 8088   Jul. 21 2000 12:04AM P1

I.7

BODYMIND & BREATH CENTER
"A Healing, Heartful Place"
P.O. Box 160, Kapaa, HI 96746
(808) 822-5488

7/20/00

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing in regard to the ATOC testing planned for Kauai and anywhere else it might be being considered. I am sure you are getting many letters on this subject matter. I do not wish to give you one more long letter explaining the reasons why this project is neither necessary nor unharmful as the project planners insist. Let me just say that I have heard too many anecdotal experiences, some from the first hand experience of people whom I have no cause to distrust and every reason to believe who have witnessed abnormal and adverse reactions to this invasion into the sea world.

15a
15b

The human race has a dangerous tendency to deny that which they do not wish to know, see or understand. I realize that a lot of time, energy and money has gone into the development of this project and the people involved do not want their investment to go down the drain. But this is a very self-centered position.

Do we always have to wait until our denial, arrogance and ignorance creates a mess that we then have to later try to clean up?

Even the Navy's own research showed that there was some significant negative effect on marine animal life.

I just heard that there was another huge billions of dollars settlement against the tobacco companies. For as long as I can remember the tobacco companies have been telling us that tobacco is not a danger to our health. If not for the legal battles, they would still be telling us these lies.

The marine life potentially jeopardized by this project will not have the ability to bring this project to court.

Joan Levy, MSW, LCSW
Director

NO.7418 P. 11   Sep. 26. 2000 10:39AM 401 847 7864

I-72

-2-

I respectfully ask that the Navy discontinue its NPAL/ATOC program and remove all related cable and the transmitter from all of the waters of and around Hawaii. I say Hawaii because that is where I live and there is this present pending decision, however, I would extend that request to the entire jurisdiction of American waters.

Thank you for your thoughtful and environmentally sound consideration in this matter.

Sincerely,

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Joan Levy, Director
BodyMind & Breath Center
P.O. Box 160
Kapaa, HI 96746

Dear Ms. Levy:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You expressed concern over significant negative effects that this project might have on marine life. This comment is addressed in Issue 15a and 15b of the Responses to Comments (Appendix F) of the Final Environmental Impact Statement (FEIS). While the level of scientific knowledge regarding the effects of sound on marine mammals is in the early stages of development, extensive investigations into the potential effects of the Kauai sound source were examined during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRP). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We are enclosing copies of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 15a, 15b

7-22-00;10:21AM;Grand Wailea Spa 1808 874 2424 # 1/ 4

I-112

ce of Naval Research
Kathleen Vigness Raposa
rine Acoustics, Inc.
Aquidneck Ave.
ddletown, RI 02842

Dear Ms. Raposa:

am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which equires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they re done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as equired by the original permit.

The D-EIS states that it is likely that the cable has been covered over nd that pulling it would cause more disruption than leaving it. How is he condition of the cable known? It is unscientific to jump to a conclusion such as this. Have observations been made of the full length of the cable? If not, why not? 6a

have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters urrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on ound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the vinter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use omewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three reatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term hysiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero. 15b 14a.2

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS as woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this ear. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, ere poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while ight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further istance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known bout the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to e NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on it, the most endangered of all ocean mammals which live in the waters of Hawai'i. 11

In whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could terfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting ating behavior. This would not be observable until after the damage was done. 9d

ery little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low equency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not TOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached ar the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests. 15a

umpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial urveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological eactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to ump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions. 14a

cientists who work with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these nimals. Do the researchers studying the reactions of humpback whales to e ATOC/NPAL transmissions have similar protocols? If not, how is it nown that these endangered whales have not been subjected to various tresses as a result of being repeatedly exposed to ATOC/NPAL's low 14a.2 requency rumbles? What is known about the effects of these sounds on regnant whales and their fetuses? What is known about the long term ffects of ATOC/NPAL exposure on new born humpback whale calves? 15b.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate o nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. t is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds n ocean creatures.

Sep. 26. 2000 2:32PM 401 847 7864 No.7431 P. 2

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

I-112

Sincerely,

Barbara Meadows

Name:

Address: 2140 Auiki Pl. #4

City, State Zip: Kihei, Hi. Country: USA

Please read the following points of interest to further state my case.

Thank-you.

I-112

A) An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM hose spill response/restoration in 1998-9) resulted in a population estimate of a minimum of 16-24 seals on Kaua'i's beaches. This survey/estimate did not include Ni'ihau, although the monk seal population there is believed to be significantly larger. The Ni'ihau seals are able to use Kaua'i's beaches as often as necessary due to the proximity of the two islands and the documented "local" traveling habits of Hawaiian monk seals. Clearly the Ni'ihau monk seal population therefore is also at risk of suffering any malevolent effects of this experiment.

B) It has also been proven recently through scientific studies (a collaborative effort between NMFS and the National Geographic Research Division), that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, unknown. It must be assumed however that the hearing of these vocalizations, by other seals or by other species, plays a part in their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns. 11

C) Moreover, NPAL presents a clear threat to marine ecosystem structure and function; for instance, it may alter abundance of prey species that are essential to protected species like the Monk Seal. 18

D) Dr. Joseph Mobley has conducted aerial surveys of Humpback Whales and other species in the waters around the Hawaiian Islands, for the Marine Mammal Research portion of the ATOC project. The results of his year 2000 survey should be included in the analysis of potential impacts of prior testing and use of high intensity sonars in these waters. There are reports that the 2000 survey showed a dramatic decline in the number of Humpback Whales in these waters. If correct, those reports may be an indication that prior testing of low frequency active sonar -- and use of such low frequency sounds in ATOC -- is causing the whales to avoid Hawai'i. 14b.

E) The risk assumptions in the D-EIS rely on the same information provided to the National Marine Fisheries Service (NMFS) as justification for the planned LWAD 00-2 test off the New York/New Jersey coast. Those tests involved the use of low frequency active sonar devices. The NMFS found the justification to be insufficient to warrant NMFS concurrence with those tests. The Navy therefore canceled the acoustic testing portions of the LWAD 00-2 tests. The EIS process for the North Pacific Acoustic Laboratory (NPAL) should include consultation with NMFS to secure copies of all comments received by NMFS, both internally and externally, regarding the LWAD 00-2 Environmental Assessment and the responses by NMFS to the Navy's request for concurrence in those tests.

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F) The risk assumptions in the D-EIS rely on the results of the Low Frequency Active Sonar Scientific Research Program (LFS SRP). (See pages 4-18 to 4-22). The Navy released the D-EIS for the deployment of low frequency active sonar in July 1999 accompanied by three technical reports. The environmental analysis relied heavily on the LFS SRP.

In comments on the D-EIS, scientists and citizens provided extensive criticisms of the LFS SRP and of the Navy's misuse of the limited data gathered by that research. The EIS process for the North Pacific Acoustic Laboratory should consider all the comments received by the Navy on the D-EIS for LFAS deployment, particularly as those comments relate to the adequacy of the LFS SRP and/or the misuse of the results of the LFS SRP by the Navy and Marine Acoustics. Given that Marine Acoustics is the consultant to the Navy for that D-EIS, the Laboratory should have easy access to the complete set of comments. Alternatively, there are web site postings of many of the comments at
http://www.ilhawaii.net/~light/comments.html
and
http://www.geocities.com/shootdaguy/responseslfas.html

15a

G) The Woods Hole Oceanographic Institution recently released "Preliminary Results of the Effects of SURTASS-LFA Sonar on Singing Humpback Whales" by Nicoletta Biassoni, Patrick J.O. Miller, and Peter L. Tyack, May 2000. This technical report provides an analysis of some of the findings from the testing of low frequency active sonar off the Hawaiian Islands in 1998 as part of the LFS SRP.

The fact that the report is titled "Preliminary Results" is evidence supporting the criticism that the Navy is rushing to use the results of the LFS SRP before the scientists conducting that research have completed their analysis of the date gathered.

The Woods Hole report found that Humpback Whales extended the length of their songs after exposure to low frequency sound. This research finding is not included in the D-EIS for NPAL/ATOC. (See pages 4-21 and 4-22). The absence of this finding from the D-EIS demonstrates the error of using the LFS SRP to justify sonar activities prior to the completion of that research.

15a

The finding in the Woods Hole report is particularly significant because singing is considered part of the mating behavior of the Humpback Whales. Any activity disrupting singing presumptively could impact the successful breeding of this endangered species. This new evidence calls into question the entire analysis found in the D-EIS for NPAL/ATOC.

The LFS SRP finding regarding Humpback Whale impacts led a federal judge to make the following comment in a recent opinion:

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"Despite the above outcome [i.e. the dismissal of the case on legal grounds], the Court notes and expresses its concern that, according to an independent study sponsored by the Navy, low frequency sonar tests do indeed effect marine life. Although the researchers are not sure whether the tests have a harmful impact, they recommend at the very minimum that the Navy should avoid active breeding areas when performing tests. Further, the Court notes that the article states that whales breed and calf off Hawaii in the winter and spring before migrating north to the Gulf of Alaska. Following these recommendations would seem to have a severe impact on any testing off Hawaii." Order Denying Plaintiffs' Motion to Set Aside Order and to Consolidate Reopened Case with Pending Case; Order Granting Motion to Dismiss; CIV. No. 98-232 ACK; CIV. No. 00-00166 ACK-BMK dated July 10, 2000 at page 3 citing to "Navy study indicates sonar has effect on whales" Honolulu Advertiser, June 22, 2000 at A3.

The court viewed the Woods Hole/LFS SRP findings as potentially having a "severe impact on any testing off Hawaii." Most whales exposed to the LFA sonar off Hawai'i in 1998 received levels at 140 dB or below. The Woods Hole report, therefore, suggests that breeding behavior may be disrupted at those levels. The D-EIS for NPAL/ATOC discusses only short term behavioral response, such as avoidance and cessation of singing [see D-EIS pages 4-21 to 4-22.]. The failure of the D-EIS to discuss potential long term effects, such as impacts on breeding, is a serious deficiency in this document.

15b

H) There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

10

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in

strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

No.1431 P. 7 Sep.26. 2000 2:35PM 401 847 1864

I-112

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Barbara Meadows
2140 Awihi Pl. #4
Kihei, HI

Dear Ms. Meadows:

Thank you for your July 23, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, table and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas, and the reports of other strandings in areas close to other military activities. As discussed in Issues 10 and 15a, since the referenced sonars have signal and operational characteristics very different from those of the Kauai source, it is not appropriate for this EIS to analyze those strandings. In response to the stranding of beaked whales in the Bahamas on March 15, 2000, the Navy and the National Marine Fisheries Service are investigating the transit of several ships using standard, hull-mounted sonar operating within normal frequency ranges, power outputs, and duty cycles, which are, respectively: 3.5 and 7.5 kHz, 235 dB and lower re: 1 µPa at 1 m, and "pings" of short duration (about one tenth of a second or less duration on a standard duty cycle of 24 seconds). (letter of Mr. Robert B. Pirie, Jr., Department of the Navy, Assistant Secretary of the Navy (Installations and Environment) to Ms. Penelope D. Dalton, Assistant Administrator for Fisheries, NOAA, June 9, 2000). Furthermore, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings (see detailed discussion in Issue 10 of the Responses to Comments (Appendix F) of the FEIS).

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. You also requested that Dr. Mobley's year 2000 aerial survey results be included in the FEIS. These comments are addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.3, the NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

You suggest that the NPAL project may alter the abundance of prey species essential for protected species. This comment is addressed in Issue 18c of the Responses to Comments (Appendix F) in the FEIS, which itemize the sections that discuss the potential direct, indirect and cumulative effects on fish, and any potential indirect effects on monk seals and other marine mammals.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 10, 11, 14a, 14b, 15a, 15b, 18c

I-151

TREEHOUSE ENTERPRISES

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University of California, San Diego
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9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Mr. Worcester,

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I fail to understand why we should have to put up with this arrogant action the Navy. They are one of the most dangerous polluters in the world and don't Seem to care what the end results of their actions are. If they are impacting Endangered species they do not care in the least. We are getting sick of it.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and 15b 14a.2 three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance

I-151

from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were 14a.2 phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Richard A. Miller
P.O. Box 1456
Hanalei, HI
96714-1456

cc: Tom Eisen, DLNR
Peter Worcester / UCSD, Scripps Institute of Oceanography
Genevieve Salmonson, OEQC
Hawaii CZM Program
Kathleen V. Raposa Office of Naval Research

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
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LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Richard A. Miller
P.O. Box 1456
Hanalei, HI 96714-1456

Dear Mr. Miller:

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table of the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. In response to the stranding of beaked whales in the Bahamas on March 15, 2000, the Navy and NMFS are investigating the transit of several ships using standard, hull-mounted sonar operating within normal frequency ranges, power outputs, and duty cycles, which are, respectively: 3.5 and 7.5 kHz, 235 dB and lower re: 1 μPa at 1 m, and "pings" of short duration (about one tenth of a second or less duration on a standard duty cycle of 24 seconds). (letter of Mr. Robert B. Pirie, Jr., Department of the Navy, Assistant Secretary of the Navy (Installations and Environment) to Ms. Penelope D. Dalton, Assistant Administrator for Fisheries, NOAA, June 9, 2000). As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issues 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-146

Larry Morningstar
PO Box 1257
Kilauea, Kaua'i, Hawai'i 96754
July 24, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

Enclosed please find my written comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. Please consider this an amended and expanded version of the statement which I gave orally at the NPAL public meeting/public hearing in Kilauea, Kaua'i, on Saturday, the 8th of July. Please include this statement in the Final EIS for the NPAL project.

6b 1) The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

2) I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and 15b loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal 14a fetuses in utero.

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3) Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was extremely out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. Those pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were most likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

11

An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM hose spill response/ restoration in 1998-9) resulted in a population estimate of a minimum of 16-24 seals on Kaua'i's beaches. This survey/estimate did not include Ni'ihau, although the monk seal population there is believed to be significantly larger. The Ni'ihau seals are able to use Kaua'i's beaches as often as necessary due to the proximity of the two islands and the documented "local" traveling habits of Hawaiian monk seals. Clearly the Ni'ihau monk seal population is also at risk of suffering from NPAL's low frequency transmissions.

4) It has recently been proven through scientific studies — a collaborative effort between NMFS and the National Geographic Research Division — that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, unknown. It must be assumed however that the hearing of these vocalizations, by other seals or by other species, is intrinsic to their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns.

9d

5) Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a

6) Very little is known about beaked whales. We do know that they are deep divers, and they apparently have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests in March of this year. Albeit, these were not ATOC/NPAL transmissions, but, like

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15a

NPAL/ATOC, they also were high intensity, low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece (during NATO LFAS exercises) in the proximity of low frequency sonar tests. It is important that all available reports (eg: Ken Balcomb's report on the Bahamas strandings during the Navy's LWAD exercises) studies, tests, reports of necropsies performed (eg: Darlene Ketten's report on the necropsies she performed at Woods Hole on several of the whales which died during the episode in the Bahamas), and articles (eg: Dr. Alexandros Frantzis' 1996 article in the peer reviewed scientific journal, "Nature" on the deaths of twelve Cuvier beaked whales exposed to NATO sonar in the Mediterranean Sea, near Greece) which were performed or written in response to any of these aforementioned incidents, be included in the final NPAL/ATOC EIS, along with an update from each of the original researchers, written specifically for this final EIS.

15a

7) Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. However, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. The accuracy of shoreline counts is questionable. No studies were made of physiological or psychological reactions of marine mammals or sea turtles to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

18c

8) Moreover, NPAL presents a clear threat to marine ecosystem structure and function. For instance, it may alter abundance of prey species that are essential to protected species such as the Monk Seal.

14b.1

9) Dr. Joseph Mobley has conducted aerial surveys of Humpback Whales and other species in the waters around the Hawaiian Islands, for the Marine Mammal Research portion of the ATOC project. The results of his year 2000 survey should be included in the analysis of potential impacts of prior testing and use of high intensity sonars in these waters. There are reports that the 2000 survey showed a dramatic decline in the number of Humpback Whales in these waters. If correct, those reports may be an indication that prior testing of low frequency active sonar — and use of such low frequency sounds in ATOC — is causing the whales to avoid Hawai'i.

15a

10) The risk assumptions in the D-EIS rely on the same information provided to the National Marine Fisheries Service (NMFS) as justification for the planned LWAD 00-2 test off the New York/New Jersey coast. Those tests involved the use of low frequency active sonar devices. The NMFS found the justification to be insufficient to warrant NMFS concurrence with those tests. The Navy therefore canceled the

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15a

acoustic testing portions of the LWAD 00-2 tests. The EIS process for the North Pacific Acoustic Laboratory (NPAL) should include consultation with NMFS to secure copies of all comments received by NMFS, both internally and externally, regarding the LWAD 00-2 Environmental Assessment and the responses by NMFS to the Navy's request for concurrence in those tests.

11) The risk assumptions in the D-EIS rely on the results of the Low Frequency Active Sonar Scientific Research Program (LFS SRP). (See pages 4-18 to 4-22). The Navy released the D-EIS for the deployment of low frequency active sonar in July 1999 accompanied by three technical reports. The environmental analysis relied heavily on the LFS SRP.

In comments on the D-EIS, scientists and citizens provided extensive criticisms of the LFS SRP and of the Navy's misuse of the limited data gathered by that research. The EIS process for the North Pacific Acoustic Laboratory should consider all the comments received by the Navy on the D-EIS for LFAS deployment, particularly as those comments relate to the adequacy of the LFS SRP and/or the misuse of the results of the LFS SRP by the Navy and Marine Acoustics. Given that Marine Acoustics is the consultant to the Navy for that D-EIS, the Laboratory should have easy access to the complete set of comments. Alternatively, there are web site postings of many of the comments at

15a

http://www.lihawaii.net/~light/comments.html and at
http://www.geocities.com/shootdaguy/responseslfas.html

12) The Woods Hole Oceanographic Institution recently released "Preliminary Results of the Effects of SURTASS-LFA Sonar on Singing Humpback Whales" by Nicoletta Biassoni, Patrick J.O. Miller, and Peter L. Tyack; May 2000. This technical report provides an analysis of some of the findings from the testing of low frequency active sonar off the Hawaiian Islands in 1998 as part of the LFS SRP.

The fact that the report is titled "Preliminary Results" is evidence supporting the criticism that the Navy is rushing to use the results of the LFS SRP before the scientists conducting that research have completed their analysis of the date gathered.

The Woods Hole report found that Humpback Whales extended the length of their songs after exposure to low frequency sound. This research finding is not included in the D-EIS for NPAL/ATOC. (See pages 4-21 and 4-22). The absence of this finding from the D-EIS demonstrates the error of using the LFS SRP to justify sonar activities prior to the completion of that research.

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The finding in the Woods Hole report is particularly significant because singing is considered part of the mating behavior of the Humpback Whales. Any activity disrupting singing presumptively could impact the successful breeding of this endangered species. This new evidence calls into question the entire analysis found in the D-EIS for NPAL/ATOC.

The LFS SRP finding regarding Humpback Whale impacts led a federal judge to make the following comment in a recent opinion:

"Despite the above outcome [i.e. the dismissal of the case on legal grounds], the Court notes and expresses its concern that, according to an independent study sponsored by the Navy, low frequency sonar tests do indeed affect marine life. Although the researchers are not sure whether the tests have a harmful impact, they recommend at the very minimum that the Navy should avoid active breeding areas when performing tests. Further, the Court notes that the article states that whales breed and calf off Hawaii in the winter and spring before migrating north to the Gulf of Alaska. Following these recommendations would seem to have a severe impact on any testing off Hawaii." Order Denying Plaintiffs' Motion to Set Aside Order and to Consolidate Reopened Case with Pending Case; Order Granting Motion to Dismiss; CIV. No. 98-232 ACK; CIV. No. 00-00166 ACK-BMK dated July 10, 2000 at page 3 citing to "Navy study indicates sonar has effect on whales" Honolulu Advertiser, June 22, 2000 at A3.

The court viewed the Woods Hole/LFS SRP findings as potentially having a "severe impact on any testing off Hawaii." Most whales exposed to the LFA sonar off Hawai'i in 1998 received levels at 140 dB or below. The Woods Hole report, therefore, suggests that breeding behavior may be disrupted at those levels. The D-EIS for NPAL/ATOC discusses only short term behavioral response, such as avoidance and cessation of singing [see D-EIS pages 4-21 to 4-22.]. The failure of the D-EIS to discuss potential long term effects, such as impacts on breeding, is a serious deficiency in this document.

15a

13) There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

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• The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

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• The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

• Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

• The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

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• The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

• The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

• California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

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• U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

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• Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

• The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully request that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Larry Morningstar

cc: Tom Eisen / Hawai'i DLNR
Genevieve Salmonson / Director, Hawai'i OEQC
Peter Worcester / UCSD, Scripps Institute of Oceanography
David W. Blane / Director, Office of Planning, Hawai'i DBEDT
John Nakagawa / Hawaii CZMP

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 19, 2000

Larry Morningstar
P. O. Box 1257
Kilauea, HI 96754

Dear Mr. Morningstar:

Thank you for your July 24, 2000 comment letter and your participation in our public meetings on Kauai concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, table and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas, and the reports of other strandings in areas close to other military activities. As discussed in Issues 10 and 15a, since the referenced sonars have signal and operational characteristics very different from those of the Kauai source, it is not appropriate for this EIS to analyze those strandings. In response to the stranding of beaked whales in the Bahamas on March 15, 2000, the Navy and the National Marine Fisheries Service are investigating the transit of several ships using standard, hull-mounted sonar operating within normal frequency ranges, power outputs, and duty cycles, which are, respectively: 3.5 and 7.5 kHz, 235 dB and lower re: 1 μPa at 1 m, and "pings" of short duration (about one tenth of a second or less duration on a standard duty cycle of 24 seconds). (letter of Mr. Robert B. Pirie, Jr., Department of the Navy, Assistant Secretary of the Navy (Installations and Environment) to Ms. Penelope D. Dalton, Assistant Administrator for Fisheries, NOAA, June 9, 2000). Furthermore, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore comments received by the Navy on that DEIS are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings (see detailed discussion in Issue 10 of the Responses to Comments (Appendix F) of the FEIS).

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

You suggest that the NPAL project may alter the abundance of prey species essential for protected species. This comment is addressed in Issue 18c of the Responses to Comments (Appendix F) in the FEIS, which itemize the sections that discuss the potential direct, indirect and cumulative effects on fish, and any potential indirect effects on monk seals and other marine mammals.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-149

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

I have had the opportunity to dive in tropical waters alongside humpback whales and sharks. I am keenly aware of the delicate ecosystem and the sensitive of these great 18c. mammals to even the subtlest vibrations. Disturbing the eco system with unnatural vibrations is an unacceptable and irresponsible intrusion on the natural balance and habitat of these water creatures.

6b. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

9 I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area.

15a Many species which will be negatively affected by these activities. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

14a.2 Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

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As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Alicia Nation
13469 Shelter Drive
Rapid City, SD 57702 USA

Sep.26. 2000 10:42AM 401 847 7864 No.7418 P. 20

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Alicia Nation
13469 Shelter Drive
Rapid City, SD 57702

Dear Ms. Nation:

Thank you for your comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented on the potential effects of the proposed action on the habitats of the marine animals. The potential direct, indirect and cumulative effects on fish were included in the DEIS in Sections 4.2.1.2.3 and 4.2.2.1.3, as well as in discussion of potential effects on Essential Fish Habitat (EFH) in Section 4.2.5. In addition, any potential indirect effects on monk seals, and other marine mammals, were included in Section 4.2.1.2.1, as addressed in Issue 18c of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS).

You requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You expressed concerns regarding the safety of marine animals, including the potential effects of masking on protected species, such as humpback whales and sperm whales. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 14a, 15a, 18c

I-171

Subject: ATOC
Date: 7/8/00
From: Imakakoloalhenenui, Imakakoloalhenenui@netscape.net

Aloha,

My name is Imakakoloalhenenui Nauha of Modesto, California. Although I now live on the mainland, my home will always be Hawai'i. I was born and raised in Honolulu. I have a sister who lives on Kaua'i and I visit her almost every year.

I am responding to the meeting that is to be held regarding the ATOC. When I was home on Kaua'i this was a big issue. But before anyone could object to the laying of the cables, the United States had already done its job. Now once again this issue is coming up.

I, a descendant of King Kamuali'i the last king of Kaua'i, object to this study. No one truly knows the effect this will have on sea mammals off the Hanalei coastline and throughout the Pacific Ocean. 15

It is said that the the Humpback whales and dolphins are not effected, so the study shows. However, like everything else the Federal Government does, the real truth is not told 'til after the effect has occurred. The Federal Government cannot be trusted. 14

Therefore, I would like the records to show that, I, Imakakoloalhenenui Nauha, great great great grandson of King Kamuali'i oppose the project of ATOC and request that the Federal Government remove the cable from the Pacific Ocean and do their studies somewhere else.

Mahalo!
Imakakoloalhenenui Nauha

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 1, 2000

Imakakoloaihenenui Nauha
Imakakoloaihenenui@netscape.net

Dear Mr. Nauha:

Thank you for your July 8, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the cable be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You commented that limited statistically significant effects were observed in the Kauai ATOC MMRP, but researchers do not know what these effects signify, and contend that more complete research data should be compiled before minimal or no impacts claims can be substantiated. The NPAL project is proposing to continue transmissions under a Letter of Authorization that includes annual reporting to the National Marine Fisheries Service. These annual reports will include analyses of aerial surveys conducted to monitor for short-term or acute effects, and potential long-term cumulative effects. Therefore, more complete research data would continue to be obtained during the proposed project, as discussed in Issue 14b.3 of the Responses to Comments (Appendix F) of the FEIS.

You also commented that there is a general lack of scientific knowledge regarding the impacts of sound on marine mammals. The issue of the level of scientific knowledge is addressed in Issue 15a of the Responses to Comments (Appendix F) in the FEIS. An extensive investigation into the potential effects of the Kauai sound source was conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP). In addition, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of other programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 14b, 15a

7/21/00 6:51: PAGE 1/1
Please Deliver To:Peter Worcester - UCSD/Scripps

I-110

FREE 2 FAX.com **Fax Cover Sheet**

To: Peter Worcester
Company: UCSD/Scripps
Fax No.: 858-534-6251

From: alexandranorton
Phone: 505-455-1945
Fax:
Email:

Subject: ATOC cable/NPAL/cetacean destruction

Message:
Dear Mr. Worcester

I am appalled at the use of transmission signals by the ATOC/NPAL program underneath our oceans. The effects upon marine life, particularly dolphins and whales is devastating.

I respectfully urge Scripps and the University of California at San Diego to influence in any way legally possible the NPAL program, the U.S. Navy, and Hawaii's Dept of Land/Resources to cease and desist from using these transmissions as part of their research, and to right-away remove the ATOC cable off the coast of Kauai.

6b

Thank you,

Mrs. Alexandra Norton

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Alexandra Norton
Phone: 505-455-1945

Dear Mrs. Norton:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the cable be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We appreciate your interest in our project. We are including copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments - Issues 6a, 6b

7/23/00 4:48: PAGE 1/1
Please Deliver To:Kathleen V. Raposa - Office of Naval Research

I-110
F-2

FREE 2 FAX.com **Fax Cover Sheet**

To:	Kathleen V. Raposa
Company:	Office of Naval Research
Fax No.:	401-847-7864
From:	Richard Norton
Phone:	505-455-1943
Fax:	
Email:	
Subject:	Naval testing and Cetaceans

Message:
Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6b.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Richard Norton
Phone: 505-455-1943

Dear Mr. Norton:

Thank you for your July 23, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We appreciate your interest in our project. We are including copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments - Issues 6a, 6b

07/27/2000 09:26 3603876321 3603876321 STEVE_OSBORN PAGE 01

I-182

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Attn: Peter Worcester
Fax: (858) 534-6251

SUBJECT: U.S. Navy Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) Sonar System

Dear Sir,

As a citizen of the United States of America, I strongly oppose the use of my taxpayer dollars on the SURTASS LFA sonar by the United States Navy.

There is significant evidence this sonar will have direct and negative impacts on ocean inhabitants, especially marine mammals and humans. Although not mentioned in the Navy's draft Environmental Impact Statement (EIS), the Navy's SURTASS LFA sonar test results showed detrimental effects: abandoned calves in the sonar test area in Hawaii, whales leaving the test area, 80% of humpback whales stopped their singing during tests, a change in the migration route of gray whales, a significant decrease in vocalizations of blue and fin whales, and instances of strandings.

The draft EIS is based on test results conducted at approximately 140 to 180 dB, yet the Navy admits that their actual planned transmission level is "classified, but not to exceed 215 dB." Since the decibel scale is logarithmic, a higher dB represents a significant increase in acoustic intensity.

The SURTASS LFA has not been tested at the level of intended usage, so we cannot know the actual impact it will have on marine life. Therefore the draft EIS conclusions are unrealistic since they are based on test results from db levels so much lower than the Navy's planned transmit levels.

The oceans and the life they support are critical for our existence. If it is so important that the U.S. Navy have the SURTASS LFA capability, then I want an alternative system that will not have any detrimental effects on marine life at the level of transmission The Navy has no right to decide on a course of action which may well imperil the oceans fragile ecosystem and its inhabitants.

Sincerely,

Mary J. Osborn

Mary J. Osborn

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

Ms. Mary J. Osborn
Fax: (360) 387-6321

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Ms. Osborn,

We have received your letter regarding your concerns about the U.S. Navy Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar. Your comment was received by the North Pacific Acoustic Laboratory (NPAL) project, which is not affiliated with the Navy LFA Program.

Comments regarding the LFA program should be directed to:
Mr. J.S. Johnson
Attn: SURTASS LFA Sonar OEIS/EIS Program Manager
901 North Stuart Street, Suite 708
Arlington, VA 22203

NPAL, formerly known as the Acoustic Thermometry of Ocean Climate (ATOC) Project Phase II, is a basic scientific research program that proposes to retain in place and reuse the power cable and sound source installed north of Kauai for an additional five years in order to 1) perform the second phase of research on the feasibility and value of large-scale acoustic thermometry; 2) study the behavior of sound transmissions in the ocean over long distances; and 3) conduct studies on the possible long-term effects from the sound transmissions on marine life. The source is located on the seafloor at a depth of 807 meters (2648 ft.), approximately 8 nautical miles (14.8 km) north of Kauai at 22°20.94'N, 159° 34.18'W.

The NPAL project is funded by the Office of Naval Research (ONR) and will be carried out by Scripps Institution of Oceanography, University of California San Diego, in conjunction with the Applied Physics Laboratory of the University of Washington.

The Final Environmental Impact Statement for the NPAL project is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please contact us.

If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

808-949-0551

T-36

July 19, 2000

Bruce Pleas

PO Box 721, ♦ Waimea, HI 96796

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

It is inconceivable to me that the proposed use of low frequency sound will not affect the ocean residents (whales, dolphins, turtles, monk seals, fish and so on). I would tend to think that the proposed low frequency sound at the moderate to high strengths proposed to be used will present a grave danger to the ocean residents.

15 I would strongly argue that a new and more detailed D-EIS be done that would address the short and long term affects that this re-introduction of low frequency sounds will do to the ocean residents.

10 The D-EIS should also cover some of the latest findings and incidents, which have been attributed to sonar, that have occured in other places around the world since Jan. 2000.

6 Please do not continue this program and remove the cable and transmitter as soon as possible to restore the ocean to the North of Kauai back to it's original condition.

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15 Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for

Sep.26. 2000 10:40AM 401 847 7864 No.7418 P. 15

T-36

9d observing monk seals. The monk seal counts included in the D-EIS were inaccurate. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

14.2 The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Bruce Pleas

Sep.26. 2000 10:41AM 401 847 7864 No.7418 P. 16

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 19, 2000

Bruce Pleas
P. O. Box 721
Waimea, HI 96796

Dear Mr. Pleas:

Thank you for your July 19, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

First you expressed concerns about the short and long-term effects that the low frequency sound transmissions might have on marine life. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You also requested that we include information about recent sonar exposure incidents. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. We did, however, include a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998, which shows no significant changes in the number, frequency, or species composition of strandings during that time.

You also requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6b of the Responses to Comments (Appendix F) in the FEIS. As is stated in this response, it is potentially more environmentally destructive to remove the cable than to allow it to remain on the seafloor, since the cable is likely to be buried in areas where the seafloor is primarily sand, and removal could result in damage to the coral that has begun to grow on it.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is also addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the FEIS. As indicated above, one of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.3, the NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 15a, 15b

I-93

July 21, 2000

University of California San diego
Scrips Institute of Oceanography
Attention: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Mr. Worcester,

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i. I AM ADAMANTLY OPPOSED TO THE USE OF SONAR TESTING ON ALL MARINE CREATURES !!!

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, 15b also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short 14a.2 term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance

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11 from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions. 15a

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

STOP NOW !!! We are on the edge of a giant irreversible environmental disaster.

Sincerely,
Mahalia Pugatch

Mahalia Pugatch
101 Woodland Road
Fairfax, CA 94930

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ADDITIONAL VERY IMPORTANT POINTS

11 A) An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM hose spill response/restoration in 1998-9) resulted in a population estimate of a minimum of 16-24 seals on Kaua'i's beaches. This survey/estimate did not include Ni'ihau, although the monk seal population there is believed to be significantly larger. The Ni'ihau seals are able to use Kaua'i's beaches as often as necessary due to the proximity of the two islands and the documented "local" traveling habits of Hawaiian monk seals. Clearly the Ni'ihau monk seal population therefore is also at risk of suffering any malevolent effects of this experiment.

B) It has also been proven recently through scientific studies (a collaborative effort between NMFS and the National Geographic Research Division), that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, unknown. It must be assumed however that the hearing of these vocalizations, by other seals or by other species, plays a part in their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns.

18c C) Moreover, NPAL presents a clear threat to marine ecosystem structure and function; for instance, it may alter abundance of prey species that are essential to protected species like the Monk Seal.

14b D) Dr. Joseph Mobley has conducted aerial surveys of Humpback Whales and other species in the waters around the Hawaiian Islands, for the Marine Mammal Research portion of the ATOC project. The results of his year 2000 survey should be included in the analysis of potential impacts of prior testing and use of high intensity sonars in these waters. There are reports that the 2000 survey showed a dramatic decline in the number of Humpback Whales in these waters. If correct, those reports may be an indication that prior testing of low frequency active sonar -- and use of such low frequency sounds in ATOC -- is causing the whales to avoid Hawai'i.

15a E) The risk assumptions in the D-EIS rely on the same information provided to the National Marine Fisheries Service (NMFS) as justification for the planned LWAD 00-2 test off the New York/New Jersey coast. Those tests involved the use of low frequency active sonar devices. The NMFS found the justification to be insufficient to warrant NMFS concurrence with those tests. The Navy therefore canceled the acoustic testing portions of the LWAD 00-2 tests. The EIS process for the North Pacific Acoustic Laboratory (NPAL) should include consultation with NMFS to secure copies of all comments received by NMFS, both internally and externally, regarding the LWAD 00-2 Environmental Assessment and the responses by NMFS to the Navy's request for concurrence in those tests.

F) The risk assumptions in the D-EIS rely on the results of the Low Frequency Active Sonar Scientific Research Program (LFS SRP). (See pages 4-18 to 4-22). The Navy released the D-EIS for the deployment of low frequency active sonar in July 1999 accompanied by three technical reports. The environmental analysis relied heavily on the LFS SRP.

In comments on the D-EIS, scientists and citizens provided extensive

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criticisms of the LFS SRP and of the Navy's misuse of the limited data gathered by that research. The EIS process for the North Pacific Acoustic Laboratory should consider all the comments received by the Navy on the D-EIS for LFAS deployment, particularly as those comments relate to the adequacy of the LFS SRP and/or the misuse of the results of the LFS SRP by the Navy and Marine Acoustics. Given that Marine Acoustics is the consultant to the Navy for that D-EIS, the Laboratory should have easy access to the complete set of comments. Alternatively, there are web site postings of many of the comments at

http://www.lihawaii.net/~light/commenta.html
and
http://www.geocities.com/shootdaguy/responseslfas.html

15a

G) The Woods Hole Oceanographic Institution recently released "Preliminary Results of the Effects of SURTASS-LFA Sonar on Singing Humpback Whales" by Nicoletta Biassoni, Patrick J.O. Miller, and Peter L. Tyack; May 2000. This technical report provides an analysis of some of the findings from the testing of low frequency active sonar off the Hawaiian Islands in 1998 as part of the LFS SRP.

The fact that the report is titled "Preliminary Results" is evidence supporting the criticism that the Navy is rushing to use the results of the LFS SRP before the scientists conducting that research have completed their analysis of the date gathered.

The Woods Hole report found that Humpback Whales extended the length of their songs after exposure to low frequency sound. This research finding is not included in the D-EIS for NPAL/ATOC. (See pages 4-21 and 4-22). The absence of this finding from the D-EIS demonstrates the error of using the LFS SRP to justify sonar activities prior to the completion of that research.

The finding in the Woods Hole report is particularly significant because singing is considered part of the mating behavior of the Humpback Whales. Any activity disrupting singing presumptively could impact the successful breeding of this endangered species. This new evidence calls into question the entire analysis found in the D-EIS for NPAL/ATOC.

The LFS SRP finding regarding Humpback Whale impacts led a federal judge to make the following comment in a recent opinion:

"Despite the above outcome [i.e. the dismissal of the case on legal grounds], the Court notes and expresses its concern that, according to an independent study sponsored by the Navy, low frequency sonar tests do indeed affect marine life. Although the researchers are not sure whether the tests have a harmful impact, they recommend at the very minimum that the Navy should avoid active breeding areas when performing tests. Further, the Court notes that the article states that whales breed and calf off Hawaii in the winter and spring before migrating north to the Gulf of Alaska. Following these recommendations would seem to have a severe impact on any testing off Hawaii." Order Denying Plaintiffs' Motion to Set Aside Order and to Consolidate Reopened Case with Pending Case; Order Granting Motion to Dismiss; CIV. No. 98-232 ACK; CIV. No. 00-00166 ACK-BMK dated July 10, 2000 at page 3 citing to "Navy study indicates sonar has effect on whales" Honolulu Advertiser, June 22, 2000 at A3.

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15a

The court viewed the Woods Hole/LFS SRP findings as potentially having a "severe impact on any testing off Hawaii." Most whales exposed to the LFA sonar off Hawai'i in 1998 received levels at 140 dB or below. The Woods Hole report, therefore, suggests that breeding behavior may be disrupted at those levels. The D-EIS for NPAL/ATOC discusses only short term behavioral response, such as avoidance and cessation of singing [see D-EIS pages 4-21 to 4-22.]. The failure of the D-EIS to discuss potential long term effects, such as impacts on breeding, is a serious deficiency in this document.

10

H) There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was

a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

Scientists who work with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these animals. Do the researchers studying the reactions of humpback whales to the ATOC/NPAL transmissions have similar protocols? If not, how is it known that these endangered whales have not been subjected to various stresses as a result of being repeatedly exposed to ATOC/NPAL1s low frequency rumbles? What is known about the effects of these sounds on pregnant whales and their fetuses? What is known about the long term effects of ATOC/NPAL exposure on new born humpback whale calves?

6a J) The D-EIS states that it is likely that the cable has been covered over and that pulling it would cause more disruption than leaving it. How is the condition of the cable known? It is unscientific to jump to a conclusion such as this. Have observations been made of the full length of the cable? If not, why not?

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Mahalia Pugatch
101 Woodland Road
Fairfax, CA 94930

Dear Ms. Pugatch:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. You also requested that Dr. Mobley's year 2000 aerial survey results be included in the FEIS. These comments are addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

You suggest that the NPAL project may alter the abundance of prey species essential for protected species. This comment is addressed in Issue 18c of the Responses to Comments (Appendix F) in the FEIS, which itemize the sections that discuss the potential direct, indirect and cumulative effects on fish, and any potential indirect effects on monk seals and other marine mammals.

Finally, you also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 10, 11, 14a, 14b, 15a, 15b, 18c

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I-145

2558 Maianroyal Street
Mississauga, Ontario
Canada L5L 1C9

July 24, 2000

Office of Naval Research
c/o Kathleen VignessRaposa
Marine ACoustics, Inc.
809 Aquidneck AVenue
Middletown, RI 02842

Dear Ms.Raposa:

It has come to my attention that the permit for use of the ATOC cable and transmitter off the coast of Kaua'i has come up for renewal with the U.S. Navy. Also that after its use the U.S. navy will leave the cable on the sea bed claiming, wrightly, that more damage would be done in removing it.

Bearing in mind the disastrous beachings of many mammals, turtles, etc. in the last few years, we must make conscienable choices whenever the opportunities present themselves.

I believe this is such a choice. I'm sure ifall the data from around the globe was ever collected and analysed the extreme danger of using sonar testing would show overwhelmingly the destructive force it has on the seas marine life.

1 Why do we need sonar testing who/what are we afraid of at this time in earth's evolution. Surely there is nothing that warrants the pain, suffering and death of such valuable creatures. Have we not done enough harm to them with the toxins and poisins we have already poured into the oceans.

Yes the U.S. navy is a powerful institution but with this comes as big a responsibility to protect and wisely use this power. How many deeds have been done in the past, truly with good intentions, but ultimately causing disastrous consequences because of the short-sightedness of the decision makers.

In this case there is too much physical evidence to prove the negative affects of sonar testing.

Please be dilligent, prudent and conscienable in making your decisions. A lot depends on your actions this day. May God's light and blessings be with you and help you.

Sincerely Concerned,

Linda Robertson

Linda Robertson
Craig Robertson

cc: T. Eisen, Dept. of Land and Natural Resources

Jul 24 4 03 PM '00

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Linda and Craig Robertson
2558 Maianroyal Street
Mississauga, Ontario
Canada I5I 1C9

Dear Mr. and Ms. Robertson:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the point raised in your letter.

You questioned the purpose and need of the proposed project. This issue is addressed in Issue 1 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). The proposed project would advance the understanding of the basic principles of low frequency, long-range acoustic propagation and the effects of environmental variability on signal stability and coherence. The ultimate objective is to understand the fundamental limits to acoustic signal processing at long range imposed by ocean processes to enable advanced signal processing techniques to capitalize on the three-dimensional character of the underwater sound and noise fields.

We are enclosing copies of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 1

Jul 24 00 11:09a 650-327-9409 p.1

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Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.,
Middletown, RI 02842
Fax: (401) 847-7864

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

15b 14a.2 I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Johanna Santer

732 Rosewood Drive

City, State Zip: Palo Alto, CA $\boxed{904303}$ USA
from www.usps.com: Palo Alto 94303

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Johanna Santer
732 Rosewood Drive
Palo Alto, CA 94303

Dear Ms. Santer:

Thank you for your comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

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We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 6a, 6b, 14a, 15a, 15b

July 22, 2000 I-178

Cynthia Schlosser
173 Meador Way SE
Atlanta, Ga. 30315 USA
404-627-7673
fax 404-624-3800 (call first)
email spiritus@mindspring.com

To: Peter Worcester

Dear Peter,

I have studied the Navy's NPAL/ATOC sonar program and I have prayed about it. I understand the good intentions behind it and the reasonings that initiated it. However, I have come to the conclusion that it should not be continued.

Please do all that you can to stop this program.

6b [I also request that the cable and transmitter be cleaned up and removed from the ocean.]

I know that you are doing all that you can to make the right decision. I pray that God will guide you.

Respectfully,
Cynthia Schlosser

FROM : SPIRITUS SANCTUS PHONE NO. : 1 404 624 3800 Jul. 21 2000 01:25PM P1
1 404 624 3800

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Cynthia Schlosser
173 Meadow Way SE
Atlanta, GA 30315

Dear Ms. Schlosser:

Thank you for your July 22, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the point you raised.

You requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

We are enclosing a copy of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-174

Gary A. Schwartz
16 Finalee Avenue • Asheville, NC 28803
(828) 253-9451
GaryAwake@aol.com

July 30, 2000

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

10 I am deeply saddened that the U.S. navy continues to press for testing of NPAL/ATOC and LFAS Sonar in spite of numerous reports of whale and dolphin beachings following previous tests. These programs also put many other forms marine life at risk.

Why is there no regard for the sanctity of these creatures?

I ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Thank You

Gary A. Schwartz

Sep.26. 2000 10:35AM 401 847 7864 No.7418 P. 2

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Gary A. Schwartz
16 Finalee Avenue
Asheville, NC 28803

Dear Mr. Schwartz:

Thank you for your July 30, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You commented that NPAL/ATOC should not continue in light of the numerous reports of beachings following previous tests. In a review of the California stranding data while the Pioneer Seamount ATOC source was operational, there are no significant changes in the number, frequency, or species composition during that time period, and we refer you to further discussion in Issue 10 of the Responses to Comments (Appendix F) of the Final Environmental Impact Statement (FEIS).

We are enclosing copies of the above-mentioned issue from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachment
Issue 10

I-140

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

6a 6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kaua'i ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have serious unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and 15b loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal 14a fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kaua'i this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, when they are not doing feeding dives, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. This is completely different than the standardized method of monk seal population assessment as performed routinely by the NMFS. Therefore, monk seal counts as included in the D-EIS were likely inaccurate. An aerial survey performed by the monk seal assessment division of the oil spill response and restoration team (during the Tesoro SPM Hose spillresponse/restoration in 1998-9), which used more "standardized" methods, resulted in a population estimate of a minimum of 16-24 seals on Kauai. This survey/estimate did not include Niihau. The population there however is believed to be significantly larger.

Due to the proximity of Niihau to Kauai (14 miles) both the islands are accessible to and used by seals on either island. This "local" travelling habit has been well documented by the NMFS Marine Mammal Research Program. In fact, weaned pups have been seen to travel over 17 miles in a single day. Clearly

I-140

then, the Niihau monk seal population is also at risk of suffering any malevolent effects of this experiment in Kauai's waters.

11 Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It has recently been discovered through highly scientific studies, that monk seals also use underwater vocalizations. Exactly why this occurs or what function it has in their survival is, at this time, still unknown. It must be assumed however that hearing of these vocalizations, by other seals or by other marine species, plays a part in their purpose. Due to the critically endangered status of this species, we must err on the side of caution whenever faced with unknowns. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore possible that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. In recent years, beaked whales have also beached near the Canary Islands and off the coast of Greece in close proximity to low frequency sonar tests.

14a Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and various forms of environmental abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Melissa Ann Shaw, D.V.M.

NMFS Monk Seal Veterinarian
P.O. Box 20
Hanalei, Hawaii 96714
e-mail: jaljolly@aol.com

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

December 14, 2000

Melissa Ann Shaw, D.V.M.
NMFS Monk Seal Veterinarian
P.O. Box 20
Hanalei, HI 96714

Dear Ms. Shaw,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Wrocester
Research Oceanographer

Attachments
Issues 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

I-73

808.949.0351

Cha Smith

1615 Mahani Loop, ♦ Honolulu, HI 96819

July 20, 2000

RECEIVED
DIVISION OF
LAND MANAGEMENT
Jun 20 4 03 PM '00

Tom Eisen
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Tom Eisen:

These comments are for the Draft Environmental Impact Statement for the NPAL program. The draft EIS is flawed and unacceptable. It does not provide answers or data to support this project. The Navy has once again funded a project and gone forward without appropriate assessment of the impacts on the environment. This is a total waste of tax dollars and I strongly protest the continuation of this project in Hawaii or anywhere else.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15 Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. The evidence generated from the recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions should be enough to generate serious questions. Instead of looking deeper into the potential harm, the Navy has moved forward without losing a step.

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This is totally unacceptable. Whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

14a The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Cha Smith

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093 0225

December 18, 2000

Cha Smith
1615 Mahani Loop
Honolulu, HI 96819

Dear Ms. Smith:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, table and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 9d, 11, 14a, 15a, 15b

I-113

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

Dear Mr. Worcester:

I am writing you from Germany to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai. It may come to you as a surprise that somebody from "half way around the globe" cares about this matter. Well ... I do.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

6a The D-EIS states that it is likely that the cable has been covered over and that pulling it would cause more disruption than leaving it. How is the condition of the cable known? It is unscientific to jump to a conclusion such as this. Have observations been made of the full length of the cable? If not, why not?

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters.

15b. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken

I-113

11 as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a. Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

14a.2 Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

14b.1 Dr. Joseph Mobley has conducted aerial surveys of Humpback Whales and other species in the waters around the Hawaiian Islands, for the Marine Mammal Research portion of the ATOC project. The results of his year 2000 survey should be included in the analysis of potential impacts of prior testing and use of high intensity sonars in these waters. There are reports that the 2000 survey showed a dramatic decline in the number of Humpback Whales in these waters. If correct, those reports may be an indication that prior testing of low frequency active sonar -- and use of such low frequency sounds in ATOC -- is causing the whales to avoid Hawai'i.

The risk assumptions in the D-EIS rely on the same information provided to the National Marine Fisheries Service (NMFS) as justification for the planned LWAD 00-2 test off the New York/New Jersey coast. Those tests involved the use of low frequency active sonar devices. The NMFS found the justification to be insufficient to warrant NMFS concurrence with those tests. The Navy

I-113

15a. therefore canceled the acoustic testing portions of the LWAD 00-2 tests. The EIS process for the North Pacific Acoustic Laboratory (NPAL) should include consultation with NMFS to secure copies of all comments received by NMFS, both internally and externally, regarding the LWAD 00-2 Environmental Assessment and the responses by NMFS to the Navy's request for concurrence in those tests.

The risk assumptions in the D-EIS rely on the results of the Low Frequency Active Sonar Scientific Research Program (LFS SRP). (See pages 4-18 to 4-22). The Navy released the D-EIS for the deployment of low frequency active sonar in July 1999 accompanied by three technical reports. The environmental analysis relied heavily on the LFS SRP.

15a. In comments on the D-EIS, scientists and citizens provided extensive criticisms of the LFS SRP and of the Navy's misuse of the limited data gathered by that research. The EIS process for the North Pacific Acoustic Laboratory should consider all the comments received by the Navy on the D-EIS for LFAS deployment, particularly as those comments relate to the adequacy of the LFS SRP and/or the misuse of the results of the LFS SRP by the Navy and Marine Acoustics. Given that Marine Acoustics is the consultant to the Navy for that D-EIS, the Laboratory should have easy access to the complete set of comments. Alternatively, there are web site postings of many of the comments at http://www.ilhawaii.net/~light/commenta.html and http://www.geocities.com/shootdaguy/responseslfas.html

The Woods Hole Oceanographic Institution recently released "Preliminary Results of the Effects of SURTASS-LFA Sonar on Singing Humpback Whales" by Nicoletta Biassoni, Patrick J.O. Miller, and Peter L. Tyack; May 2000. This technical report provides an analysis of some of the findings from the testing of low frequency active sonar off the Hawaiian Islands in 1998 as part of the LFS SRP.

The fact that the report is titled "Preliminary Results" is evidence supporting the criticism that the Navy is rushing to use the results of the LFS SRP before the scientists conducting that research have completed their analysis of the date gathered.

15a. The Woods Hole report found that Humpback Whales extended the length of their songs after exposure to low frequency sound. This research finding is not included in the D-EIS for NPAL/ATOC. (See pages 4-21 and 4-22). The absence of this finding from the D-EIS demonstrates the error of using the LFS SRP to justify sonar activities prior to the completion of that research.

14b. The finding in the Woods Hole report is particularly significant because singing is considered part of the mating behavior of the Humpback Whales. Any activity disrupting singing presumptively could impact the successful breeding of this endangered species. This new evidence calls into question the entire analysis found in the D-EIS for NPAL/ATOC.

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The LFS SRP finding regarding Humpback Whale Impacts led a federal judge to make the following comment in a recent opinion:

"Despite the above outcome [i.e. the dismissal of the case on legal grounds], the Court notes and expresses its concern that, according to an independent study sponsored by the Navy, low frequency sonar tests do indeed affect marine life. Although the researchers are not sure whether the tests have a harmful impact, they recommend at the very minimum that the Navy should avoid active breeding areas when performing tests. Further, the Court notes that the article states that whales breed and calf off Hawaii in the winter and spring before migrating north to the Gulf of Alaska. Following those recommendations would seem to have a severe impact on any testing off Hawaii." Order Denying Plaintiffs' Motion to Set Aside Order and to Consolidate Reopened Case with Pending Case; Order Granting Motion to Dismiss; CIV. No. 98-232 ACK; CIV. No. 00-00166 ACK-BMK dated July 10, 2000 at page 3 citing to "Navy study indicates sonar has effect on whales" Honolulu Advertiser, June 22, 2000 at A3.

The court viewed the Woods Hole/LFS SRP findings as potentially having a "severe impact on any testing off Hawaii." Most whales exposed to the LFA sonar off Hawai'i in 1998 received levels at 140 dB or below. The Woods Hole report, therefore, suggests that breeding behavior may be disrupted at those levels. The D-EIS for NPAL/ATOC discusses only short term behavioral response, such as avoidance and cessation of singing [see D-EIS pages 4-21 to 4-22.]. The failure of the D-EIS to discuss potential long term effects, such as impacts on breeding, is a serious deficiency in this document.

15b.

There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are:

10

The Canary Islands: A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast: In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California: The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands: In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in

I-113

strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list.

The Mediterranean Sea near Greece: In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature,1996)

The Hawaiian Islands: In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California: Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands: On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

Australia: The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas: Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

I-113

14a. Scientists who work with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these animals. Do the researchers studying the reactions of humpback whales to the ATOC/NPAL transmissions have similar protocols? If not, how is it known that these endangered whales have not been subjected to various stresses as a result of being

15b. repeatedly exposed to ATOC/NPAL1s low frequency rumbles? What is known about the effects of these sounds on pregnant whales and their fetuses? What is known about the long term effects of ATOC/NPAL exposure on new born humpback whale calves?

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Dieter Sommer
An der Waldpromenade 6
Steina, 37441, Germany

EMail: DieterSommer@web.de
Fax (Germany): +49 (180) 50 52 54 - 50 62 91
Fax (U.S.): +1 (810) 454-1730

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Dieter Sommer
An der Waldpromenade 6
Steina, 37441
Germany

Dear Mr. Sommer:

Thank you for your July 24, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points you raised.

You requested that the cable and transmitter be removed from the seafloor, and that data on the condition of the cable be provided. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes the known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, table and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

Finally, you also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

I-21

808-949-0551

July 19, 2000

Joshua Stanbro

Po Box 118 , ♦ Hokualoa, HI 96725

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15a Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward. This is crazy. WHY do we need
15b to destroy our environment--especially since the Cold War is OVER.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

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14a The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Joshua Stanbro

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Joshua Stanbro
P.O. Box 118
Holualoa, HI 96725

Subject: North Pacific Acoustic Laboratory (NPAL) Project

Dear Mr. Stanbro,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 11, 14a, 15a, 15b

I-111

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,RI 02842

Dear Ms. Raposa:

I am writing to give my comments on the Draft Environmental Impact Statement for the NPAL program off the coast of Kauai, Hawaii.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins have super sensitive hearing and live by sound of echolocation, for mating and feeding .The endangered humpback and sperm whale,hawkbill, leatherback, Hawaiian green ,olive ridley, and loggerhead turtles which inhabit the waters of Kauai, Hawaii are surely at risk.

Issue 10
15a

In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar ,stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resisitance to obtain autopsies that check for this particular problem. But in 1996 in the Med Iterranean Sea near Greece,12 Cuvier beaked whales exposed to NATO sonar were found stranded and at the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. The most recent in March 2000, in the Bahamas, numerous beaked whales and other cetaceans stranded on various beaches. Necropsies on some of the whales discovered blood in the eyes and brains which is associated with acute shock trauma. Seems like the list goes on and on of evidence that shows that the species of the sea are most certainly affected by the NPAL. Let's stop and THINK, that our earth is mostly water and is not meant to be a testing ground for the ocean species. How can we protect the

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endangered species of the ocean when we have this sonar testing known to kill the ones we are trying to save! Let's save our ocean and all the ocean species. Each time something is taken from the ocean, it becomes more out of balance. Let's start NOW and begin to help the ocean species keep their natural environment safe. I am asking that the Navy to discontinue the NPAL program NOW!

Sincerely,
Lynne Starke
Lynne Starke
83-5572 Middle Keei Road
Captain Cook, Hawaii 96704 USA

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

November 1, 2000

Lynne Starke
83-5572 Middle Keei Road
Captain Cook, HI 96704

Dear Ms. Starke:

Thank you for your July 21, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the point raised in your letter.

You commented on marine mammal strandings in areas close to military activity, suggesting that this shows that marine animals are affected by NPAL. The referenced sonars have signal and operational characteristics very different from those of the Kauai source. In a review of the California stranding data while the Pioneer Seamount ATOC source (same signal and operational characteristics as the Kauai ATOC/NPAL source) was operational, there are no significant changes in the number, frequency, or species composition during that time period, and we refer you to the details included in Issue 10 of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS) for this information.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Jennifer Foor Stephen 773-929-6665 p.1

I-183

Department of Land and Natural Resources
Attn: Tom Eisen
1151 Punchbowl Street
Honolulu, HI 96813
Fax: (808) 587-0455

Dear Mr. Eisen:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6a 6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these 15b 14a waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy accustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Scott Gerard Stephen

1833 West Berenice

City, State Zip. Chicago, IL 60613, USA

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Scott Gerard Stephen
1833 West Berenice
Chicago, IL 60613

Dear Mr. Stephen,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be taken into consideration.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Wrocester
Research Oceanographer

Attachments
Issue 6a, 6b, 14a, 15a, 15b

I-101

808-949-0551

July 22, 2000

. **Victoria Takamine**

98614 Kaimu Loop, ♦ Aiea, HI 96701

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

15 The NPAL program and its use of the ATOC cable and transmitter off the coast of Kaua'i need to be halted. We do not know the long and short term effects of this program on our natural environment. Until adequate information can be gathered to ensure the safety of our fragile environment and the species that inhabit them, all programs should cease. I

9 There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

14a.2 The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without

I-101

these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Victoria Takamine

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Victoria Takamine
98614 Kaimu Loop
Aiea, HI 96701

Dear Ms. Takamine:

Thank you for your July 22, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term effects. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments - Issues 9d, 11, 14a, 15a, 15b

I-171

808-949-0551

TO: Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

FROM: Healani Waiwai'ole
3408 'Eono St.
Lihu'e, HI 96766-1026

DATE: July 20, 2000

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

I am Native Hawaiian/Kanaka Maoli, and Hawai'i is my homeland.

I have many concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins have super sensitive hearing and rely on sound for echolocation, mating, and feeding, and therefore are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

15 Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. 9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions.

Sep. 26. 2000 10:40AM 401 847 7864 No. 7418 P. 13

I-171

Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

14a The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

As a Native Hawaiian/Kānaka Maoli, I can also say that one of the species in the ocean is my aumakua, that is, part of my ancestral family. What affects this species, directly affects me and my future generations.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i. Please do this.

Pela ka'u waiha me ka'u waipa la ke akua, ka uhane nui, na aumakua, na akua apau. 'Amama ua noa.

Sincerely,

Healani Waiwai'ole

Sep. 26. 2000 10:40AM 401 847 7864 No. 7418 P. 14

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

December 18, 2000

Healani Waiwai'ole
3408 'Eono Street
Lihue, HI 96766-1028

Dear Ms. Waiwai'ole:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 9d, 11, 14a, 15a, 15b

I-47

808-949-0551

TO: Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

FROM: Breana Wheeler
1119 Stanyan St
San Francisco, CA 94117

DATE: July 20, 2000

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles. Major concerns exist for the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. This past March,seventeen whales beached themselves in the Bahamas, in close proximity to Navy tests of another low frequency sonar. Some of those whales had bleedings eyes, and scientists found that some of them had hemorrhages in or around their ears.

10

15a 15b Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known, this project is inappropriate and should not go forward.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. Fin whale vocalizations are within the NPAL frequency range.

9d It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

I-47

15a Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests.

14a The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions.

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Breana Wheeler

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Breana Wheeler
1119 Stanyan Street
San Francisco, Ca 94117

Dear Ms. Wheeler,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you raised the issue of the Bahamas strandings. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the Final Environmental Impact Statement (FEIS), the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In addition, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998, shows no significant changes in the number, frequency, or species composition of strandings during that time period.
You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Peter Worcester

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 9d, 10, 11, 14a, 15a, 15b

I-165

★Department of Land and Natural Resources
Attn: Tom Eisen
PO Box 621
Honolulu, HI 96809

Dear Mr. Eisen:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai. Although currently in New Mexico, I lived on Kauai for over 10 years and will be headed back there in a month or so. I'm very disturbed that this project is still affecting the waters there.

6b. The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at-risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these

15b 14a.2 waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero.

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and

14a.2 distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

I-165

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i. Please think about this, and the spirit of "malama".

Sincerely,

Jeanne Wheeler

Jeanne Wheeler
HCR 65, Box 77
Ojo Sarco, NM, 87521

P.S. I hope that you truly make an effort to fulfill the scope of your duties towards the land (above and below water) and natural resources of Hawaii. The apparatus might be used again if left - but at any rate, would not be another un-needed mess. How much more disregard can you conscionably witness/support? Aloha? JW

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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

Ms. Jeanne Wheeler
HCR 65, Box 77
Ojo Sarco, NM 87521

Subject: **North Pacific Acoustic Laboratory (NPAL) Project**

Dear Ms. Wheeler,

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issue 6a, 6b, 9d, 11, 14a, 14b, 15a and 15b

I-56

AT HOME HERE
3134 Kuhio Highway, PMB 31, Lihue, HI 96766
www.AtHomeHere.com ▲ ohyeah@aloha.net
1-800-443-0096 (tollfree phone and fax)

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842 (by fax)

cc Tom Elsen - State of Hawaii, Department of Land and Natural Resources (by fax)

cc Genevieve Salmonson - Director, State of Hawaii, Office of Environmental Quality Control (by fax)

cc Peter Worcester - University of California, San Diego, Scripps Institute of Oceanography (by fax)

Thursday, July 20, 2000

Dear Ms. Raposa,

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

6b The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit.

I have many major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero. 15b 14a.2

11 Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC

I-56

11 marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i.

9d Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done.

15a Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests.

14a.2 Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions.

1 As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures. I am convinced that what you can learn from this type of research has little or no added value to life on earth and that it would be much better for you to spend taxpayers' money on research that is substantially and directly valuable to all life forms on our planet. I am also as convinced that we know so little about the wholistic effects of just about anything and everything that we do (especially in the realms of "scientific research"), that to do nothing in most cases is a much more appropriate action plan. It is clear to me that in this case we are tampering in realms of energy way beyond our current levels of understanding and that it would be best if we minimize our damage, cut our losses and get on with research that is actually beneficial.

I respectfully ask that the Navy immediately discontinue its NPAL/ATOC program and be accountable for its prior agreement to fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Panther Wilde

Panther Wilde

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 18, 2000

Panther Wilde
3134 Kuhio Highway, PMB 31
Lihue, HI 96766

Dear Mr. Wilde:

Thank you for your July 20, 2000 comment letter concerning the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL). The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably foreseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. Further relevant discussion appears at sections 1.1.2 and 4.2.1.2.1 of the EIS. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from the acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, habitat use patterns, and hearing sensitivity of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures that summarize the known frequencies of sounds produced by mysticetes and odontocetes and a table that summarizes known hearing sensitivities of odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.1 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and the beachings in the Bahamas. As discussed in Issue 15a, the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. However, any results from research on the potential effects of low frequency sound on marine mammals conducted as part of these programs will be included in the NPAL analysis of potential effects. As such, Section 4.2.1.2.1 of the FEIS has been modified to include information which was not available prior to the release of the DEIS. The revised paragraph is included in Issue 15a of the Responses to Comments (Appendix F) of the FEIS.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

FORM LETTER 1

I-1

808-949-0551

July 20, 2000

Barbara London

2523 - 43rd Avenue, ♦ San Francisco, CA 94116

Kathleen Vigness Raposa
Office of Naval Research/Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown,, RI 02842

Dear Kathleen Vigness Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kaua'i.

There are major unanswered concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kaua'i are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, also endangered, inhabit and use the same area as do endangered and other sea turtles.

Because the short and long term impacts of ATOC/NPAL signals on marine mammals are NOT known this project is inappropriate and should not go forward. 15b 15a

Hawaiian monk seals have a remaining population of less than 1300 The data on monk seals on Kaua'i in the D-EIS was woefully out of date and incomplete. The aerial marine mammal surveys taken as part of the ATOC marine mammal research program were poorly designed for observing monk seals. The monk seal counts included in the D-EIS were inaccurate. 11 Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities which could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. 9d

Very little is known about beaked whales. They are deep divers and experience adverse reaction to low frequency sounds. This is evidenced by recent beachings in the Bahamas during Navy acoustic tests during similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the immediate proximity of low frequency sonar tests. 15a

The Humpback whales data in the DEIS were inadequate, utilizing visual information generated from observation stations or from aerial surveys, such as numbers of whales and distribution.

You commented that the significance of the ocean climate research is not conveyed. This comment is addressed in Issue 1 of the Responses to Comments (Appendix F) in the FEIS, where we point out that the ocean plays an integral role in determining the planet's weather and climate, and the objective of the proposed research to quantitatively assess the feasibility of using acoustic thermometry in an integrated ocean observing system for ocean weather and climate.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Sincerely,

Dr. Peter Worcester
Research Oceanographer

Attachments
Issues 1, 6a, 6b, 9d, 11, 14a, 15a, 15b

I-1

No studies were done on physiological or psychological reactions to these sounds. Without these data it is extremely inappropriate and unacceptable to assume that there would be no impact to humpbacks and other mammals from ATOC transmissions. 14a

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

In my opinion, the Navy must immediately discontinue its NPAL/ATOC program and fully remove the cable and transmitter from the waters of Hawai'i.

Sincerely,

Barbara London

Letters with identical content and wording were submitted by the following individuals:

Sean Adler	Lea Heimerman	Gian Andrea Morresi
Melissa F. Armstrong	Stephen Herrington	Nanea Morris
Neil Bajwa	Matt Hoberg	Tracie Naranjo
Scott Barnes	Tina Horowitz	Nathan Nazdrowicz
Ruth Ann Bates	Eva Hutchinson	Dr. P. Neil
Diana Bennett	Bianca Isaki	Kealii Pang
Catherine Black	Bob Jacobson	Barbara Peck
Nathan Boddie	Robin Johnson	Saundra Pendleton
Jasmine Bourque	Anjanette Kalb	Claire Poertner
Katherine Brede	Adrian Kamalii	Susan Reghi
Bill Brooks	Anne Kaohelaulii	Becki Retzlaff
Terry Bunch	Rosemary Kekoa	Lori Sgambati
L-Marina C. Cabanilla Maza	Donna Killian	Kimberlie E. Sheldon
George Ciervo Jr.	Chris Kubiak	D. William Sinnett
Simone Cole	Eliza Linzer	Suni Somalwar
Kevin Correll	Kawika Liu	Jeremiah Spence
Andrea Cronrod	Leonardo D. Logan	Jill Strawder
Lynne Delabre	Barbara London	Matt Taylor
Janine Denny	Daniel Lovejoy	Karuna Thal
Michael Douglas	Timothy Mahar	Gabriel Andres Thoumi
Kathleen Erickson	Ryan Manro	Cohenour Tina
Tyler Forman	Mara Mayo	Joe Weichman
Jeffri H. Frontz	Susan McGuire	Ricky Wright
Donna Hampson	Bob Meyers	Rosemarie Zellers
Elliott Harris	Maya Moiseyev	

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

To: Distribution

From: Peter Worcester
Research Oceanographer
Scripps Institution of Oceanography, University of California, San Diego

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

You stated that since the short and long-term impacts of ATOC/NPAL signals on marine mammals are not known, this project should not go forward. This comment is addressed in Issues 15a and 15b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As we indicate in our response, extensive investigations into the potential effects of the Kauai sound source were conducted during the Acoustic Thermometry of Ocean Climate (ATOC) Marine Mammal Research Programs (MMRPs). The results from the MMRPs are summarized in Chapter 1 of the FEIS, and suggest that the proposed NPAL project would not result in biologically significant acute or short-term effects. Although the MMRP did not provide sufficient information to prove or disprove long-term impacts, the information gained through the MMRP, together with other credible scientific information now available, indicate that it is not reasonably foreseeable that ATOC/NPAL will have long term adverse effects on marine mammals. Nevertheless, the proposed project would continue to monitor for any acute or short-term effects and to study the potential for chronic or long-term effects due to continued operation of the sound source.

You indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are also included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Attachments
Issues 9d, 11, 14a, 14b, 15a, 15b

Distribution:

Sean Adler
Melissa F. Armstrong
Neil Bajwa
Scott Barnes
Ruth Ann Bates
Diana Bennett
Catherine Black
Nathan Boddie
Jasmine Bourque
Katherine Brede
Bill Brooks
Terry Bunch
L-Marina C. Cabanilla Maza
George Ciervo Jr.
Simone Cole
Kevin Correll
Andrea Cronrod
Lynne Delabre
Janine Denny
Michael Douglas
Kathleen Erickson
Tyler Forman
Jeffri H. Frontz
Donna Hampson
Elliott Harris
Lea Heimerman
Stephen Herrington
Matt Hoberg
Tina Horowitz
Eva Hutchinson
Bianca Isaki
Bob Jacobson
Robin Johnson
Anjanette Kalb
Adrian Kamalii
Anne Kaohelaulii
Rosemary Kekoa
Donna Killian
Chris Kubiak
Eliza Linzer
Kawika Liu
Leonardo D. Logan
Barbara London
Daniel Lovejoy
Timothy Mahar
Ryan Manro
Mara Mayo
Susan McGuire
Bob Meyers
Maya Moiseyev
Gian Andrea Morresi
Nanea Morris
Tracie Naranjo
Nathan Nazdrowicz
Dr. P. Neil
Kealii Pang
Barbara Peck
Saundra Pendleton
Claire Poertner
Susan Reghi
Becki Retzlaff
Lori Sgambati
Kimberlie E. Sheldon
D. William Sinnett
Suni Somalwar
Jeremiah Spence
Jill Strawder
Matt Taylor
Karuna Thal
Gabriel Andres Thoumi
Cohenour Tina
Joe Weichman
Ricky Wright
Rosemarie Zellers

FORM LETTER 2

I-70
F-2

Office of Naval Research
c/o Kathleen Vigness Raposa
Marine Acoustics, Inc.
809 Aquidneck Ave.
Middletown, RI 02842

Dear Ms. Raposa:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

The Hawaii Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit. 6b

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in ~~the same area. Two~~ 15b endangered sea turtle species, hawksbill and leatherbacks~~, and three threatened species~~, Hawaiian green, olive ridley and loggerheads also inhabit these waters. Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects or effects on breeding patterns, or on marine mammal fetuses in utero. 14a.2

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawaii. 11

Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. 9d

Very little is known about beaked whales. They are deep divers, which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity of low frequency sonar tests. 15a

I-7D
F-2

2

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions. 14a

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species, which have become endangered largely through our own negligence, mismanagement, and

abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.
I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawaii.

Sincerely,

Donna J. Dickinson
1951 Revolutionary Coutr
Phoenixville, PA 19460

Letters with identical content and wording were submitted by the following individuals:

Heidi Benson	Gwendolyn Hjelmstad	Sharon Mullane
Kelly A. Bergeron	Renee Ingram	Jessalyn Nash
Michaela Boudreaux	Barbara Jarvis	Joseph M. Noonan
Gena Gouquet	Vickie L. Johnson	Richard Norton
William & Joan Bramsch	Risa Kaparo/David Boulton	Maria Petrak-Rajput
Linda A. Cook	Penny Khaled	Susan Pico
Nancy Crom	Professor Ken Knight	Kathee Pizzi
Jamie Dack	Craig Knox	Deborah M. Railer
Lotus & Sun Dancer	Marsha Koller	Lourdes Resperger
Pamela Glendinning Diaz	Sky Landis	Pat Rundstrom
Donna J. Dickinson	Stefan Laug	Adrienne Arabian Simidian
Mark Farrell	Georgina Lopez Gonzalez	Heidi Sittinger
Mary Fishback	Donna MacIver	Ariel Spilsbury
Roberta Goodman	Cynthia Marshall	Carl M. Stepath
Erin Graue	Moksha McClure	Melissa Stevenson
Marta Greenleaf	Ed Moen	Penny Thomas
William Greenleaf	Myrica Morningstar	David Lopez Wheelock
Siobhan Harrington	Michael Morosey	Will Wilcox
D.Grant Haynes	Kimberly Morill	Morgan Paul Williams
Linda Hecht	Judith Muir	

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)
LA JOLLA, CALIFORNIA 92093-0225

December 14, 2000

To: Distribution

From: Peter Worcester
Research Oceanographer
Scripps Institution of Oceanography, University of California, San Diego

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issues 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility has conducted a Remotely Operated Vehicle (ROV) survey of the underwater cables on the west and northwest sides of Kauai, and have documented that the Acoustic Thermometry of Ocean Climate (ATOC) cable has coral growing on it to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available indicates that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

Your letter also indicated that the monk seal data used in the DEIS was out of date and incomplete. In response, we have incorporated additional information on the status, habitat requirements, and habitat use patterns of the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS.

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Attachments
Issue 6a, 6b, 9d, 11, 14a, 14b, 15a, 15b

Distribution:

Heidi Benson	Renee Ingram	Sharon Mullane
Kelly A. Bergeron	Barbara Jarvis	Jessalyn Nash
Michaela Boudreaux	Vickie L. Johnson	Joseph M. Noonan
William & Joan Bramsch	Risa Kaparo/David Boulton	Maria Petrak-Rajput
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Donna J. Dickinson	Sky Landis	Pat Rundstrom
Mark Farrell	Stefan Laug	Adrienne Arabian Simidian
Mary Fishback	Georgina Lopez Gonzalez	Heidi Sittinger
Roberta Goodman	Donna MacIver	Ariel Spilsbury
Erin Graue	Cynthia Marshall	Carl M. Stepath
Marta Greenleaf	Moksha McClure	Melissa Stevenson
William Greenleaf	Ed Moen	Penny Thomas
Siobhan Harrington	Myrica Morningstar	David Lopez Wheelock
D.Grant Haynes	Michael Morosey	Will Wilcox
Linda Hecht	Kimberly Morill	Morgan Paul Williams
Gwendolyn Hjelmstad	Judith Muir	

FORM LETTER 3

I-115

Identical letter from Trish Regan = I-114

University of California, San Diego
Scripps Institute of Oceanography
Attn: Peter Worcester
9500 Gilman Drive
IGPP 0225
La Jolla, CA 92093

July 20, 2000

Dear Peter Worcester:

I am writing to provide my comments on the Draft Environmental Impact Statement for the NPAL program and its continued use of the ATOC cable and transmitter located off the coast of Kauai.

The Hawai'i Board of Land and Natural Resources granted an after-the-fact permit for the Kauai ATOC cable, which requires the removal of the cable after completion of the project. The Navy now wants to abandon the cable when they are done with it, leaving it as garbage on the ocean floor. I request that the cable and transmitter be fully removed, as required by the original permit. The D-EIS states that it is likely that the cable has been covered over and that pulling it would cause more disruption than leaving it. How is the condition of the cable known? It is unscientific to jump to a conclusion such as this. Have observations been made of the full length of the cable? If not, why not? 6a

I have major concerns regarding the safety of endangered species, as well as non-listed species, in the waters surrounding the low frequency NPAL source. Whales and dolphins with their super sensitive hearing and reliance on sound for echolocation, mating, and feeding, are especially at risk. The warm coastal waters of Kauai are one of the winter breeding and calving grounds for endangered humpback whales. Sperm whales, which are also endangered, use somewhat deeper waters in the same area. Two endangered sea turtle species, hawksbill and leatherbacks, and three threatened species, Hawaiian green, olive ridley, and loggerheads, also inhabit these waters. 15b Long term effects of ATOC/NPAL signals are NOT known for any of the protected species mentioned above, nor are short term physiological effects, or effects on breeding patterns, or on marine mammal fetuses in utero. 14a.2

Hawaiian monk seals have a remaining population of less than 1300. The data on monk seals on Kauai in the D-EIS was woefully out of date and incomplete. At least three monk seal pups are known to have been born on Kauai this year. The aerial marine mammal surveys which were taken as part of the ATOC marine mammal research program, were poorly designed for observing monk seals. These pinnipeds generally inhabit the shoreline and close waters, while flight patterns for the aerial surveys were set up to observe humpbacks and sperm whales, at significantly further distance from the shore. Therefore monk seal counts as included in the D-EIS were likely inaccurate. Little is known about the hearing range of these seals. They dive to depths of 500 meters, which could put them dangerously close to the NPAL source. It would be unconscionable for NMFS to issue a Letter of Authorization for an incidental take on this, the most endangered of all ocean mammals which live in the waters of Hawai'i. 11

Fin whale vocalizations are within the NPAL frequency range. It is therefore likely that NPAL transmissions could interfere with fin whale mating calls or other activities. Such interference could harm this species by negatively affecting mating behavior. This would not be observable until after the damage was done. 9d

Very little is known about beaked whales. They are deep divers which seem to have a strongly adverse reaction to low frequency sounds, as evidenced by recent beachings in the Bahamas during Navy acoustic tests. Albeit, these were not ATOC/NPAL transmissions, but they were similar low frequency transmissions. Beaked whales have also beached near the Canary Islands and off the coast of Greece in the proximity 15a *of low frequency sonar tests.*

Humpback whales were the most widely studied species in the ATOC Marine Mammal Monitoring Studies. Nonetheless, all that was really studied were phenomena that were visible from shore observation stations or from aerial surveys, such as numbers of whales and distribution. No studies were made of their physiological or psychological reactions to these sounds. Without having any information on these kinds of reactions, it was extremely unscientific to jump to the conclusion that there was no response on the part of humpbacks to the ATOC transmissions. 14a

Scientists who work with laboratory rats have developed specific protocols for monitoring the effects of psychological stress in these animals. Do the researchers studying the reactions of humpback whales to the ATOC/NPAL transmissions have similar protocols? If not, how is it known that these endangered whales have not been subjected to various stresses as a result of being repeatedly exposed to ATOC/NPAL's low frequency rumbles? What is known about the effects of these sounds on pregnant whales and their fetuses? What is known about the long term effects of ATOC/NPAL exposure on new born humpback whale calves? 14a.2 15b

As stewards of these lands and waters, we have a sacred responsibility to protect all creatures, and a special mandate to nurture the species which have become endangered largely through our own negligence, mismanagement, and abuse. It is totally inappropriate and inhumane to create a laboratory in the Pacific to test the response of low frequency sounds on ocean creatures.

There is a growing body of evidence relating sonar exposures to adverse impacts on cetaceans. The D-EIS for NPAL/ATOC fails to discuss this body of evidence. Among the events which should be discussed and analyzed for their cumulative importance are: 10

The Canary Islands:
A total of 21 whale strandings in 1985, 1988, and 1989 were linked to visible US Navy maneuvers. These were the only times whales were reported to strand in the Canary Islands. (Nature, 1991)

The Atlantic Coast:
In a 1987 Navy experiment, dolphins exposed to 235 decibels of sonar stranded and were found to suffer from lung tissue explosion. Since this revelation, there has been a great deal of resistance to obtain autopsies that check for this particular problem.

Northern California:
The first public test of ATOC in November of 1995 was followed by the beaching of three humpback whales - all buried before autopsies could be performed.

The Haro Strait, San Juan Islands:
In the Summer of 1996, 195 decibels were sent into this key waterway used by orcas, porpoises, seals and other mammals, followed by an increase in strandings of these mammals. ABC News recently reported that the previously thriving orca population from this area is now in enough trouble to be considered eligible for the Endangered Species list

The Mediterranean Sea near Greece:
In 1996, twelve Cuvier beaked whales exposed to NATO sonar were found stranded. At the same time 200 dolphins stranded and were suspected of suffering from tissue explosion. (Nature, 1996)

The Hawaiian Islands:
In 1998, three whale calves and one dolphin calf were found dead or abandoned during and immediately following sonar testing, even though in 15 years of research this phenomenon had never been observed. One of these was a distressed whale calf that breached 230 times and pectoral slapped 658 times in front of Dr. Marsha Green's research team in a four-hour period before the sun set on his distress. In addition, a pod of dolphins was observed by naturalists familiar with normal dolphin behavior huddling unusually close to the shore near the surface and vocalizing excessively while the sound was on.

California:
Since the testing in California began in 1997, sonar exposed whales immediately began to strand in increased numbers. In addition, there was a report of uncharacteristically aggressive behavior. More recently, The Malibu Times reported in January, 1999, that more than 150 gray whales were found dead due to starvation along their migratory route where testing took place in 1998.

U.S. Virgin Islands:
On October 3 1999, three pilot whales beached off of the U.S. Virgin Islands of St. Croix, St. John, and St. Thomas, coincident with Navy maneuvers

Australia:
The Australian government has questioned a connection between observed US Navy and NATO maneuvering and strandings off their shores.

The Bahamas:
Most recently in March 2000, numerous beaked whales and other cetaceans stranded on various beaches, a rare occurrence as beaked whales are not typically schooling animals. A 1998 report in Nature found that only four beaked whale strandings had occurred since 1963. Necropsies on some of the whales discovered blood in the eyes and brains commensurate with acute shock trauma. The Navy admits that a fleet in the area broadcast sonar from various ships at the time of the strandings. The most likely explanation for the strandings is the use of that sonar.

The cumulative evidence is now sufficient to conclude that high intensity sound broadcasts into the marine environment represent a significant threat to the cetacean community.

I respectfully ask that the Navy discontinue its NPAL/ATOC program and fully remove its cable and transmitter from the waters of Hawai'i.

Sincerely,

Douglas B. Hackett

Douglas B. Hackett
82-955 Aka Ala St.
Captain Cook, Hawaii 96704
USA

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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CECIL H. AND IDA M. GREEN
INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
SCRIPPS INSTITUTION OF OCEANOGRAPHY (0225)

LA JOLLA, CALIFORNIA 92093-0225

December 13, 2000

To: Douglas B. Hackett
Trish Regan

From: Peter Worcester
Research Oceanographer
Scripps Institution of Oceanography, University of California, San Diego

Thank you for your comment letter regarding the Draft Environmental Impact Statement (DEIS) for the proposed North Pacific Acoustic Laboratory (NPAL) project. The following information responds to the points raised in your letter.

First you requested that the cable and transmitter be removed from the seafloor. We have responded to this comment in Issue 6a and 6b of the Responses to Comments (Appendix F) in the Final Environmental Impact Statement (FEIS). As stated in this response, and more fully discussed in Sections 2.1.1.1 and 4.1.1.1 of the FEIS, changed circumstances and new information show that it would be more environmentally harmful to remove the cable than to allow it to remain on the seafloor. The cable has been on the seafloor for 6 years, and natural processes are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Also, as indicated in Issue 6a, the Pacific Missile Range Facility (PMRF) has done extensive work with underwater cables on the west and northwest sides of Kauai. In consultation with them, they have provided additional information on the status of the ATOC cable, and of other cables in the area. This additional information was included in the third paragraph of Section 4.1.1.1 of the FEIS. The revised third paragraph is also included in copy of Issue 6a (copy attached). Although PMRF personnel have not made observations of the full length of the cable, they have conducted a Remotely Operated Vehicle (ROV) survey out to water depths of approximately 300 feet (100 meters). During this survey, they observed coral growth on the cable out to depths of approximately 200 ft (61 meters). Therefore, removal of the cable could result in damage to this coral.

You also expressed concerns regarding the safety of marine animals, including the long-term effects on protected species, such as humpback whales, sperm whales and sea turtles, as well as short-term physiological effects on breeding patterns and fetuses in utero. The issue of long-term effects is addressed in Issue 15b of the Responses to Comments (Appendix F) in the FEIS. Although the ATOC Marine Mammal Research Program (MMRP) did not provide sufficient information to prove or disprove long-term impacts on marine mammals, the information gained through the MMRP together with other credible scientific information now available and application of research methods generally accepted in the scientific community indicate that it is not reasonably forseeable that ATOC/NPAL will have long-term adverse effects on marine mammals. One of purposes of the proposed action is to conduct marine mammal monitoring studies in order to advance the understanding of the potential for long-term effects from acoustic transmissions on marine life. Answers to questions about breeding and reproduction would also be addressed in this context. Response to the comment regarding short-term physiological effects can be found in Issue 14a.2. Studies of direct physiological or psychological reactions require captive specimens, which is not an option for research on large marine mammals. Therefore, we plan to use the best available methods to obtain estimates of physiological and psychological reactions through observations of behavioral reactions, as was done for humpback whales in the studies conducted by the Kauai ATOC MMRP.

You also indicated that the monk seal data used in the DEIS was incomplete and that the ATOC MMRP was poorly designed for observing monk seals. In response, we have incorporated additional information on the Hawaiian monk seal into Section 3.2.2.3 of the FEIS, as indicated in Issue 11.

You also commented that it is likely that the NPAL transmissions would interfere with fin whale mating calls, or could negatively affect their mating behavior. In response to this comment, we have constructed figures and tables that summarize the known frequencies of sounds produced by mysticetes and odontocetes, and inserted them into Sections 3.2.2.1 and 3.2.2.2 of the FEIS respectively. We have also modified the subsection "Potential for Masking" in Section 4.2.1.2.1 to include a discussion of the marine mammal species that may be masked by NPAL. The figures, tables and revised paragraphs are included in Issue 9d of the Responses to Comments (Appendix F) of the FEIS

We have also responded to your comment regarding beaked whales and beachings. As discussed in Issue 15a, other Navy acoustic tests and sonars, such as the Navy Littoral Warfare Advanced Development (LWAD) and Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) systems are substantially different from the Kauai source, and therefore are not relevant to the discussion of potential impacts from this sound source. Furthermore, no odontocete has been shown audiometrically to have acute hearing (i.e., a detection threshold of less than 80 dB re 1 μPa) below 500 Hz (Ketten, 1998), and no behavioral studies have been conducted that suggest that beaked whales are sensitive to low frequency sounds.

Your letter also indicates that the humpback whale data in the DEIS was inadequate, and that no studies had been done on the physiological or psychological reactions to the sounds. This comment is addressed in Issue 14a and 14b of the Responses to Comments (Appendix F) in the FEIS, where we discuss the methodology of the ATOC MMRP, as well as the results and conclusions. As is indicated in Issue 14a.2, the ATOC MMRP protocols used the best available methods for studying free-ranging animals; that is, indirectly estimating physiological and psychological reactions through observations of behavioral reactions. The NPAL project is proposing to continue to monitor for short-term or acute effects, and potential long-term cumulative effects in order to obtain more complete research data during the proposed project.

Finally, you also raised the issue of sonar exposures and cetacean strandings, and listed a series of events for discussion. As indicated in Issue 10 of the Responses to Comments (Appendix F) of the FEIS, the referenced sonars have signal and operational characteristics very different from those of the Kauai source, and therefore it is not appropriate for this EIS to analyze those strandings. In your list, one of the events listed does involve the California source, however, a review of the California stranding data while the ATOC source was opportunistically operational from 1995 through 1998 shows no significant changes in the number, frequency, or species composition of strandings.

We are enclosing copies of the above-mentioned issues from the Responses to Comments section of the FEIS. The complete document is available online at http://npal.ucsd.edu/FEIS/toc.html. If you would like to have a copy mailed to you, please return the enclosed postcard.

We appreciate your interest in our project. If you have further questions or comments regarding NPAL, feel free to contact Susie Pike or myself at (858) 534-8031.

Attachments
Issues 6a, 6b, 9d, 10, 11, 14a, 14b, 15a, 15b

APPENDIX G

CHANGES MADE TO THE DEIS

This appendix, Changes Made to the DEIS, includes detailed information about the changes that were made to the text of the DEIS in the production of this FEIS. Except for the edits made in Sections 1.3.3 and 6.1.3 to clarify the Endangered Species Act (ESA) permitting process, the edits made in Sections 4.5.3 and 6.2.3 to reflect new Hawaii legislation passed since the DEIS was out for public review, and edits made to Sections 3.2 and 4.2.1.2.1 to add sei whales as discussed with NMFS in consultation under the ESA, all changes made to the DEIS were in response to comments received or were updates that reflect the progression of the EIS process (e.g. the updates made in Section 1.3.1.1).

In the main body of this document, the locations of changes made to the text are indicated with a vertical line in the adjacent right margin. Each change is also numbered so that it can be cross-referenced to its corresponding entry in this appendix. Each changed section is included in this appendix with deleted text indicated in a strikeout format and new or changed text indicated as both italicized and underlined (*<u>such as this</u>*).

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

APPENDIX G

CHANGES MADE TO THE DEIS

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In the main body of this document, the locations of changes made to the text are indicated with a vertical line in the adjacent right margin. Each change is also numbered so that it can be cross-referenced to its corresponding entry in this appendix. Each changed section is included in this appendix with deleted text indicated in a strikeout format and new or changed text indicated as both italicized and underlined (*such as this*).

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EXECUTIVE SUMMARY

This Executive Summary describes the proposed action and alternatives analyzed in this Environmental Impact Statement (EIS) for the continued operation for five additional years of the low frequency (LF) sound source (including the seabed power cable) previously installed off the north shore of Kauai, Hawaii, for use in Acoustic Thermometry of Ocean Climate (ATOC) research. The proposed action is reuse of the sound source and cable for the North Pacific Acoustic Laboratory (NPAL), a U.S. Navy Office of Naval Research (ONR) basic research project, which would combine:

- a second phase of research on the feasibility and value of large-scale acoustic thermometry;
- long-range underwater sound transmission studies; and
- marine mammal monitoring and studies.

The action would be carried out by Scripps Institution of Oceanography, University of California, San Diego (Scripps), which is the applicant for necessary state and federal permits, and by the Applied Physics Laboratory of the University of Washington. This EIS presents a detailed description of the proposed project, its facilities, environmental setting, alternatives, potential environmental effects, and mitigation and monitoring measures, in addition to other information required by the National Environmental Policy Act and the Hawaii Environmental Impact Statement Law.

~~Under these authorities, ONR and Scripps must ensure that the potential environmental effects of the proposed project have been adequately addressed and analyzed. In addition, other agencies will review and consider the information presented in this EIS prior to deciding whether to approve aspects of the project under their specific jurisdiction. These required approvals include incidental harassment/taking authorization from the National Marine Fisheries Service (NMFS), a Conservation District Use Permit (CDUP) from Hawaii Department of Land and Natural Resources (DLNR), and various other reviews and consultations described more fully in Chapters 1 and 6.~~ 1

An understanding of the basic principles of subsea sound is important for assessing the material included in this EIS. Therefore, readers unfamiliar with subsea sound are referred to Appendix A for a summary of fundamental knowledge.

ENVIRONMENTAL IMPACT ANALYSIS

Under the National Environmental Policy Act and the Hawaii Environmental Impact Statement Law, ONR and Scripps must ensure that the potential environmental effects of the proposed project have been adequately addressed and analyzed. This analysis includes consideration of the project's consistency with land use plans and policies as well as policies and standards of applicable state and federal regulatory requirements. The information and analysis is presented 2 *primarily through this EIS, which is prepared in compliance with state and federal law. It will be used by other agencies in determining whether to approve aspects of the project under their specific jurisdiction. Federal, state, and local authorities potentially relevant to review and approval of this project are discussed in detail in Chapters 1 and 6. Required agency approvals are summarized below.*

AGENCY	*ACTION*
National Marine Fisheries Service (NMFS)	*Incidental harassment/taking authorization under MMPA/ESA*
NMFS	*Consultation under ESA, § 7*
NMFS	*Coordination under Magnuson-Stevens Fisheries Conservation and Management Act*
Hawaii Department of Land and Natural Resources	*Conservation District Use Permit* *Approval of Disposition of Land*
Hawaii Office of Coastal Zone Management	*Federal Consistency Certification*
Department of the Navy	*Decision to Proceed*

DLNR review of Scripps' application for a Conservation District Use Permit is triggered by use of state submerged lands for a portion of the cable route. The land lies within the Resource Subzone of the Conservation District, for which the objective is "to develop, with proper management, areas to ensure sustained use of the natural resources of these areas..." Hawaii Administrative Rule (HAR) § 13-5-13. As discussed in Section 6.2.1, the public purposes and specific characteristics of the scientific research activities provide DLNR with a foundation for finding the project consistent with the objective and specifically allowable uses of the Resource Subzone.

Federal consistency review by the Hawaii Office of Coastal Zone Management (OCZM) is triggered by the project's need to obtain authorization under the Marine Mammal Protection Act. Such authorizations are listed in the State's federally approved Coastal Zone Management Program as a basis for federal consistency review. Scripps has prepared a certification that the proposed project is consistent with the State's Coastal Zone Management Program. This consistency certification includes consideration of each of the program's enforceable policies. The analysis appears in Section 6.2.2 and is supported by information in this EIS.

POTENTIAL ENVIRONMENTAL EFFECTS

As described in detail in the EIS, the environment includes the following major resources: physical, biological, economic, and social. Physical effects include those from construction and/or removal of facilities and potential increases in ambient noise. The physical installations at Midway Island as part of the Midway Alternative, involving the placement of a small sound source and power cable, would be relatively minor and generally are benign from an environmental standpoint. The No Action Alternative and the Midway Alternative would involve the removal of the sound source and cable presently in place off northern Kauai. Since the cable has been on the seafloor for six years, natural processes such as sediment drift are likely to have buried the cable. Removing the cable is therefore likely to disrupt the seafloor environment. In those regions where the cable is not buried, it is possible that new coral may have begun to grow on the cable. The Pacific Missile Range Facility (PMRF) has discovered significant coral growth on many of its underwater cables. In addition, the installation of the Shallow Water Training Range (SWTR) off the northeast coast of Kauai by PMRF complicates the cable recovery task. In terms of the sound fields of the source, all alternatives except the No Action Alternative would add somewhat to the ambient noise levels during transmission periods.

The biological environment potentially affected by the Preferred Alternative includes marine mammals, sea turtles, and fish. There would be limited probability of a direct adverse effect on the benthic biological environment due to sound source and cable installation and/or removal. However, Hawaiian monk seals, a severely endangered species, use the beaches of Midway Island for breeding and pupping, and recent increases in pup survival at Midway suggest that the seals may reestablish the atoll as a major breeding site. Therefore, activities associated with the installation of a power cable at Midway may disrupt their behavior.

~~Though s~~*S*everal potential effects due to source transmissions are discussed, including the
potential for physical auditory effects, behavioral disruption, habituation, masking, long-term 3
effects, and indirect effects*.*~~, only the potential for physical auditory effects and behavioral disruption are believed to be of any significance~~. Analysis of the potential effects on marine mammals was accomplished with results of the California and Hawaii ATOC Marine Mammal Research Programs (MMRPs) and a comprehensive program of underwater acoustical modeling. The ATOC MMRPs were designed to determine the potential effects of the acoustic transmissions on marine mammals and other marine life. Neither MMRP observed any overt or obvious short-term changes in behavior, abundance, distribution, or vocalizations in the marine mammal species studied. Intense statistical analyses revealed some subtle changes in the distance and time between successive humpback whale surfacings (segment length and segment duration), and in the distribution of humpback whales away from the Kauai source and humpback (and possibly sperm) whales away from the California source during transmission periods. Bioacoustic experts concluded that these subtle effects would not adversely affect the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, ~~1999a~~*2000*).

In order to estimate the potential for biological risk, a comprehensive program of underwater acoustical modeling was undertaken. The potential for biological risk is a function of an animal's exposure to sound. The parameters used for determining exposure were RL in decibels, length of the signal, and the number of signals received. Therefore, the level of risk for an animal depends on its location in relation to the sound source. In order to determine the potential for risk, threshold standards were established. These threshold standards set the amount of *potential* risk for *a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to*
impact on the reproductive success of an animal ~~disturbance of a biologically important behavior~~ 4
if an animal received one *1-min* signal at that received level. The threshold standards, which

were developed into a risk continuum, were based on a comprehensive literature review and the results of recent studies on the effects of LF sound on marine mammals. As explained in detail in Chapter 4, the risk continuum estimates that 95 percent of the marine mammals exposed to a single *1-min* ping at 180 dB could incur a temporary threshold shift (TTS); that the risk of disturbing a biologically important behavior is zero below 120 dB; and that 2.5 percent of a population exposed to a single *1-min* ping at a RL of 150 dB would experience disturbance of a biologically important behavior. The resulting risk continuum is shown in Figure ES-1.

To quantify the potential for risk, the sound field around the source was estimated using the Navy's standard acoustic performance prediction transmission loss model. These data are input to the Acoustic Integration Model (AIM) which coupled the acoustic environment with population distribution, abundance, density, general movement and diving profile data for marine mammals in the area. AIM was used to simulate the acoustic exposure for each animal over one 20-min transmission and over one day of transmissions (six 20-min transmissions). *To account for animal movement during the 20-min transmission and over one day of transmissions, the NPAL signal was broken up into 1-min pings. The energy an animal received from each of these 1-min pings (either 20 1-min pings for one transmission or 120 1-min pings for one day of transmissions) was then summed and the corresponding received level for one 1-min ping (i.e., the single ping equivalent) was calculated. The single ping equivalent was the input into the risk continuum to estimate the potential effects of the NPAL transmissions.* Estimates of the percentages of marine mammal populations potentially affected by the Preferred Alternative and the Midway Alternative are displayed in Tables ES-1 and ES-2, respectively. A value of zero means that less than 0.01% (i.e., 0.0001) of the marine mammal population are potentially affected. These results ~~demonstrate~~ *suggest* that only humpback whales near Kauai have a chance for disturbance of a biologically important behavior, and no TTS effects are expected with any of the species at either site. 5

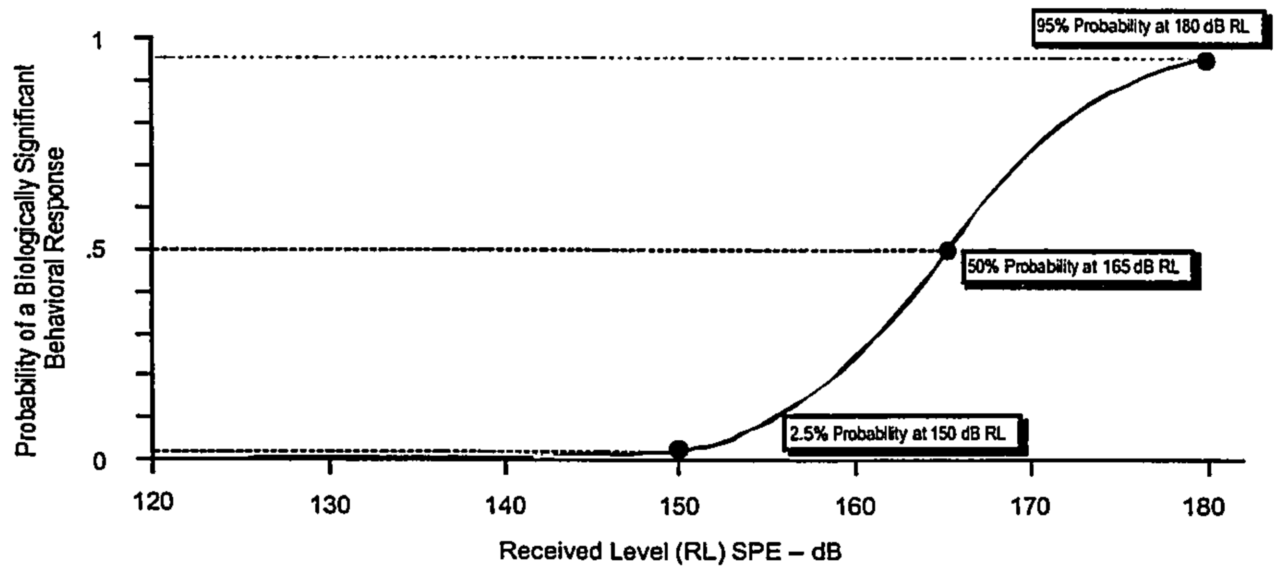

Figure ES-1, Single Ping Equivalent Probability Function

Table ES-1 Percentages of Marine Mammal Populations Potentially Affected by the Preferred Alternative

Marine Mammals	One Transmission		One Day of Transmissions	
	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)
humpback whale	0	0	0.01	0
fin whale	0	0	0	0
sperm whale	0	0	0	0
dwarf and pygmy sperm whales	0	0	0	0
Blainville's beaked whale	0	0	0	0
Cuvier's beaked whale	0	0	0	0
short-finned pilot whale	0	0	0	0
fasle killer whale	0	0	0	0
melon-headed whale	0	0	0	0
Risso's dolphin	0	0	0	0
rough-toothed dolphin	0	0	0	0
bottlenose dolphin	0	0	0	0
striped dolphin	0	0	0	0
spotted dolphin	0	0	0	0
spinner dolphin	0	0	0	0
Hawaiian monk seal	*0*	*0*	*0*	*0*

6

Table ES-2 Percentages of Marine Mammal Populations Potentially Affected by Alternative 3

Marine Mammals	One Transmission		One Day of Transmissions	
	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)
blue whale	0	0	0	0
fin whale	0	0	0	0
Bryde's whale	0	0	0	0
minke whale	0	0	0	0
sperm whale	0	0	0	0
dwarf and pygmy sperm whales	0	0	0	0
Blainville's beaked whale	0	0	0	0
Cuvier's beaked whale	0	0	0	0
melon-headed whale	0	0	0	0
Risso's dolphin	0	0	0	0
rough-toothed dolphin	0	0	0	0
bottlenose dolphin	0	0	0	0
striped dolphin	0	0	0	0
spotted dolphin	0	0	0	0
spinner dolphin	0	0	0	0
Hawaiian monk seal	0	0	0	0

Concerning sea turtles, the maximum residence time in the area of the Preferred Alternative is < 24 hours, given their general coastal distribution and known transit speeds. In addition, the maximum dive depths for leatherbacks are > 1000 m (3281 ft). No other species of sea turtle are know to dive > 500 m (1591 ft), and therefore would not be capable of receiving the highest RLs. The measured hearing threshold for green turtles (and by extrapolation, at least the olive ridley, loggerhead, and hawksbill) is only slightly lower than the maximum levels to which these three species could be exposed. It is not believed that a temporary threshold shift would occur at such a small margin over threshold in any species. Therefore, no threshold shifts in green, olive ridley, loggerhead, or hawksbill sea turtles are expected. Because leatherback turtles are morphologically distinct (leathery shell, with minimal calcification of bone), approximating hearing thresholds from data available for the other (hard shell) species is probably inappropriate. However, inasmuch as the density of leatherbacks over the study area is low, but patchy (Eckert, pers. comm., 1994), the fact that only a small percentage of time is spent at depth, the intermittent nature and low duty cycle of the NPAL source, and the fact that the proposed project site is not believed to be a particularly important location of leatherback prey species, any impact should be minimal. Similarly, the potential for short-term behavioral disturbance or displacement of all sea turtle species is unlikely.

~~L~~ *Though* little information on hearing exists for *the particular* marine fish species in the vicinity of the proposed *sites, sufficient research on fish and their hearing mechanisms allows fish species to* ~~. However, fish species can~~ be grouped into two categories *to estimate potential effects:* "specialists" that have specializations that enhance their hearing sensitivity, and "nonspecialists" that do not possess such capabilities. It is speculated that in order for extensive damage to occur, sound levels of 220 to 240 dB (RL) would be needed to injure the ears of nonspecialists. The comparable level for a hearing specialist might be on the order of 50 dB lower. Therefore, the risk of physical harm or injury would be at received levels at or above 180 dB. For the NPAL project, proportionally few fish are expected to be exposed to levels >180 dB, which would occur within a radius of approximately 5 m (18 ft) from the source. In addition, the proposed source site would comprise only a small portion of the range for any fish species. In light of this, plus the low duty cycle and intermittent nature of transmissions, it is concluded that although threshold shifts might occur in a few hearing specialists that are deep divers, the impact on fish populations should be minimal. 7

UNRESOLVED ISSUES

The principal unresolved issue presented by the proposed project is the degree to which LF, subsea sounds could potentially affect marine animals over the long-term (NRC 1994, 1996, 2000). Results from the California and Hawaii ATOC MMRPs, which occurred over a time period of two years, are summarized in Chapters 1 and 4. All of the effects detected by the MMRPs were subtle, of short duration, and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, 2000). The proposed project is reuse of the sound source and cable for an additional five years of transmissions. This EIS acknowledges that the current level of knowledge on potential long-term effects is relatively sparse. Chapter 4 summarizes the scientific evidence 8 *relevant to this issue and evaluates potential long-term impacts based upon the ATOC MMRPs data and, when necessary, reasonable extrapolations from that data.*

The project itself is intended to fill information gaps and reduce uncertainty concerning the possible long-term effects of low frequency sounds on marine animals. The benefits of the proposed project could not be fully realized by any of the other alternatives proposed.

CHANGES MADE TO THE DEIS

This document is organized so that changes made to the DEIS in the production of this FEIS can be clearly identified. The locations of text changes are indicated with a vertical line in the adjacent right margin. Each change is also numbered so that it can be cross-referenced to its corresponding entry in Appendix G, Changes Made to the DEIS. Except for the edits made in Sections 1.3.3 and 6.1.3 to clarify the Endangered Species Act (ESA) permitting process, the edits made in Sections 4.5.3 and 6.2.3 to reflect new Hawaii legislation passed since the DEIS was out for public review, and edits made to Sections 3.2 and 4.2.1.2.1 to add sei whales as discussed with NMFS in consultation under the ESA, all changes made to the DEIS were in response to comments received or were updates that reflect the progression of the EIS process (e.g. the updates made in Section 1.3.1.1). Copies of all comments and responses are included in Appendix F, DEIS Comments and Responses. 9

Appendix G includes detailed information about the changes that were made to the text of the DEIS. Each changed section is included in this appendix with deleted text indicated in a strikeout format and new or changed text indicated as both italicized and underlined (such as this).

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ACRONYMS AND ABBREVIATIONS

AIM	Acoustic Integration Model
APL-UW	Applied Physics Laboratory, University of Washington
ARGO	Argos Global Centre
ARPA	Advanced Research Projects Agency
ATOC	Acoustic Thermometry of Ocean Climate
°C	degrees Celsius
CDF	Cumulative Distribution Function
CDUP	Conservation District Use Permit
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
cm	centimeters
COE	Corps of Engineers
CORE	Consortium for Oceanographic Research and Education
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibel
DBDB	Digital Bathymetric Data Base
deg	degree
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources of the state of Hawaii
DO	Dissolved Oxygen
DOA	Department of Agriculture
DOC	Department of Commerce
DOH	Department of Health
DOI	Department of the Interior
DOT	Department of Transportation
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENSO	El Niño Southern Oscillation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
4D	four-dimensional
°F	degrees Fahrenheit
FAD	fish aggregating device

FCMA	Fisheries Conservation and Management Act
FM	Frequency Modulated
fm	fathom
FMP	fishery management plan
ft	feet
GCOS	Global Climate Observing System
GOOS	Global Ocean Observing System
HAPC	habitat areas of particular concern
HAR	Hawaii Administrative Rules
HEPA	Hawaii Environmental Policy Act
HIFT	*Heard Island Feasibility Test*
HIHWNMS	Hawaiian Island Humpback Whale National Marine Sanctuary
HiTS	Historical Shipping
HORM	Hawaii Ocean Resources Management
HRS	Hawaii Revised Statutes
HURL	Hawaii Undersea Research Laboratory
Hz	Hertz (cycles per second)
in	inches
IPRC	International Pacific Research Center
IWC	International Whaling Commission
KCC	Kauai Community College
kg	kilogram
km	kilometers
km/hr	kilometers per hour
kt	knots (nautical miles per hour)
kw	kilowatts
L	Liters
L_{eq}	Level-equivalent
lbs	pounds
LF	Low Frequency
LFS SRP	Low Frequency Sound Scientific Research Program
LOA	Letter of Authorization
LORAN	Long Range Navigation
m	meters
min	minute
MMRP	Marine Mammal Research Program
μPa	micro Pascal
NEPA	National Environmental Policy Act
nm	nautical miles

NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPAL	North Pacific Acoustic Laboratory
NSMRL	Naval Submarine Medical Research Laboratory
NWR	National Wildlife Refuge
OAML	Oceanographic and Atmospheric Master Library
OEQC	Office of Environmental Quality Control
OMZ	Oxygen Minimum Zone
ONR	Office of Naval Research
OTTED	Office of Technology Transfer and Economic Development
PDO	Pacific Decadal Oscillation
PE	Parabolic Equation
PEIS	Programmatic Environmental Impact Statement
PMRF	Pacific Missile Range Facility
PMUS	pelagic management unit species
ppt	parts per thousand
PTS	Permanent Threshold Shift
RL	Received Level
rms	root mean squared
ROD	Record of Decision
Scripps	Scripps Institution of Oceanography
SCORP	State Comprehensive Outdoor Recreation Plan
S.E.	Standard Error
SL	Source Level
SMA	Special Management Area
SPE	Single Ping Equivalent
SPL	Sound Pressure Level
SOFAR	SOund Frequency and Ranging
SOSUS	SOund SUrveillance System
SS1	Shore Station 1
SS2	Shore Station 2
SSI	Seafloor Surveys International, Inc.
SST	Sea Surface Temperature
SURTASS LFA	Surveillance Towed Array Sensor System Low Frequency Active
SWFSC	Southwest Fisheries Science Center
SWTR	Shallow Water Training Range
3D	three Dimensional
TL	Transmission Loss
TTS	Temporary Threshold Shift

W	Watt
W/m^2	Watts per square meter
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
XBT	Expendable Bathythermograph

1 PURPOSE AND NEED FOR THE PROPOSED ACTION

This Environmental Impact Statement (EIS) evaluates the potential effects of continued operation for five additional years of the low frequency (LF) sound source (including the seabed power cable) previously installed off the north shore of Kauai, Hawaii, for use in Acoustic Thermometry of Ocean Climate (ATOC) research. The proposed action is reuse of the sound source and cable for the North Pacific Acoustic Laboratory (NPAL), a U.S. Navy Office of Naval Research (ONR) basic research[1] project, which would combine:

- a second phase of research on the feasibility and value of large-scale acoustic thermometry;
- long-range underwater sound transmission studies; and
- marine mammal monitoring and studies.

Acoustic thermometry is a method for obtaining information about the temperature field in the ocean from precise measurements of the travel times of sound pulses transmitted through the ocean. It is also a technique for *acoustic remote sensing* of the ocean interior, in which the properties of the ocean *between* the acoustic sources and receivers are determined, rather than the properties of the ocean *at* the instruments as is the case for conventional thermometers and current meters. Remote sensing of the ocean interior using light or radio waves is not feasible because they travel only a short distance in seawater (up to a few hundred meters for light) before being absorbed. Acoustic thermometry in the ocean is closely related to seismology in the Earth, in which properties of the Earth's interior are inferred from travel times of earthquake waves.

A full understanding of long-range underwater sound transmission in the ocean is important not only for acoustic remote sensing of the ocean interior. It is also important because all users of the ocean environment must rely on acoustic signals to sense their undersea surroundings and to perform the many tasks underwater for which light and other electromagnetic radiation are used in the atmosphere. Sound is used for such basic tasks as measuring ocean depth, locating underwater objects, navigation, and communication, for example. The fundamental limits to the performance of these tasks are due in part to the effects of small-scale ocean variability on acoustic signals.

The proposed action would be conducted by Scripps Institution of Oceanography (Scripps) of the University of California, San Diego, which carried out the first phase of ATOC feasibility research, and by the Applied Physics Laboratory of the University of Washington (APL-UW). Funding would be provided by ONR. Scripps is the applicant for all necessary permits.

[1] Under the Department of Defense Financial Management Regulation, basic research (category 6.1) includes scientific study and experimentation to increase fundamental knowledge and understanding in the physical, engineering, environmental and life sciences related to long-term security needs.

The original ATOC feasibility project demonstrated that acoustic thermometry is a powerful tool for making large-scale oceanic measurements of temperature variability; key results from that study are discussed below. Based on this successful scientific research effort, the Navy recognizes the opportunity to transition this methodology into a second phase of research on large-scale acoustic thermometry.

An understanding of the basic principles of subsea sound is important for assessing the material included in this EIS. Therefore, readers unfamiliar with subsea sound are referred to Appendix A for a summary of fundamental knowledge. 1-1

1.1.3 Marine Mammal Monitoring Studies

The Marine Mammal Monitoring Studies element of the proposed action is designed to advance the understanding of the potential for long-term effects of the sound transmissions on marine life through the conduct of aerial surveys off the north Kauai coast. Thus, ONR would seek answers to the most important scientific issues surrounding potential long-term effects: animal abundances and distribution. A total of ~~four~~ *eight* aerial surveys would be conducted during each humpback whale season. The Marine Mammal Monitoring Studies would have four components: 1-2

- data analysis: NPAL abundance and distribution data would be statistically analyzed and compared with those data collected during the Kauai ATOC Marine Mammal Research Program (MMRP);
- data reporting: NPAL aerial survey results, data compilations and findings would be published in reports (documents and/or electronic versions);
- data sharing: ONR/Scripps would make all published reports available in the public domain; and
- data monitoring: Marine mammal stranding data in Hawaii would be monitored for any long term trends.

Information from the Marine Mammal Monitoring Studies would be provided annually to NMFS for review.

1.2.2 ATOC: Marine Mammal Research Program Results

The California and Hawaii ATOC MMRPs were designed to determine the potential effects of the acoustic transmissions on marine mammals and other marine life. They consisted of multiple components, including:

- Aerial surveys designed to determine any changes in the abundance and distribution of marine mammals in the vicinity of the Pioneer Seamount source;
- Elephant seal tagging studies designed to determine any changes in elephant seal migratory or diving behavior in response to the Pioneer Seamount source transmissions;
- Playback studies to humpback whales off the Kona-Kohala coast of Hawaii designed to look for behavioral changes in response to ATOC-like sounds prior to the actual ATOC source transmissions north of Kauai;
- Aerial surveys designed to determine any changes in the abundance and distribution of humpback whales north of Kauai when the ATOC source was transmitting compared to measurements made in previous years when the source was not transmitting;
- Visual observations of humpback whale abundance, distribution, and behavior north of Kauai to determine if there were any changes in response to the ATOC transmissions;
- Undersea acoustic recordings made with seafloor data recorders north of Kauai to determine any changes in humpback vocalizations in response to the ATOC transmissions;
- Auditory measurements on small toothed whales (odontocetes) to determine their sensitivity to the frequencies transmitted by the ATOC sources; and
- Playback studies to fish at the Bodega Bay Marine Laboratory designed to look for behavioral changes in response to ATOC-like sounds.

Abundance and distribution. During the MMRPs conducted in both California and Hawaii, there were no observations of overt or obvious short-term changes in the abundance and distribution of marine mammals in response to the transmissions of the ATOC sound sources. No species were observed to vacate the area around the sound sources during transmissions. Intensive statistical analyses of aerial survey data showed some subtle shifts in the distribution of humpback (and possibly sperm) whales away from the Pioneer Seamount source during transmission periods. No statistically significant shifts in distribution were found for any other species of marine mammal. Visual observation data from the Kauai MMRP showed a similar small shift in mean distance of humpback whales away from the Kauai source during transmission periods.

Behavioral measures. During the MMRPs conducted in both California and Hawaii, there were no observations of overt or obvious short-term changes in the behavior of humpback *whales in response to the playback of ATOC-like sounds, n*or elephant seals *or humpback whales* in response to ~~the playback of ATOC like sounds or~~ to transmissions of the ATOC sound sources. Intensive statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; Frankel and Clark, ~~1999~~*2000*). The study results showed that

1-3

he distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing sound levels. This result is not what would be predicted, in that if the animals were stressed by the sound source, it might be expected that they would remain at the surface longer because of the lower received levels there. Longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors measured.

Vocalizations. The Hawaii MMRP did not find any overt or obvious short-term changes in the singing behavior of humpback whales in the vicinity of the sound source north of Kauai. No statistically significant changes in the underwater sound output from humpback whales in one of the frequency bands in which they vocalize was found in the vicinity of the Kauai source.

Audiograms. The hearing sensitivity of two species of dolphins to the ATOC sound was measured behaviorally (Au et al., 1997). Audiograms showed that their hearing is poor at the frequencies transmitted by the ATOC sources. The animals would have to be extremely close to an ATOC source simply to be able to detect the transmissions.

Fish. Preliminary playback studies of ATOC-like sounds to fish found no statistically significant responses (Klimley and Beavers, 1998).

All of the effects detected by the MMRPs were subtle and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, ~~1999~~*2000*) 1-4

1.3.1.1 The EIS Process

The NEPA process for this project began with a Notice of Intent (NOI), which was published in the *Federal Register* on June 15, 1999. Scoping of issues was carried out to gather information about the nature, scope and priority of issues from interested public agencies, persons, and groups. Scoping provided opportunity for written and oral comment. A 30-day period for receipt of written comments was announced in the NOI. A 45-day period was announced in a notice published in the Hawaii Office of Environmental Quality Control Bulletin on August 8, 1999. In addition to the written scoping comments received by ONR, oral comments were invited and received at the following public meetings in Hawaii:

- Hanalei, Kauai, on June 29, 1999
- Lihue, Kauai, on June 30, 1999
- Honolulu, Oahu, on July 1, 1999.

All comments received during the comment period have been considered and are summarized in Section 1.4.

Following the completion of the draft EIS (DEIS), a Notice of Availability (NOA) ~~will be~~*was* published in the *Federal Register on June 2, 2000*, signaling the start of a 45-day period for review and comment upon ~~this~~ *the* DEIS. *A 45-day public comment period was* also *announced in a Notice of Availability published in the Hawaii Office of Environmental Quality Control Bulletin on June 5, 2000. In addition to the written public comments received by ONR, oral comments were invited and received at the following public meetings in Hawaii:* 1-5

- *Lihue, Kauai, on July 5, 2000*
- *Honolulu, Oahu, on July 6, 2000*
- *Kilauea, Kauai, on July 8, 2000*

The final EIS ~~will~~ incorporate*d* and include*s* responses to comments submitted within the review period, as well as any other appropriate modifications to the DEIS. *The reader is referred to Appendix F for 1) lists of DEIS comment letters received, 2) responses to comments raised by the DEIS, and 3) copies of comment letters, associated response letters, and the public hearing transcript from July 8, 2000 (Participants of the first two meetings did not make any comments, and therefore the transcripts from those meetings were not included).*

The final EIS will be available for public review for 30 days. Thereafter, the Navy's final decision on the proposed action will be published in the form of a Record of Decision (ROD) in the *Federal Register.*

1.3.2 Marine Mammal Protection Act

The Kauai sound source is located in an area that is inhabited by marine mammals. While the intensive statistical analysis of Kauai MMRP data revealed some subtle changes in the behavior of humpback whales in response to ~~the~~ *ATOC-like playback* sounds and transmissions of the ~~ATOC~~ Kauai *ATOC* source, the suggested effects do not support ~~a~~ *the need to* request a LOA *because they do not indicate a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.* None-the-less, Scripps, in coordination with the National Marine Fisheries Service (NMFS), which administers the MMPA have determined to pursue a letter of authorization (LOA) for incidental taking by harassment under 16 U.S.C 1371 because of: the level of controversy associated with NPAL; past history associated with the ATOC effort and the Kauai ATOC EIS; and public interest in the state of Hawaii. An LOA is available when the proposed activity will have no more than a negligible effect on affected stocks, appropriate monitoring and mitigation measures are included, and other standards are met. Concurrent with publication of the DEIS, Scripps ~~will~~ commence*d* the process of applying for a LOA. 1-6

1.3.3 Endangered Species Act

The Kauai sound source is located in an area that is inhabited by species listed as threatened or endangered under the Endangered Species Act (ESA, 16 USC §§ 1531-1543). Continued operation of this sound source would allow continued transmission of acoustic signals in the water column that could potentially cause reactions by listed species. Consequently, two provisions of the ESA are applicable to this project.

~~The Project will require a permit for incidental taking of listed species, under § 1539(a)(2)(B) of the Act. Such permits are issued subject to requirements that the activity will not appreciably reduce the likelihood of the species' survival and recovery, that impacts are minimized and mitigated, and other standards are met. This permit process is administered by NMFS in conjunction with the MMPA authorization discussed above.~~

Section 1539(a)(2)(B) of the Act provides for authorization of activities that will not appreciably reduce the likelihood of the species' survival and recovery, when impacts are minimized and mitigated and other standards are met. This process is administered by NMFS in conjunction with the MMPA authorization discussed above. 1-7

The potential effect upon listed species will also require consultation among the cognizant federal agencies, under § 7 of the ESA. Upon publication of the DEIS, ONR ~~will~~ initiate*d* interagency consultation *on June 23, 2000,* by submitting to NMFS a Biological Assessment of the proposed action's potential effects on listed species and their designated critical habitat. Consultation ~~will~~ conclude*d* with NMFS' issuance of a Biological Opinion *on April 26, 2001,* addressing the issues of whether the project can be expected to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

1.3.4 The Magnuson-Stevens Fisheries Conservation and Management Act

The Magnuson-Stevens Fisheries Conservation and Management Act (16 USC §§ 1801-1861) addresses the sustainability of fish stocks through risk-averse management practices and habitat protection, including the designation of essential fish habitat. Federal agencies must consult with NMFS on activities which may adversely affect essential fish habitat. This issue is being addressed through the NEPA review process *(see Section 4.2.5 for the full discussion). There is no indication that the proposed project would reduce the quality and/or quantity of essential fish habitat.* 1-8

1.3.5 Hawaii Environmental Review Law

Hawaii law provides two bases for environmental review of proposed projects which require state agency approval and which may significantly affect the environment. The Hawaii Environmental Policy Act (HEPA), Chapter 344, Hawaii Revised Statutes (HRS), establishes the state's environmental policy and provides guidelines for agency decision-making. The Hawaii EIS Law, HRS Chapter 343, provides standards and procedures for the state's environmental review process, including the development and processing of environmental impact statements. Regulations implementing HEPA and the EIS Law are contained in Hawaii Administrative Rules, Title 11, Chapter 200.

An EIS prepared under these authorities must be accepted by the principal state permitting agency before a permit can be issued. In this case, the accepting agency is the Hawaii Department of Land and Natural Resources (DLNR), which has permit authority over state-owned seabed lands underlying the existing power supply cable. Scripps' conduct of the proposed project will require use of ~~the~~ these lands to support the cable. Scripps has applied to DLNR for a use permit (see Section 1.3.6), and the application has triggered environmental review under the Hawaii EIS Law. 1-9

The Hawaii EIS Law provides for reliance on a joint federal-state EIS in cases, such as this one, where federal involvement calls for an EIS under NEPA. During early consultation on this project, DLNR advised that a supplementary EIS or full EIS would be necessary for the project. The project sponsors made the decision to prepare a full EIS.

The EIS will support DLNR's consideration of Scripps' application for a conservation district use permit, as well as other state review and consultation processes. See Section 6.2.

An EIS Preparation Notice published in OEQC Bulletin on August 8, 1999, initiated the state environmental review process conducted under Chapter 343, HRS. A 45-day scoping comment period followed and closed at the end of business on September 22, 1999. All comments received within the 45-day public comment period have been considered and are summarized ~~into this DEIS~~ in Section 1.4. Following issuance of th<u>e</u>~~is~~ Draft EIS, a 45-day public comment period ~~will be~~ *was* provided, *which ended on July 24, 2000. All comments received* during this comment period *were responded to* and are incorporated into this document. *Copies of all comments and responses are included in Appendix F.* ~~after which the Final EIS will be prepared.~~ 1-10

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2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1.1.1 Kauai Source Specifications

Under this alternative, the sound source and its power cable would remain in their present locations. The sound source is located on the seafloor at a depth of 807 m (2648 ft), approximately 14.8 km (8 nm) north of Kauai at 22°20.94'N, 159°34.18'W. To power the sound source, a seabed power cable was installed to connect the source to a seashore interface cable at the Pacific Missile Range Facility (PMRF), Barking Sands.

• Acoustic Source: Produced by Alliant Techsystems, the ceramic bender-bar acoustic source is roughly 2.1 m (6.9 ft) high by 0.9 m (3.0 ft) in diameter (comparable in size to a large water heater) and weighs 2268 kilogram (kg) (5000 pounds (lbs)). It is contained in a 3.5 m (11 ft) high, galvanized steel tripod frame, illustrated in Figure 2.1-1, Line Drawing of Sound Source. Total weight of this unit in air is 5443 kg (12000 lbs); in water its weight is about 3402 kg (7500 lbs). The tripod frame has a seafloor footprint of 5.95 m^2 (64 ft^2). The source is isolated from the frame with shock mounts. There are three nitrogen gas bottles for pressure compensation, to equalize the internal pressure with the external pressure of the deep ocean. All pressure cases are plated mild steel with double o-ring seals. All exposed electrical cables are protected by encasement within either a protective steel pipe or a rubber hose. All components have a design life in excess of 10 years with a minimum guaranteed design life specification of three years. The acoustic source is a resonant source, which means that it works most efficiently in a narrow frequency band. As a result, the source cannot serve as a "loudspeaker" to broadcast broad spectrum sounds (e.g., tapes of whale calls).

• Seabed Power Cable: The seabed power cable runs at about 100-m (328.1-ft) depth around the northwest side of Kauai before turning north into deeper water near the source (Figure 2.1-2, Approximate Cable Route and Sound Source Site). The cable is approximately 51.5 km (27.8 nm) long with a nominal diameter of 3.18 cm (1.25 in). It is a coaxial, twin conductor, insulated cable. The cable route was selected based upon side-scan sonar bathymetric (seafloor) surveys conducted in March and May of 1993 by Seafloor Surveys International, Inc. (SSI) of Kailua, Hawaii. Survey results are described in the *Final Survey Report for Kauai Acoustic Thermometry of Ocean Climate Site*, SSI 1993. The route was established so as to run the cable along a flat path avoiding cable suspensions and rough surfaces, like coral, and at sufficient depth to not be affected by surface waves.

The cable connects the source to an existing seashore interface cable 1.3 km (0.7 nm) offshore at the PMRF, Barking Sands, in about 25 m (82 ft) of water on a seafloor comprised of coarse sand and coral rubble. This area is inside the main offshore reef around this portion of Kauai. The coral rubble extends offshore to depths of 28 to 30 m (92 to 98 ft), and may mark the extent of the more severe bottom disruption due to storm waves, or could be a relic of a lower stand of the sea. Seaward of the coral rubble, the cable crosses a gentle, sandy slope (dipping less than 1 degree (deg)) from approximately 1400-2200 m (4593-7218 ft) offshore. The cable crosses the irregular outer face of the offshore reef in water depths of 45 m to 67 m (148 to 220 ft). This exposed reef is approximately 250 m (820 ft) wide with frequent surge channels (steep-sided, narrow breaks in the reef that have a sandy seafloor). The cable route crosses the reef at a

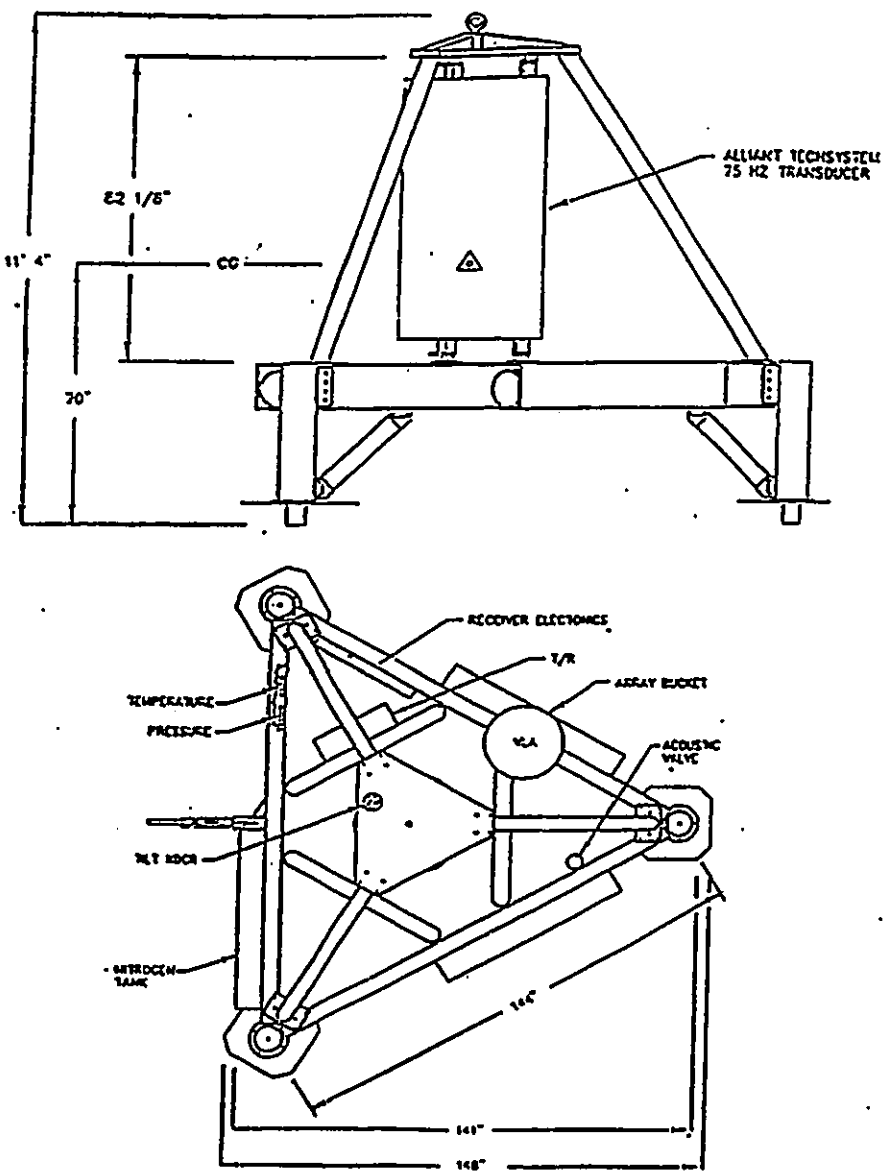

Figure 2.1-1 Line Drawing of Sound Source

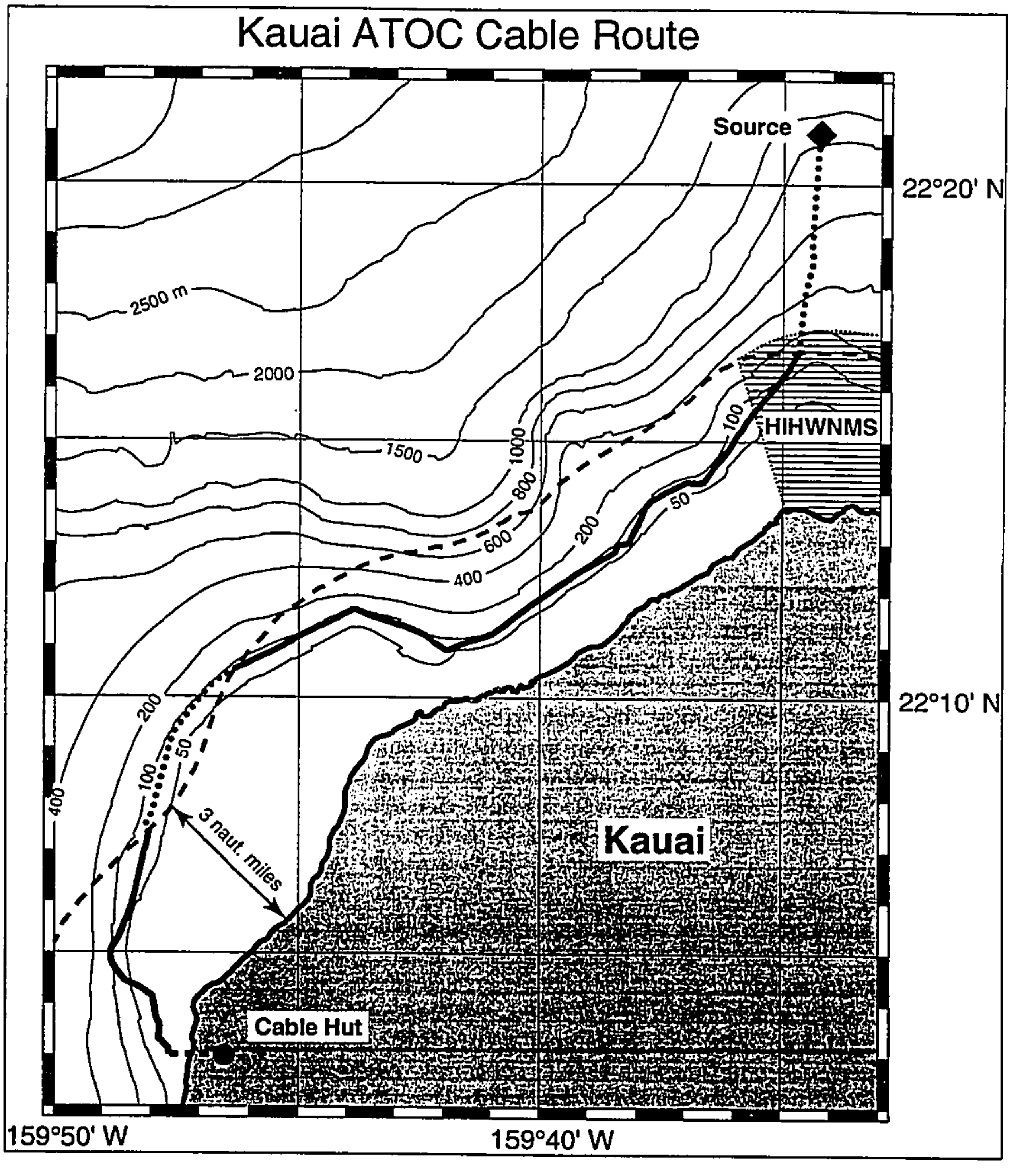

Figure 2.1-2 Approximate Cable Route and Sound Source Site

favorable angle, in one of the largest surge channels in the reef. These surge channels are floored by sand, which is generally mobile and has probably moved to cover the cable.

West of the outer reef the ocean is floored by thick sediments, probably sands, which dip at less than 2 deg to a depth of approximately 85 m (279 ft), then start to dip more steeply into deeper water, and start to approach 15 deg at depths of over 215 m (705 ft). These steep slopes are typical of the upper flanks of the Hawaiian Islands.

The major portion of the cable route runs along the gentle upper slope of the submarine flank of Kauai, with water depths of 75 to 100 m (246 to 328 ft) and slopes of approximately 2 deg. The cable was laid clear of the reef, with about 2-4 percent slack to allow the cable to be naturally buried by the sediment.

After traversing the northwest corner of Kauai at the approximate depths of 70-100 m (230-328 ft), the cable route turns north into deeper waters. The cable runs nearly straight down a fairly gentle (average 4.5 deg with steeper areas up to about 8 deg), sediment-covered slope. Small boulders are scattered in the area from approximately 370-410 m (1214-1345 ft) depth and below 700 m (2297 ft) depth. The cable ends at the source site in approximately 807 m (2648 ft) of water. The bottom slope is about 4 deg.

The cable was installed for the ATOC project in October 1993. By now, natural processes such as sediment drift are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Depending on the characteristics of the sediment, the cable may be lying on the seafloor surface in some areas and buried 2.54 cm (1 in) to 30.5 cm (1 ft) in other areas. By the end of the proposed NPAL project, the cable will have been on the seafloor for approximately 12 years, and can be expected to be even more deeply buried and integrated into the benthic (seafloor) environment. ~~Assessing the effect of cable removal on the surrounding environment and the cable itself, the Handbook of Ocean and Underwater Engineering (Myers et al., 1969) states, "a cable that is well buried on a favorable bottom and left undisturbed will probably last many years. Breaking it out is detrimental in every respect."~~ *PMRF conducted an ROV survey of cables on the west-northwest side of Kauai in 1995 out to water depths of approximately 300 ft (100 m) (Dick, pers. comm., 2000). Mr. Dick stated that the ATOC cable was encountered during the ROV survey, and that it was buried under sand and barely visible. He said that when the cable was laid, a concerted effort was made to place the cable along the 300 ft (100 m) depth contour where the sediment consists of a prehistoric drowned beach; therefore it is likely that the majority of the cable along this depth contour is buried by sand. Furthermore, the existing seashore interface cable that the ATOC cable was connected to has been in place for approximately 20 years, and photos document massive coral growth on that 0.7 nm section (Dick, pers. comm., September 14, 2000). Mr. Dick commented that, to depths of approximately 200 ft (61 m), the ATOC cable also has coral growing on it, but not to the same extent since it hasn't been in place as long as the seashore interface cable. Therefore, removal of the cable could result in damage to the coral that has begun to grow on it.* 2-1

2.1.1.2 Transmission Characteristics

Transmissions would continue with roughly the same signal parameters and transmission schedule as those used during the first feasibility phase of the ATOC study. Approximately 260 Watts of acoustic power are radiated during transmission. At 1 m (3.3 ft) from the source, the sound intensity (i.e., source level (SL)) is about 195 dB referenced to the intensity of a signal with a sound pressure level of 1 microPascal (μPa) on a "water standard" basis.

Optimum waveform and acoustic signal coding are used to reduce the required source levels. The nominal source waveform is a digital sequence of coded signals that has been optimized for decoding at the distant underwater receivers (Munk et al., 1995). The transmission length of 20 minutes is designed to spread the energy over time, at much lower source levels than if the signals were sent as short, loud pulses of the same total energy. Although the sounds cannot be "heard" in the usual sense over most of the transmission path or at the receivers, they are detected and timed using advanced digital signal processing techniques, similar to those used by NASA to retrieve data from deep space satellites. Since the signal-to-noise ratio at the receiver after appropriate processing is directly proportional to the duration of a transmission, weak but carefully constructed signals of long duration can be extracted from below-ambient noise levels. However, signals of much longer than 20-minute duration lose their coherence, and therefore lose the correlation between signal duration and signal-to-noise ratio. Results from the first phase of the ATOC feasibility study demonstrate that these source characteristics provide adequate, but not excessive, signal-to-noise ratios at the receiver ranges of interest. As a result, the current waveform parameters are designed to optimize reception, thereby reducing the RLs to which marine animals are exposed. 2-2

Even PE models have difficulty making accurate predictions of RL as sound travels upslope near shore. *To resolve this issue, RL data were collected by the Kauai ATOC MMRP (Frankel and Clark, 2000). The power in the 60-90 Hz band was calculated each second, and the 25th percentile value of each calculation was returned as the received level measurement. The data points displayed in Figure 2.1-7 represent modal estimates of all RLs measured at the given range from the source. Frankel and Clark (2000)* ~~Measurements made by the Kauai ATOC MMRP~~ found that RL decreases rapidly as the sound travels upslope towards Kauai, as can be seen in Figure 2.1-7 (Measured Received Levels from Kauai Sound Source). Figure 2.1-7 shows the ATOC sound source at 807 m (2648 ft) and the ocean bottom topography heading south from the source towards Kauai. At approximately 3 km (1.6 nm) from the sound source, the water depth is approximately 600 m (1970 ft) and the RL is approximately 125 dB re 1 μPa. At about 6 km (3.2 nm) from the sound source, the water depth is about 300 m (980 ft) and the RL is about 115 dB re 1 μPa. The boundary of the Hawaiian Island Humpback Whale National Marine Sanctuary (HIHWNMS) is located at the 100-fathom (183 m) depth contour, about 7 km (3.8 nm) from the sound source, as seen by the vertical dashed line. The RL within the HIHWNMS is approximately 110 dB. Research conducted off the island of Hawaii during the humpback season estimated ambient noise in the 60-90 Hz band at 105 dB re 1 μPa (Frankel and Clark, 1998), shown in Figure 2.1-7 by the horizontal dashed line labeled "winter ambient noise level." It 2-3 should be noted that in the Wenz curve (Figure 2.1-8, Ambient Noise Spectra (From Wenz, 1962)), heavy shipping was estimated at a spectrum level of 83 dB re 1 μPa, which equates to approximately 98 dB in the 60-90 Hz ATOC frequency band. The estimated ambient noise value of 105 dB was likely elevated by the contributions of humpback whales singing during the winter. Nonetheless, RLs from the sound source are only slightly above the typical background ambient noise level during the winter when humpback whales are present and singing, which means that the signal is barely detectable within the 100-fm contour without specialized computer processing.

2.1.4 Alternate Project Site

Under the Alternate Project Site alternative, the long-range propagation and acoustic thermometry feasibility studies would be undertaken with the source located at a site other than off the north shore of Kauai. To put a reasonable bound on possible choices, this subsection first describes the process by which alternate sites were selected for analysis in this EIS.

An initial task in screening alternate sites was the selection of an ocean basin and general source site areas that would best serve both the thermometry and the long-range propagation study objectives. Three factors proved to be particularly important in this regard.

- First, an area is needed with a relatively large number of existing subsea listening arrays (i.e., SOSUS arrays) in order to obtain the greatest number of acoustic pathways from each source, to sample the greatest volume of ocean. Since the North Pacific and North Atlantic basins were heavily instrumented during the Cold War, and listening arrays in the southern hemisphere are much less numerous, a northern hemisphere study area is preferable.

- Second, in comparing the Atlantic and Pacific oceans, it was determined that the mid-Atlantic ridge, which acoustically divides the North Atlantic basin, would complicate the acoustic investigations and limit the ranges over which testing could occur. A North Pacific study area is therefore preferred to avoid these problems.

- Third, the sound channel tends to be deeper at lower latitudes (nearer the Equator). Deeper source locations would reduce the RLs for marine animals in the upper part of the water column. This rationale suggested a lower latitude, temperate or tropical location for the sound source.

Based on these screening factors, the following criteria were developed to compare and contrast possible alternate sites:

- Location within approximately 93 km (50 nm) of a shore station for a cabled source to avoid excessive power loss in the cable.

- Location at or near the deep sound channel axis, to provide efficient coupling of sound energy into this long-distance sound duct and to reduce surface RLs.

- Location at a site with clear acoustic pathways to existing and planned receiver locations (islands or seamounts between sources and receivers block acoustic paths), preferably a site that combines transmission pathways with large seasonal variations (e.g., equatorial source to high latitude (northerly) receivers) and pathways with small seasonal variations (e.g., equatorial source to nearby or equatorial receivers).

- Location at a site that is locally smooth with a steep slope (8-15 deg) in the direction of the receivers (to minimize bottom interactions with the transmitted signal as it propagates away from the source).

- Location at a site with optimum bottom properties (sand sediment over basalt basement is best for good bottom reflection characteristics) and minimum bottom currents (to minimize the potential for source displacement).

- Location in an area with minimal risk of damage due to bottom fishing.

- Location in an area with low potential for environmental consequences.

- Location in an area with minimal abundances of marine life (including but not limited to marine mammals) that might possibly be adversely affected by LF sound.

Potential sites in the Pacific Ocean were comprehensively evaluated by project scientists. *One of the key siting criteria was the number of receiving locations that have clear acoustic pathways from the source location. Computer-generated "shadow plots" were created in which the white "spokes" represent those areas that would be in an acoustic shadow. A mid-Pacific site was preferred to an eastern Pacific site since transmissions in the mid-Pacific have the potential to reach both central Pacific and eastern Pacific existing subsea listening arrays (i.e., SOSUS arrays). Because of the bathymetry along the U.S. west coast, west coast listening arrays would not receive transmissions by a west coast source. A shadow plot from a source located on Pioneer Seamount, off the California coast, is included for comparison (Figure 2.1-9, Pioneer Seamount Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis). As shown in Figure 2.1-9, most of the west coast arrays are in shadow. The number of acoustic paths obtained is therefore significantly reduced compared to the number obtained with a mid-Pacific source. The reduction in the number of paths reduces the geographic coverage for acoustic thermometry, as well as the variety of oceanographic environments in which sound transmissions can be studied. Therefore, in order to maximize the number of transmission paths and the geographic coverage of the region, potential sites in the Pacific Ocean were restricted to the mid-Pacific.* 2-4

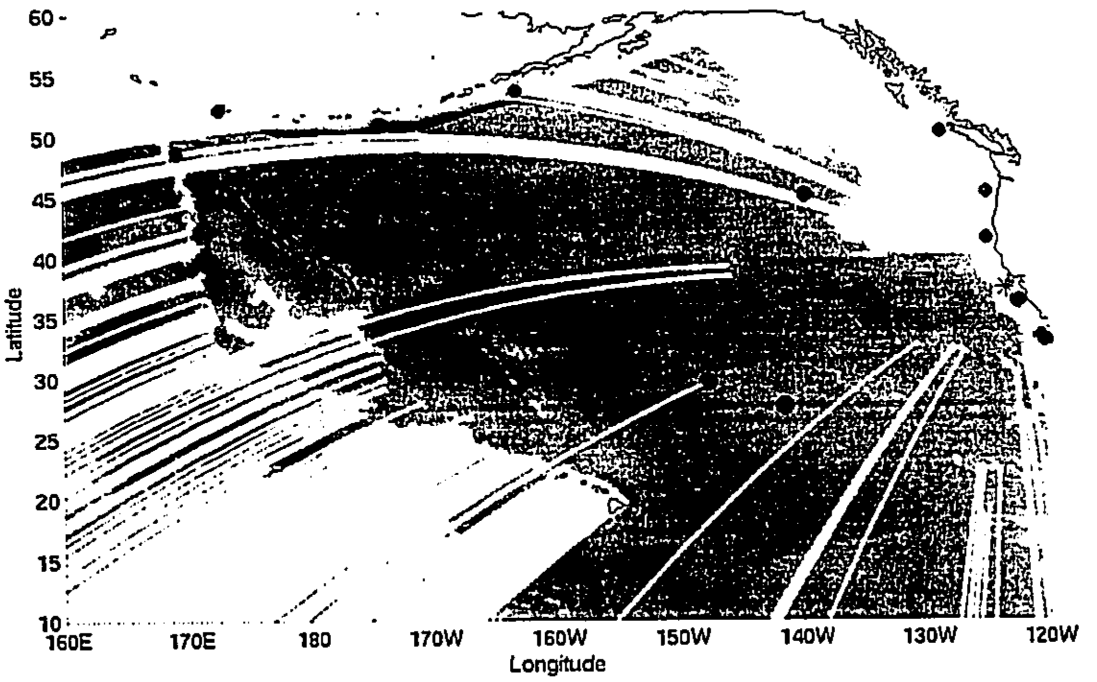

Figure 2.1-9 Pioneer Seamount Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis

In the mid-Pacific, only a few locations are feasible given the sparseness of islands, the fact that many of those islands are uninhabited, and the remoteness of many of those islands. These locations were initially assessed for their ability to provide long-range acoustic paths needed for the viable study of large-scale acoustic thermometry and long-range acoustic propagation. This constituted the first cut of the possible sites and narrowed the field down to the preferred location north of Kauai and the following three alternate locations discussed below:

- Midway Island
- Johnston Atoll
- Adak Island, Alaska

Although the full range of potential mid- and north-Pacific source locations was evaluated during the initial site screening process, Midway Island proved to be the site with the greatest potential and will be the location further evaluated as part of Alternate Project Site Alternative. One of the key siting criteria is the number of receiving locations that have clear acoustic pathways from the source location. Computer-generated "shadow plots" were created for the preferred location north of Kauai (Figure 2.1-~~9~~*10*, Kauai Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis) and for the alternate locations. In each case, an acoustic shadow was cast by bathymetric features, such as islands and seamounts, that are 1000 m (3281 ft) or less below the axis of the sound channel. The white "spokes" represent those areas that would be in an acoustic shadow. 2-5

At Midway Island, the deep sound channel axis is located at a depth of approximately 700 m (2296 ft). The shadow plot (Figure 2.1-~~10~~*11*, Midway Island Alternate Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis) shows that Midway has relatively clear path coverage to most of the existing receivers. The Midway site has bottom sediment and basement properties that would minimize bottom reflection and refraction of acoustic energy that could block or otherwise interfere with the outgoing transmission paths. Bottom currents should not adversely affect the Midway site nor should there be any significant impact by bottom fishing. Additionally, marine species are not particularly abundant or diverse at Midway Island, reducing the number of animals potentially exposed to the sound and the possibility for significant environmental effects. However, Hawaiian monk seals, a severely endangered species, use the beaches of Midway Island for breeding and pupping, and recent increases in pup survival at Midway suggest that the seals may reestablish the atoll as a major breeding site. Therefore, activities associated with the installation of a power cable may disrupt their behavior. 2-6

Johnston Atoll and Adak Island were considered as possibilities; however, neither will be evaluated as part of this alternative because of their reduced acoustic capabilities. The sound channel axis at Johnston Atoll is approximately 1000 m (3281 ft) deep. However, a shadow plot (Figure 2.1-~~11~~*12*, Johnston Atoll Alternate Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis) reveals that almost none of the sound energy transmitted northward reaches receiver sites at Guam, the Aleutians, and the U. S. west coast. 2-7

The proposed site is locally flat and well sloped, with good bottom properties for relatively predictable acoustic reflection/refraction. Bottom currents would be expected to be minimal.

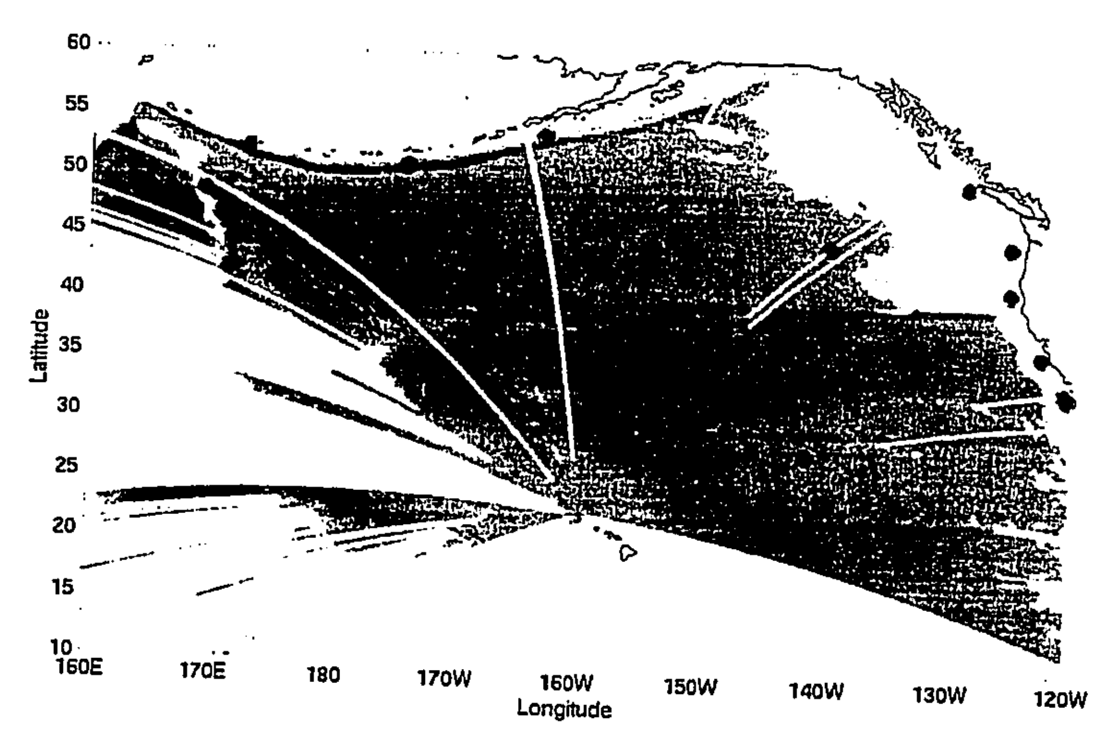

Figure 2.1-~~9~~10 Kauai Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis | 2-8

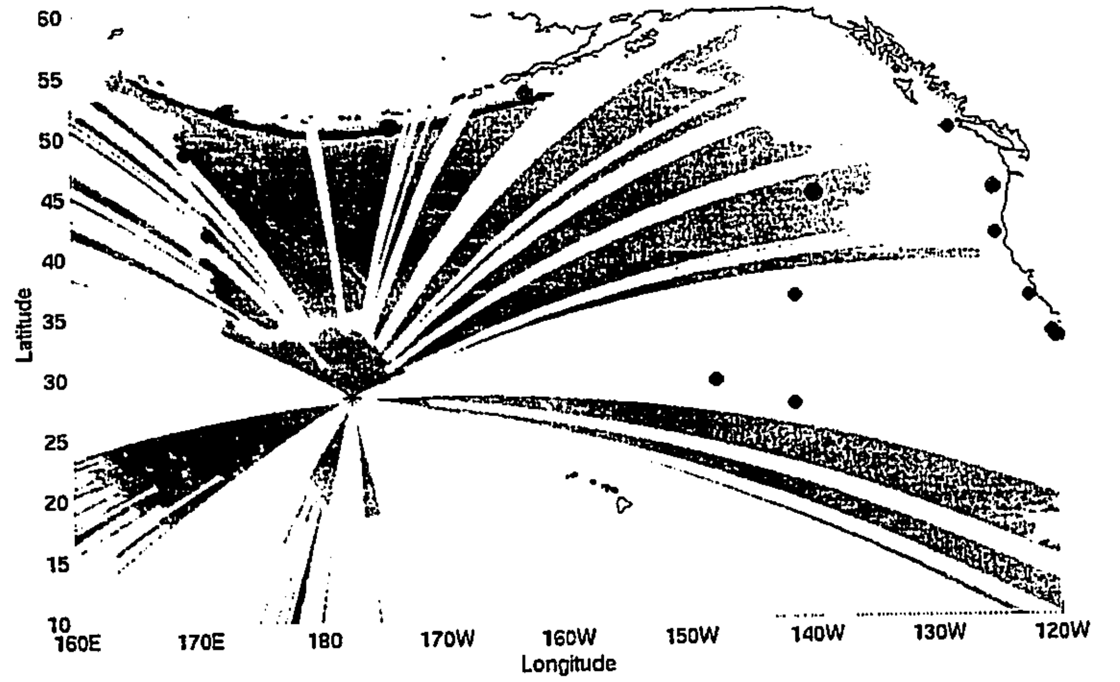

Figure 2.1-~~10~~*11* **Midway Island Alternate Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis** 2-9

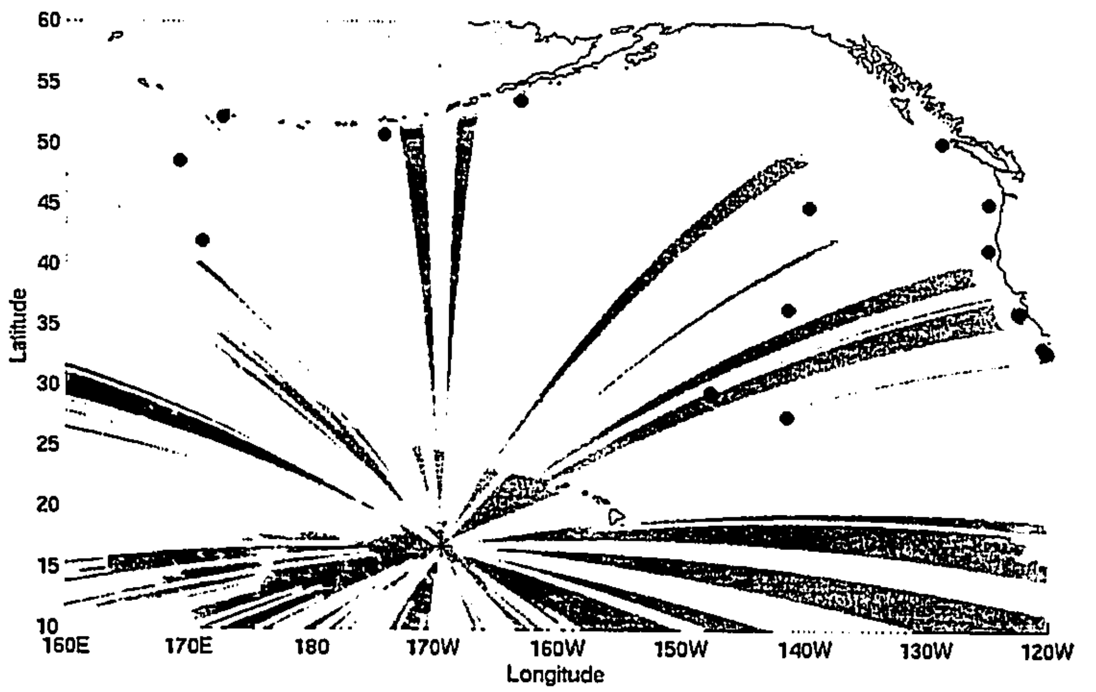

Figure 2.1-~~11~~12 **Johnston Atoll Alternate Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis** 2-10

For the Adak Island source, the sound channel axis is at approximately 100 m (328.1 ft) depth, requiring the source to be located much shallower than at more mid-latitude locations. This shallow source depth translates to greater potential risk from commercial fishing activities, and a greater possibility for marine animals to be exposed to the acoustic transmissions. A shadow plot (Figure 2.1-*13*~~12~~, Adak Island Alternate Site Shadow Plot for Bathymetric Features 1000 m 2-11 (3281 ft) Below the Sound Channel Axis) indicates uninterrupted transmission paths to Guam and three existing receiver sites in midocean. This location is on the Aleutian ridge, where the source must be placed on a shallow shelf. The average slope to the south, southwest, and west is about 1-2 deg, much less than desired. Based on available oceanographic data for the region, it's believed that this location would have the greatest potential for undesirably high bottom currents.

2.1.5 Moored Autonomous Source

This section describes the alternative of using autonomous sources; that is, sound sources which are not attached to shore-based power by cables but are free-standing, powered by large battery assemblies. Such sound sources would be moored to the ocean bottom with weights and held, suspended by floats, at the desired ocean depth.

A conceptual moored autonomous source is depicted in Figure 2.1-*14*~~13~~, Conceptual Moored 2-12 Autonomous Source. The figure shows not only the moored source, but also the long-baseline acoustic navigation system needed to track the movement, or wandering, of the source in a circle of up to 300 m (980 ft) radius around the anchor on the ocean floor due to the influence of tidal 12and other ocean currents on the mooring. The exact location of the source at the time of each transmission is determined by analyzing changes in the travel times of sound transmissions from transponders located around the mooring at different inclination angles to the source itself (Cornuelle, 1983; Cornuelle, 1985).

At present, however, there are no acoustic sources designed for autonomous operation that transmit at 75 Hz, that have adequate bandwidth, and that have been demonstrated to operate reliably over long time periods at the high pressures found at 750-900 m (2461-2953 ft) depth in the ocean. The engineering issues that need to be addressed in the development of any such source system include the design of:

- A robust pressure compensation system to allow the source to operate at the high pressures found at depth;
- A battery pack adequate to power the source for deployments lasting a year or more; and
- A mooring system capable of supporting the heavy weights of a LF source and the associated battery pack.

The pressure-compensation system on the existing ATOC sources is designed for installation of the sources at a fixed depth on the bottom. A moored source must be designed to be able to operate over a range of pressures as the mooring moves in response to ocean currents, changing

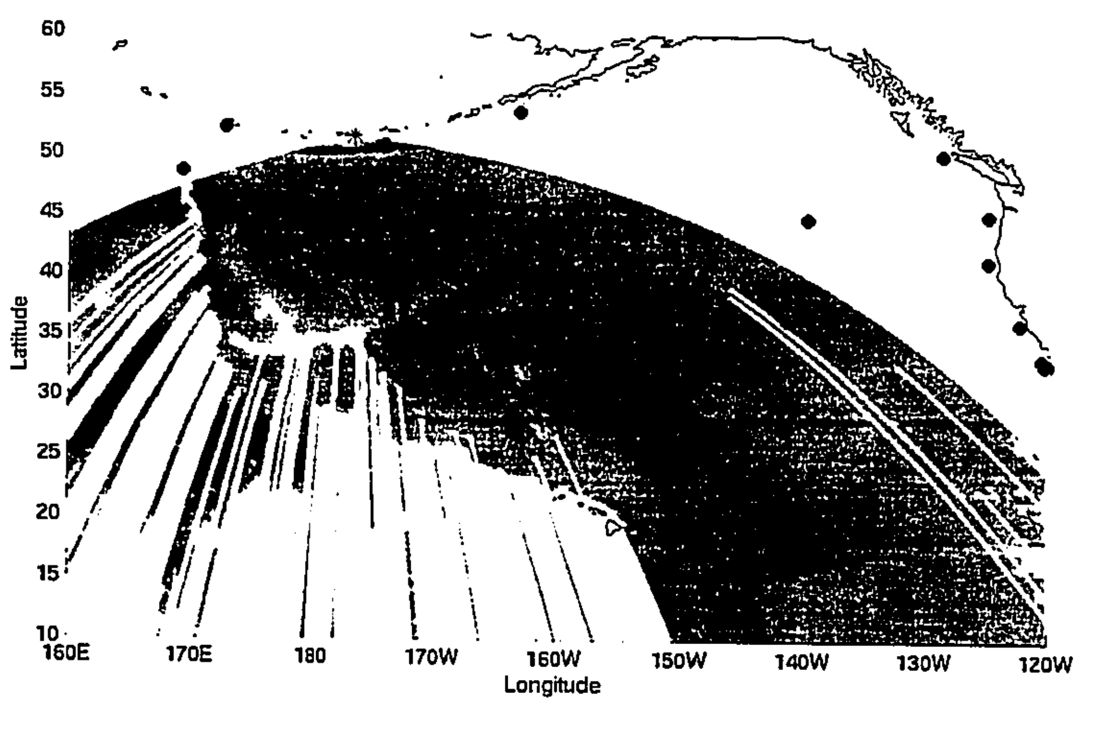

Figure 2.1-~~12~~13 Adak Island Alternate Site Shadow Plot for Bathymetric Features 1000 m (3281 ft) Below the Sound Channel Axis | 2-13

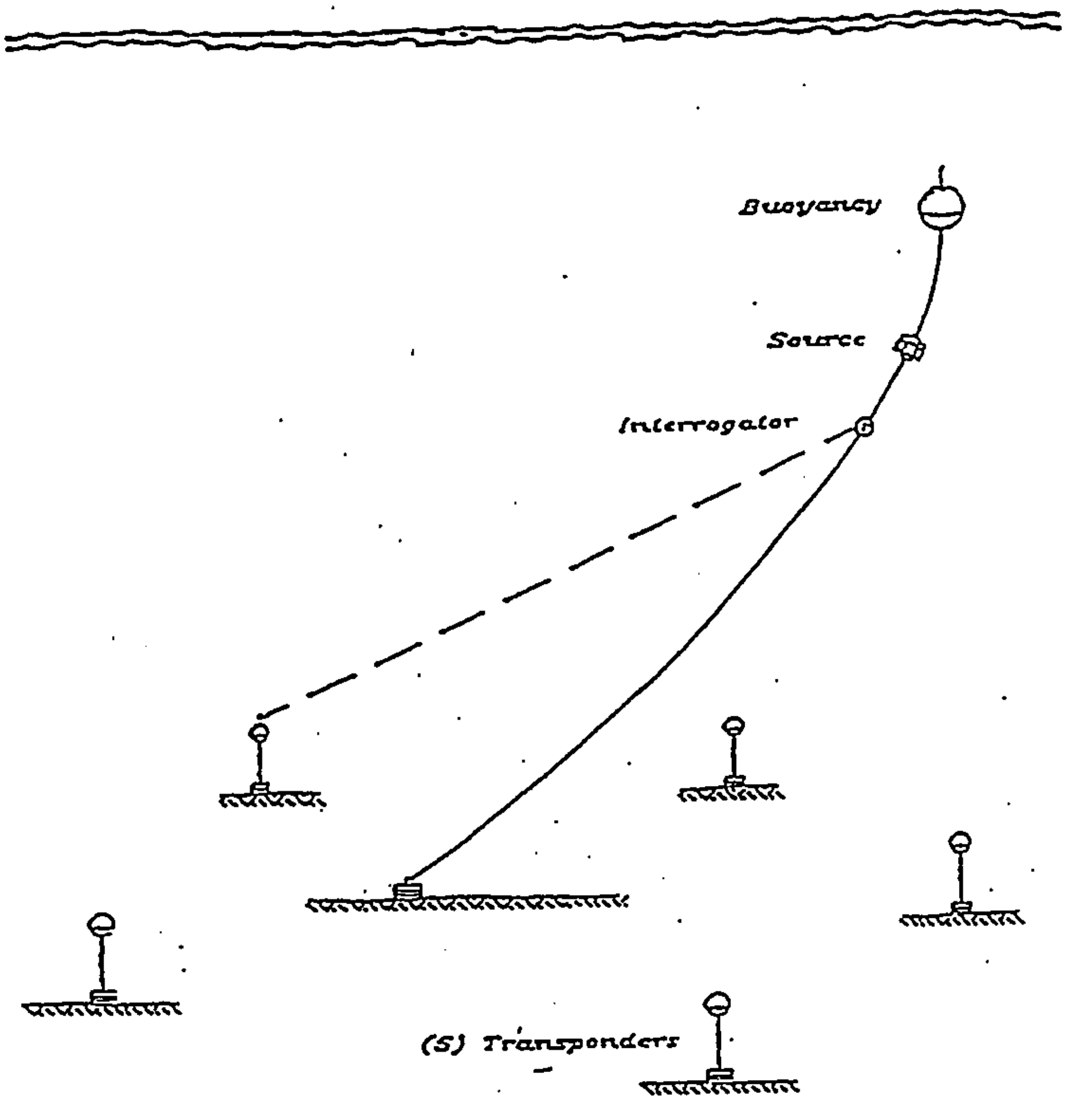

Figure 2.1-~~13~~*14* **Conceptual Moored Autonomous Source** 2-14

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3 AFFECTED ENVIRONMENT

3.1.4.3 Existing Noise Setting

Ambient noise is the existing background noise of the environment (Greene, 1991). The following comprise common sources of ambient noise for the study area:

- Tidal currents and waves;
- Wind and rain over the water surface;
- Water turbulence and infrasonic (extremely low frequency) noise;
- Biological sources; and
- Human-made sounds (ships, boats, low-flying aircraft).

The ambient noise levels from natural sources are expected to vary according to numerous factors, including wind and sea conditions, seasonal biological cycles, and other physical conditions. Noise levels in the project source frequency band can reach 107 dB from natural *sounds alone (Figure 2.1-8)* (Heindsman et al., *1955).*

Noise associated with human sources varies with the characteristics of the specific noise source as well as the distance between the source and the alternate sites. The primary human-made noise source within the study area is expected to be associated with ship and vessel traffic. This includes commercial tankers and container ships transiting to and from ports along the Pacific Rim and the west coast of North America, commercial fishing boats and research vessels, military surface vessels, submarines, and aircraft. Vessel noise is primarily associated with the propeller and propulsion machinery. In general, noise levels increase with vessel size, speed, and load. The following indicate estimated upper bounds of broadband noise levels generally within the low frequency band (<1000 Hz) (Urick, 1983; Natural Resources Defense Council, 1994, 1999):

• Super Tankers (approximately 127 at sea at any time)	187-232 dB
• Freighters, bulk carriers, large tankers (approximately 23,000 at sea at any time)	185-200 dB
• Tankers, merchant ships (approximately 100,000 at sea at any time)	155-190 dB
• Medium-small motor-powered vessels, including fishing boats (hundreds of thousands at sea at any time)	150-160 dB

Noise associated with the passage of vessels and low-flying aircraft is expected to be transient in nature because the sound source typically is moving through the study area. Based on information contained in the Historical Shipping (HiTS) database, the eastern Pacific major tanker shipping lanes have been defined. The average density of vessels (ships per one square degree) at any time in the vicinity of the proposed action site is:

- Merchant Ships: 0.1 to 0.3;
- Tankers: 0.05 to 0.18;
- Large Tankers: 0.003 to 0.005; and
- Super Tankers: 0.002 to 0.003.

These densities are based on data between April and August over recent years. The monthly variability in ship densities among the Hawaiian Islands does not change appreciably (i.e., approximately 20-30%).

In 1987, at least 21,325 vessels called at Hawaiian ports, most of which fall in the categories of commercial fishing boats, tanker/merchant, freighter/large tanker, or super tanker. Based on these data, an average of one vessel would be expected to enter or leave a port in Hawaii every 30 minutes. Thus, a relatively high level of ship traffic can be expected in the vicinity of the study area. The inclusion of military, recreational fishing, and other medium-small size vessels can increase transient noise received levels in the study area to 140 dB and higher in the frequency band of the project source. Vessel movements near the Midway Atoll alternate site are as much as 90% less than in the Hawaiian Islands, with a proportionate decrease in ambient noise levels attributable to such sources.

Ambient noise was measured during the 1996 and 1997-1998 Kauai MMRP research seasons (January through April). The 25th percentile ambient noise level in the 60-90 Hz (ATOC) band was 105 dB re 1 µPa (Frankel and Clark, 1998). This value was measured while singing humpback whales were present, and they appear to have raised the ambient noise level, even though samples with very loud whales were excluded from the analysis. A similar measurement, conducted during the fall of 1997 off Kauai, found that the mean ambient noise level, before whales arrived, was 96 dB re 1 µPa (Frankel and Clark, ~~submitted~~ 2000). 3-1

The sound frequency and ranging (SOFAR) channel (deep sound channel) corresponds to the depth range in which the speed of sound is at a minimum. At depths shallower and deeper than the SOFAR channel, the speed of sound is relatively greater than the channel due to higher temperatures above and relatively greater pressure below. Because the properties of the channel are related to the temperature structure of the water column, the depth of the SOFAR channel varies with location. In the vicinity of the proposed action and Midway Atoll sites, the SOFAR channel occurs at depths between approximately 800 and 1000 m (2625 and 3281 ft).

3.2.1 Species Screening

In order for an animal to be affected by the proposed sound source, the animal must possess (1) some sensory mechanism that allows it to perceive LF sounds or (2) tissue with sufficient acoustic impedance mismatch to be affected by LF sounds. An acoustic impedance mismatch results when two dissimilar media (e.g., seawater and an air-filled cavity) exist side-by-side. The acoustic energy exiting from one medium must be transferred to the other medium. Since the media are dissimilar, the particles in the two media vibrate differently with the same amount of acoustic energy. The difference in the vibrations of these two media may stress or damage any connective tissues or barriers between the two media (Ketten, 1998).

Based on these considerations, a detailed analysis of only those organisms in the proposed or alternate site areas that meet the following criteria was undertaken in this document:

- Does the area receiving sound from the proposed sound source overlap the distribution of this species? If so,

- ~~Is the species capable of being physically affected by LF sound?~~ Are acoustic impedance mismatches large enough to enable LF sound to ~~have a physical effect~~*stress or damage any tissues*? 3-2

- Can the species sense LF sound?

Species that did not meet these criteria were excluded from consideration. For example, jellyfish and zooplankton species have no sensory perception mechanism to detect low frequencies (the sound pulse essentially would pass through them without being detected). Therefore, they did not have the potential to be physically affected and so were not evaluated for impacts.

In cases where direct evidence of acoustic sensitivity was lacking for a species, reasonable indirect evidence was used to support the evaluation (e.g., there is no direct evidence that a species hears LF sound but good evidence that the species produces LF sound). In cases where important biological information was not available or was insufficient for one species, but data were available for a related species, the comparable data were used.

3.2.1.2 Vertebrates

Vertebrates, especially those species whose bodies contain air-filled cavities (e.g., lungs or sinuses), offer a high acoustic impedance contrast with water, hence are potentially susceptible to the operation of the sound source. In addition, all vertebrates have specialized organs for hearing.

Baleen Whales (Mysticetes)

All 11 species of baleen whales produce LF sounds (summarized in Richardson et al., 1995). Sounds may be used as contact calls, for mating displays, for maintaining the cohesion of the migratory herd, and possibly for navigation and food finding. Although there are no direct data on auditory thresholds for any mysticete species, anatomical evidence strongly suggests that their inner ears are well adapted for low frequency hearing (Ketten, 1998). Therefore, sound perception and production are assumed to be critical for mysticete survival. For this reason all mysticete species are considered sensitive to LF sound. However, only ~~six~~ *seven* species of mysticetes, or baleen whales, are known to be frequently or infrequently found in the Kauai and/or Midway Atoll areas. This includes the humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), blue (*Balaenoptera musculus*), northern right (*Eubalaena glacialis*), *sei* 3-3

(Balaenoptera borealis), Bryde's (*Balaenoptera borealis*), and minke (*Balaenoptera acutorostrata*) whales.

3.2.2 Marine Mammals

This section provides information on marine mammals residing in, or passing through, the study region. Twenty ~~three~~ *four* marine mammal species, including ~~six~~ seven baleen whales (mysticetes), sixteen toothed whales (odontocetes), and one pinniped, may reside permanently or occur seasonally to rarely within the region (Table 3.2-1). 3-4

Mysticete and odontocete sightings within 35 km (18.9 nm) of the Kauai site during the Marine Mammal Research Program (MMRP) aerial surveys are presented in Table 3.2-1. Results of these aerial surveys indicate that humpback whales are one of the most abundant marine mammals in the study area, with a total of 2773 individuals being sighted. A total of 2445 spinner and spotted dolphin (*Stenella* spp.) were recorded, as well as 774 short-finned pilot whales. Observational data were collected from two shore stations in 1994, the Albatross (SS1) at Princeville (47 m [154.2 ft] height), and the Kalalau (SS2) on the Kalalau Trail (140 m [459.3 ft] height). At SS1, 319 humpback pods, totaling over 500 individuals were observed. At SS2, 382 humpback pods, totaling nearly 700 individuals were recorded. Data on marine mammal sightings off Midway Atoll are limited. Because recent surveys have not been conducted in the vicinity of Midway Atoll, most of the occurrences have been historical observations. Humpback whales have not been reported near Midway, although they are seen near the main Hawaiian Islands.

3.2.2.1 Mysticetes

~~Six~~ Seven species of baleen whale (humpback, fin, blue, right, sei, Bryde's, and minke) may occur in the Kauai or Midway Atoll area. However, only one, the humpback, is known to be present historically in reasonably large numbers. Humpback whales (*Megaptera novaeangliae*) are abundant in coastal waters of the main Hawaiian Islands from November through April, but have not been reported near Midway Atoll. Fin whales (*Balaenoptera physalus*) and blue whales (*B. musculus*) could possibly occur in the area; however, their distribution and abundance in the region is believed to be uncommon (Balcomb, 1987). Right whales (*Eubalaena glacialis*) and sei whales (*B. borealis*) occur rarely in the Hawaiian Islands area (Herman et al., 1980). Bryde's whales (*B. edeni*) are occasionally seen in the northwest Hawaiian Islands (which includes Midway Atoll) (Leatherwood et al., 1988). Minke whales are sometimes seen around the leeward islands of Hawaii (Leatherwood et al., 1988). 3-5

A summary of the frequency range of sounds produced by mysticetes is included as Figure 3.2-1 (Frequency Range of Sounds Produced by Mysticetes). Au et al. (2000) provide a summary of what is known about hearing by mysticetes. No direct data on the underwater hearing range or sensitivity of mysticetes is available. Functional models based on anatomical data indicate that the functional hearing range for mysticetes commonly extends to 20 Hz, with several species expected to hear well into infrasonic frequencies (Ketten, 1998)(Figure 3.2-2). The upper functional range for most mysticetes has been predicted to extend to 20-30 kHz. The playback of biologically meaningful sounds (song, social sounds, and feeding call) to humpback whales estimated a response threshold at broadband received levels of 102 dB re 1 μPa for the feeding call, and 106 dB re 1 μPa for synthetic sound (Frankel et al., 1995). 3-6

The composite audiogram shown in Figure 3.2-2 (Marine Mammal Audiograms) illustrates that the best scientific data suggests that mysticetes have the most sensitive LF hearing of all marine mammals.

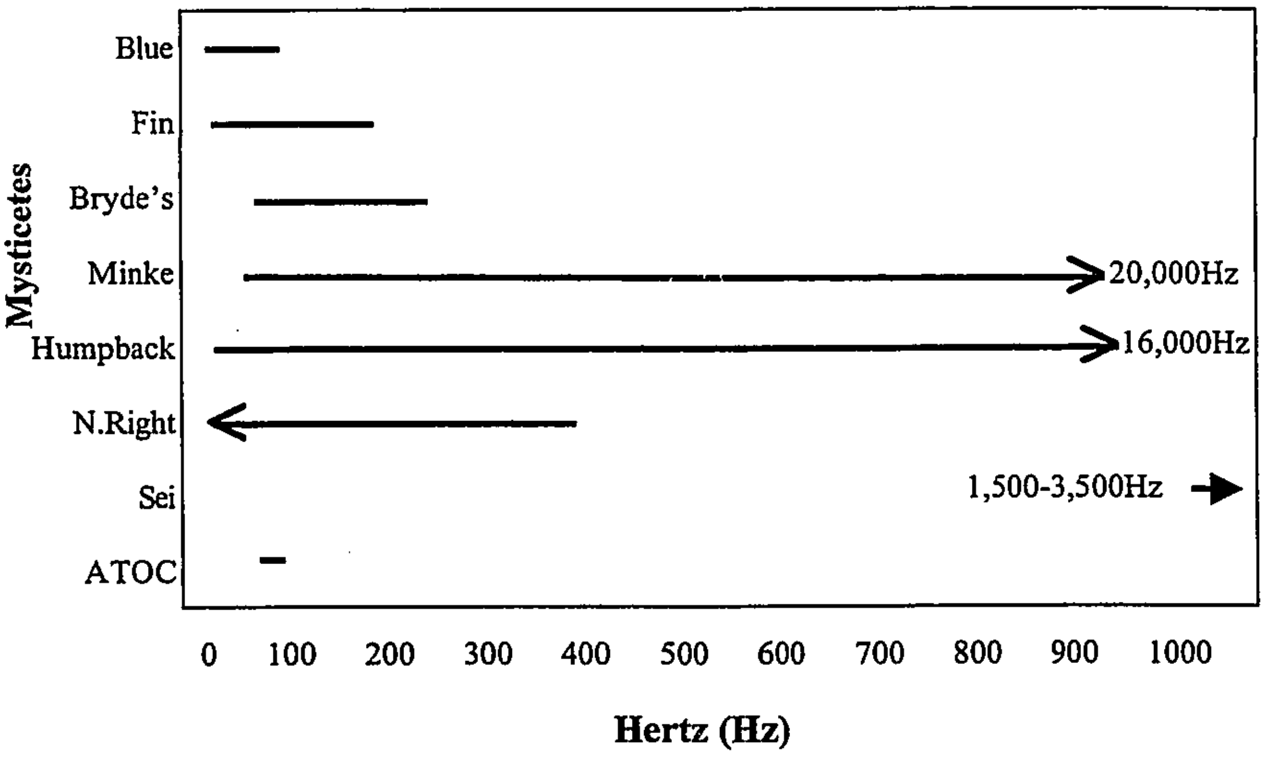

Figure 3.2-1 Frequency Range of Sounds Produced by Mysticetes

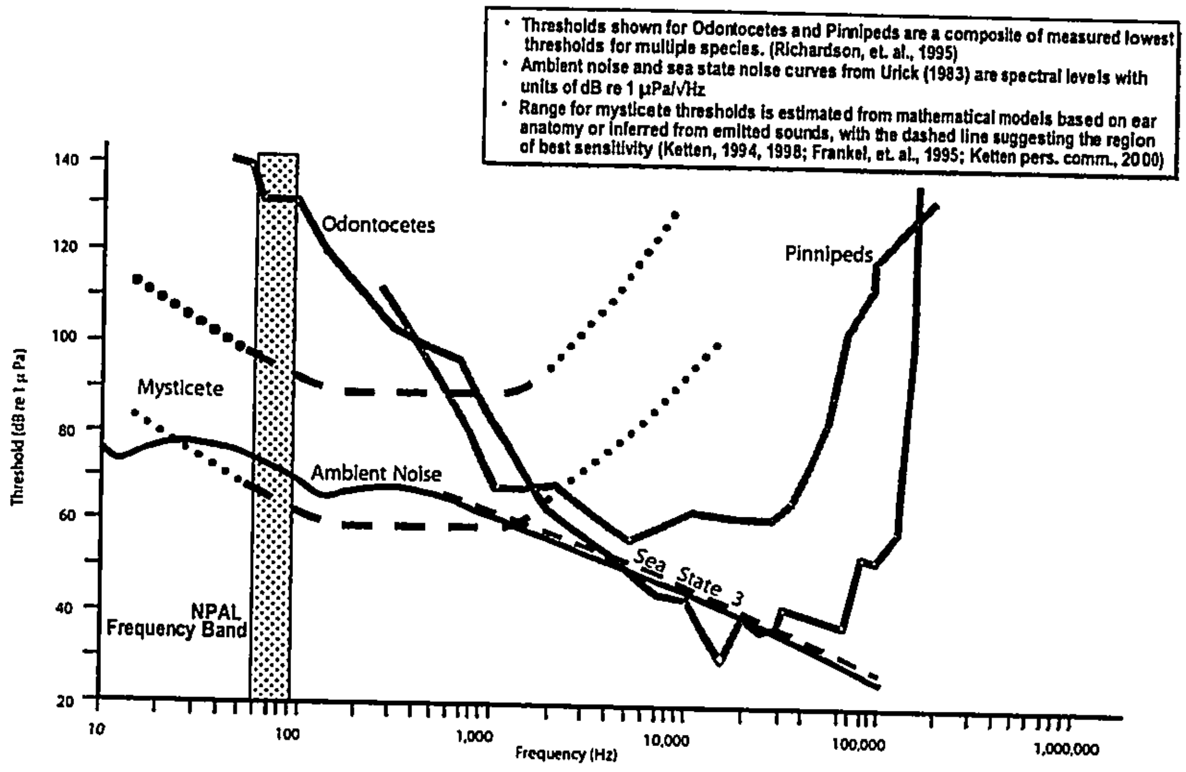

Figure 3.2-2 Marine Mammal Audiograms

Humpback Whales

Humpback whales occur worldwide in both coastal and open ocean areas, with estimated abundances of approximately 6,000 in the North Pacific (Calambokidis et al., 1997; Cerchio, 1998; Mobley et al., 1999c). Estimates of the number of individuals in the Northern Pacific stock have recently risen. Estimates in the 1980's ranged from 1407 to 2,100 (Baker, 1985; Darling and Morowitz, 1986; Baker and Herman, 1987). Photographic resight studies estimate 6,010 animals (S.E. = 474) for the entire North Pacific (Calambokidis et al., 1997). Cerchio (1998) estimated that about 4,000 animals visit Hawaii annually. Aerial surveys conducted between 1976 and 1990 found a significant increase in sighting rates of humpbacks over that time (Mobley et al., 1999a), consistent with the increase in photographic estimates. Finally, aerial survey data using line-transect methodologies were conducted in 1993, 1995 and 1998. Hawaiian population estimates derived from the sighting data in Table 3.2-1 show an increase from 2717 (+/- 608) in 1993, to 3284 (+/- 646) in 1995 and 3852 (+/- 777) in 1998 (Mobley et al., 1999b).

Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. The whales occupy tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, feeding primarily on small schooling fish and krill (Caldwell and Caldwell, 1983). It is believed that minimal feeding occurs in wintering grounds, such as the Hawaiian Islands (Balcomb, 1987; Salden, 1987). Maximum diving depths for humpbacks are approximately 150 m (492 ft) (but usually <60 m [197 ft]), with a very deep dive (240 m [787 ft]) recorded off Bermuda (Hamilton et al., 1997). They may remain submerged for up to 21 min (Dolphin, 1987). Humpback whales are endangered under the Endangered Species Act (ESA) and protected under the Convention on International Trade in Endangered Species (CITES).

Three sounds are produced by humpback whales: "songs" produced in late fall, winter, and spring by single animals; sounds produced by groups of humpback whales (possibly associated with aggressive behavior among males) on the winter breeding grounds; and sounds produced on the summer feeding grounds. The frequencies of these songs range from 40 Hz or lower, up to 4 kHz, with components of up to 8 kHz (Thompson et al., 1979). Source levels average 155 dB and range from 144 to 174 dB (Thompson et al., 1979). The songs appear to have an effective range of approximately 10 to 20 km. Sounds often associated with possible aggressive behavior by males (Tyack, 1983; Silber, 1986) are quite different from songs, extending from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz. These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead, 1983). Sounds are produced less frequently on the summer feeding grounds and are at approximately 20-2000 Hz, with median durations of 0.2-0.8 sec and source levels of 175-192 dB (Thompson et al., 1986).

Humpback whales occur off all eight Hawaiian Islands, but particularly within the shallow waters of the "four-island" region (Kaho'olawe, Molokai, Lanai, Maui), the northwestern coast of the Big Island, and the waters around Niihau, Kauai and Oahu (Wolman and Jurasz, 1977; Herman et al., 1980; Baker and Herman, 1981). The largest concentrations of humpbacks in Hawaiian waters can be found on Penguin Bank west of Molokai (Balcomb, 1987). The whales are generally found in shallow water shoreward of the 100-fathom (fm) (183-m [600-ft]) depth contour (Herman and Antinoja, 1977), although Frankel et al. (1989) reported some vocalizing individuals up to 20 km (10.8 nm) off South Kohala on the west coast of the Big Island, over bottom depths of 1400 m (4593 ft). Cow/calf pairs appear to prefer very shallow water less than 18 m (10 fm [60 ft]) Glockner and Venus, 1983). At Kuili off the Big Island, Smultea (1989) found significantly more cow/calf pairs in water <55 m (180.5 ft) deep. Some results suggest that habitat use patterns of nearshore waters by females and calves near Maui may have changed (decreased), potentially due to increasing vessel and other human activities (Salden, 1988; Glockner-Ferrari and Ferrari, 1990). Figure 3.2-~~1~~3 depicts the locations of humpback 3-7 whale sightings during the 1993-1998 MMRP aerial surveys (Mobley et al., 1999b).

Humpback calves are found most often in the "four-island" region, consisting of Maui, Molokai, Lanai, and Kahoolawe. Statewide aerial surveys conducted between 1993 and 1998 found that 67% of the calves were found in that area (Mobley et al., 1999b). During those surveys, 26,966 nautical miles (49,941 km) of effort were flown and 1,678 pods of humpbacks were seen. Approximately 16% of the calves were seen off Kauai. During shore-based scan samples conducted from Princeville, Kauai, on the north shore in 1994 and 1998, 571 pods were sighted, 17 of which had calves (Frankel, pers. comm.).

Humpback whales are rarely, if ever, seen near Midway Atoll, and it is not thought to support breeding or feeding of this species; thus, the potential for visits to the atoll by humpbacks is low.

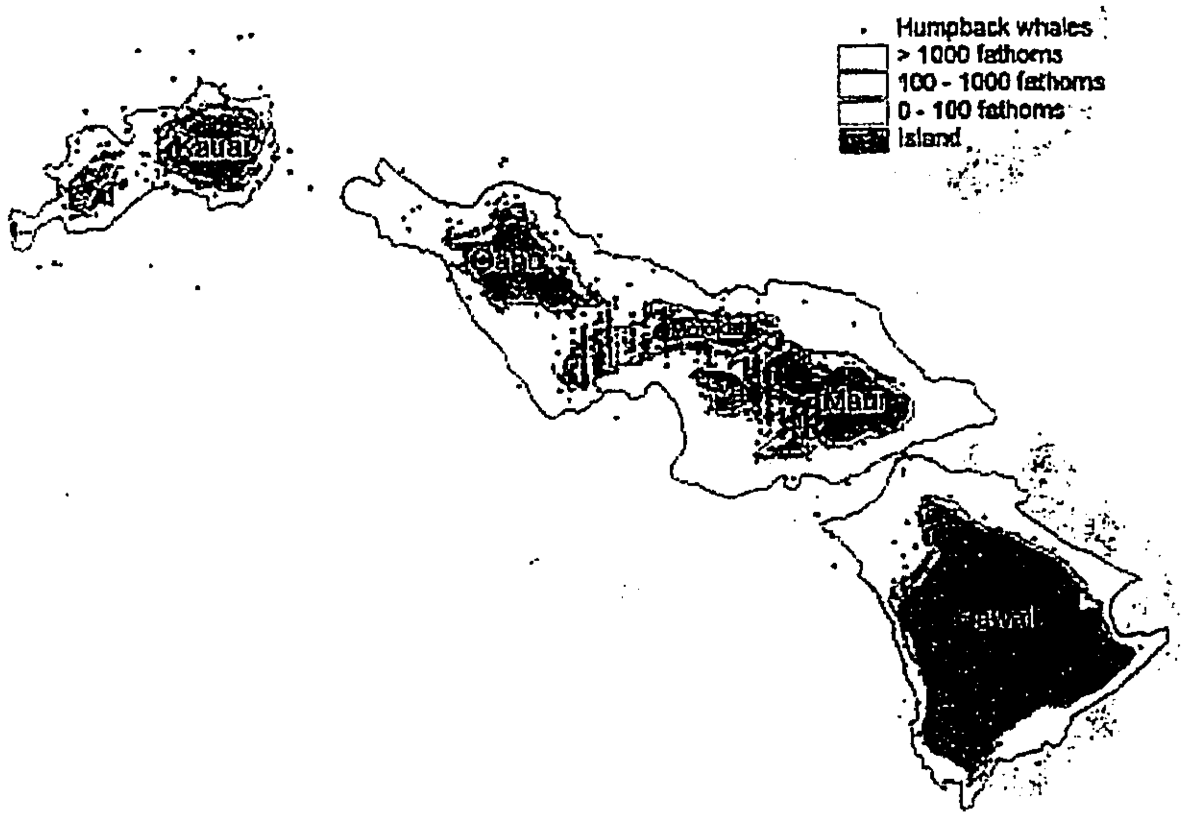

Figure 3.2-~~1~~3 1993-1998 Sightings of Humpback Whales (Mobley et al., 1999b) 3-8

Sei Whales

Sei whales are distributed in all of the world's oceans, except the Arctic Ocean. The IWC's Scientific Committee groups all of the sei whales in the entire North Pacific Ocean into one stock (Donovan, 1991). However, some mark-recapture, catch distribution, and morphological research indicates that more than one stock exists; one west of 175°W longitude, one between 175°W and 155°W longitude, and another east of 155°W longitude (Masaki, 1977). Sei whales are typically distributed far out to sea in temperate regions of the world and do not appear to be associated with coastal features (Forney et al., 2000). In the North Pacific Ocean, sei whales have been reported primarily south of the Aleutian Islands, in Shelikof Strait and waters surrounding Kodiak Island, in the Gulf of Alaska, and inside waters of southeast Alaska 3-9

(Leatherwood et al., 1983). Within the U.S. EEZ, there is a significant lack of information regarding the distribution of sei whales in the eastern north Pacific (see Perry et al., 1999). No sei whales were sighted in the vicinity of the main Hawaiian islands during the ATOC MMRP aerial surveys (Mobley et al., 1999b). In California waters, only one confirmed and five possible sei whale sightings were recorded during 1991, 1992, 1993, and 1996 aerial and ship surveys (Forney et al., 2000). No sightings were confirmed off Washington and Oregon during recent aerial surveys. Sei whales are endangered under ESA and protected under CITES.

Reproductive activities for sei whales occur primarily in winter. Gestation is about 12.7 months and the calving interval is about 3 years (Rice, 1977). Sei whales in the North Pacific primarily feed on copepods, which make up about 83 percent of their diet, but also feed on euphausiids (13 percent of their diet) (Nemoto and Kawamura, 1977). The balance of their diet consists of squid and schooling fish, including smelt, sand lance, Arctic cod, rockfish, pollock, capelin, and Atka mackerel (Nemoto and Kawamura, 1977). Rice (1977) suggested that the diverse diet of sei whales may allow them greater opportunity to take advantage of variable prey resources, but may also increase their potential for competition with commercial fisheries.

Generally, sei whales make 5-20 shallow dives of 20-30 sec duration followed by a deep dive of up to 15 minutes (Gambell, 1985). The depths of sei whale dives have not been studied, however the composition of their diet suggests that they do not perform dives in excess of 300 m (984 ft).

Under only one or two circumstances have the sounds of sei whales been recorded (Thompson et al., 1979; Richardson et al., 1995). The recorded sounds consist of two phrases of 10-20 0.5- to 0.8-s frequency modulated sweeps in the 1.5- to 3.5-kHz range spaced 0.4-1 s apart. No studies have directly measured the sound sensitivity of sei whales (Croll et al., 1999).

Sei whales are usually found in small groups of up to 6 individuals, but also commonly form larger groupings on the feeding grounds (Gambell, 1985). Sei whale abundance prior to commercial whaling in the North Pacific has been estimated at 42,000 (Tillman, 1977). When commercial whaling for sei whales ended in 1974, the population of sei whales in the North Pacific had been reduced to between 7,260 and 12,620 animals (Tillman, 1977). Current abundance or trends are not known for stocks in the North Pacific.

3.2.2.2 Odontocetes

Sixteen species of toothed whales and dolphins may be found in the Kauai and Midway Atoll areas. Aerial survey sightings within 35 km (18.9 nm) of the Kauai site during the MMRP are listed in Table 3.2-1 (Mobley et al., 1999b).

The following species of odontocetes were sighted in or near the proposed area during surveys conducted between 1993 and 1998 by the University of Hawaii under NMFS permit No. 810: sperm whales (*Physeter macrocephalus*), short-finned pilot whales (*Globicephala macrorhyncus*), beaked whales (*Ziphius cavirostris, Berardius bairdi, and Mesoplodon* spp.), spinner and spotted dolphins (*Stenella* spp.), bottlenose dolphins (*Tursiops truncatus*), and rough-toothed dolphins (*Steno bredanensis*).

Other species believed to inhabit the area include pygmy sperm whales (*Kogia breviceps*), dwarf sperm whales (*Kogia simus*), striped dolphins (*Stenella coeruleoalba*), killer whales (*Orcinus orca*), false killer whales (*Pseudorca crassidens*), pygmy killer whales (*Feresa attenuata*), and melon-headed whales (*Peponocephala electra*). Based on the limited density data available, it is believed that the population abundance of these species is quite small.

A summary of the frequency range of sounds produced by odontocetes is included as Figure 3.2-4 (Frequency Range of Sounds Produced by Odontocetes). Au et al. (2000) provide a summary of what is known about hearing by odontocetes. Audiograms are available for seven odontocete species, most of which are delphinids, but also includes beluga whales and harbor porpoises. There are no published audiograms for sperm or beaked whales. Best sensitivities range from about 20 kHz in killer whales to over 100 kHz in harbor porpoises (Ketten, 1998) (Figure 3.2-2). No odontocete has been shown audiometrically to have acute hearing (<80 dB re 1 μPa) below 500 Hz (Table 3.2-2, Known Underwater Hearing Sensitivities of Odontocetes) 3-10

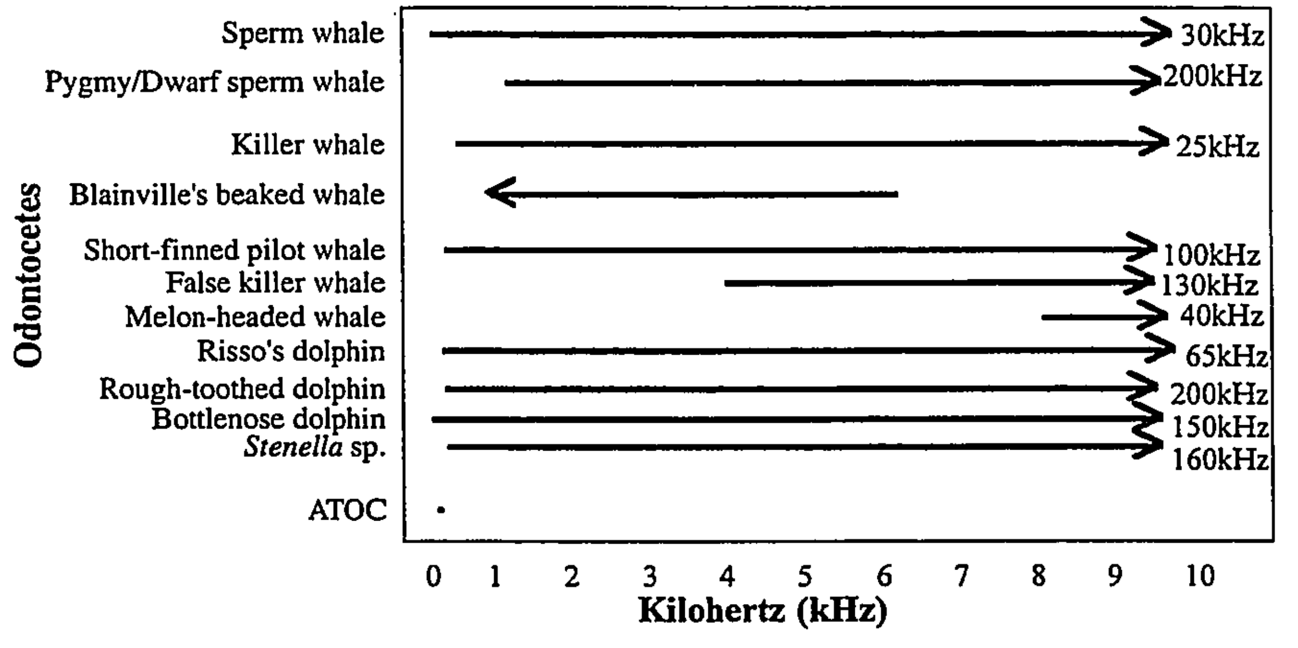

Figure 3.2-4 Frequency Range of Sounds Produced by Odontocetes

Table 3.2-2 Known Underwater Hearing Sensitivities of Odontocetes

Species	Underwater Hearing Sensitivity
Sperm whale (*Physeter macrocephalus*)	- Good hearing sensitivity above 2.5 kHz; lower limit of hearing probably 100 Hz
Pygmy and dwarf sperm whales (*Kogia* sp.)	- Best underwater hearing from 90-150 kHz from auditory brainstem response study
Killer whale (*Orcinus orca*)	- Hear sounds from <0.5 kHz to 105 kHz - Maximum sensitivity (+36 dB re 1 μPa) at 20 kHz
Blainville's beaked whale (*Mesoplodon densirostris*)	- No hearing data available
Cuvier's beaked whale (*Ziphius cavirostris*)	- No hearing data available
Short-finned pilot whale (*Globicephala macrorhynchus*)	- No hearing data available
False killer whale (*Pseudorca crassidens*)	- Hear sounds from <1.0 kHz to 115 kHz - Hearing threshold for 75 Hz pure-tone signal is 140.7 ± 1.2 dB, for ATOC signal is 139.0 ± 1.1 dB
Melon-headed whale (*Peponocephala electra*)	- No hearing data available
Risso's dolphin (*Grampus griseus*)	- Hear sounds from 0.75 kHz to 100 kHz - Hearing threshold for 75 Hz pure-tone signal is 142.2 ± 1.7 dB, for ATOC signal is 140.8 ± 1.1 dB
Rough-toothed dolphin (*Steno bredanensis*)	- No hearing data available
Bottlenose dolphin (*Tursiops truncates*)	- Hear underwater sounds from 0.15 kHz to 135 kHz - Behavioral alterations to 400 Hz signal occurred at RLs of 180 dB; no TTS occurred at RLs of up to 193 dB
Striped dolphin (*Stenella coeruleoalba*)	- Hear sounds from <10 kHz to >100 kHz
Spinner dolphin (*Stenella longirostris*)	- No hearing data available
Spotted dolphin (*Stenella attenuata*)	- No hearing data available
Sources: Richardson et al., 1995; Croll et al., 1999; Szymanski et al., 1999; Au et al., 1997; Schlundt et al., 2000.	

3.2.2.3 Pinnipeds

The Hawaiian monk seal or ilio-holo-i-ka-uaua (*Monachus schauinslandi*) is *the only pinniped species known to occur within the general study region. This species* occurs only in the Hawaiian Islands, where its greatest distribution is in the small, mostly uninhabited chain of islands and atolls stretching 1100 nm (2037 km) northwest of the main Hawaiian Islands, ~~most~~ *all* of which *except Kure Atoll* are included in the Hawaiian *Islands* National Wildlife *Refuge or the Midway Atoll National Wildlife Refuge* (USFWS, 1984; Tomich, 1986). Hawaiian monk seals are listed as endangered under the ESA and protected under CITES. 3-11

The hearing sensitivity of a young male Hawaiian monk seal was studied at Sea Life Park on Oahu (Thomas et al., 1990). Auditory thresholds from 2 to 48 kHz were measured. The resulting audiogram shows a narrow hearing range than for other tested pinnipeds, with the most sensitive region being from 12 to 28 kHz. Below 8 kHz, the monk seal's hearing was less sensitive than other pinniped species.

~~This is the only pinniped species known to occur within the general study region. Monk seals are reported from around the main Hawaiian Islands (USFWS, 1984). They tend to stay near land (Tomich, 1986), and small numbers (1-4) are regularly seen around Kauai and each of the other main Hawaiian Islands (Nitta, pers. comm., 1995). There is a small undetermined population on Niihau.~~ *More than 90 percent of all pups are born at six major breeding colonies located at French Frigate Shoals, Laysan Island, Pearl and Hermes Reef, Lisianski Island, Kure Atoll, and Midway Atoll (MMC, 1999).* Most pups are born between March and May, but pupping has been recorded year-round (U.S. Dept. of Commerce, 1986). ~~A single female gave birth to a female pup on the north coast of Kauai in 1988 (Reeves et al., 1992) and a pup was born in the Poipu Beach area during the summer of 1989 (Naughton, pers. comm., 1990a). There were three monk seal sightings on Kauai in 1993 (Anahola, Kipu Kai, and Kapaa). One monk seal was observed off the north shore of Kauai during recent shore based MMRP surveys (Smultea et al., 1994). Virtually nothing is known about the distribution and movement patterns of this species when they are at sea (Gilmartin, 1983; U.S. Dept. of Commerce, 1986).~~

Counts of Hawaiian monk seals have been made since the late 1950s at the atolls, islands, and reefs where they haul out on the northwest Hawaiian Islands ~~(NMFS, 1991~~ (*Johanos and Ragen, 1999*). ~~In 1982, the highest count for all atolls was about 50% of those made in 1957-58. NMFS (1991)~~ *Forney et al. (2000)* estimates ~~that currently the monk seal population is slightly more than 1000 animals~~ *the minimum population size for the species is 1436 seals.* ~~By most recent counts, it appears that the population is declining at about 5%/yr (Ragen, pers. comm., 1995). However, based on data collected at the five major haul-outs, the number of births recorded in 1990 declined by 23% from the average annual levels recorded between 1983 and 1989 (NMFS, 1991).~~ *Johanos and Ragen (1999) noted that the age composition of animals counted remains skewed towards adults and expressed concern that reproduction would decrease in the near future if older adult females were not replaced by young females reaching reproductive age.*

~~At the breeding islands,~~ *Monk seals are opportunistic foragers, eating prey as they are encountered. Their diet can consist of* ~~monk seals feed on~~ octopus, spiny lobster, eels, bottom fish, and reef fish (Rice, 1960; Gilmartin, 1983). *Recent research (Parrish et al., 2000) fitted 24 adult male seals with a video camera. All documented feeding was directed at demersal and benthic fish, and most prey were caught at depths of 50-100 m (164-328 ft) on the relatively level terraces which are remnant of prehistoric sea-level change. Most of the seals' dives were to the bottom in water 10-100 m (33-328 ft) deep, though 3 of the 24 seals made dives greater than 300 m (984 ft).* ~~Limited data on diving patterns indicate that for adult males about half of their foraging activity is shallower than 35 m (114.8 ft) (NMFS, 1991); however, recent time-depth recorder information from a tagged monk seal revealed that it dove to at least 500 m (1640.5 ft) (Ragen, pers. comm., 1995).~~

On the island of Kauai, "the numbers of adults and numbers of births seem to be clearly on the increase." (Heacock, pers. comm., September 18, 2000). In 1997, Mr. Heacock started the Kauai Monk Seal Watch Program with the cooperation of the county lifeguards, Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), and NMFS. Though there are no published reports, Mr. Heacock noted that the total count of beached monk seals recorded in 1999 by this program was 10-12, with 1 birth also recorded. In August, 2000, NMFS conducted a statewide aerial survey which observed 17 beached seals for Kauai County (Kauai, Niihau, Lehua Rock and Kalua Rock) and 3 births which were all on the island of Kauai (Heacock, pers. comm., September 18, 2000). NMFS normally multiplies their beach counts of seals by a correction factor of 3 to account for animals that may not be observed to obtain a reasonable estimate of the actual population size.

Hawaiian monk seals ~~breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs (Tomich, 1986). They~~ are ~~also~~ known to ~~use~~ *breed at* the Midway Islands, among other northwest Hawaiian Islands (USFWS, 1984). The colony on Midway was virtually eliminated during the active use by the U.S. Navy. However, the beach count of 24 seals in 1998 was the highest since 1960. Furthermore, 11 pups were born at Midway in both 1997 and 1998. Twenty of the 22 pups were successfully weaned (MMC, 1999). These encouraging findings suggest that the seals at Midway may reestablish the atoll as a major breeding site.

3.2.3 Sea Turtles

Five species of sea turtle occur in the Pacific Ocean near the Hawaiian Islands: the green or honu (*Chelonia mydas*), loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), hawksbill or èa (*Eretmochelys imbricata*), and olive ridley (*Lepidochelys olivacea*). Hawksbills, ~~and~~ leatherbacks, *olive ridleys and green sea turtles* are listed at the federal and state levels as endangered ~~(DLNR, 1996)~~ (Biological Opinion, Appendix H). ~~Olive ridley, l~~Loggerhead ~~and green~~ sea turtles are listed as threatened at the federal and state levels ~~(DLNR, 1996)~~ (Biological Opinion, Appendix H) in Hawaiian waters. 3-12

The distribution of each species has been determined from one or more of the following: 1) observations of adult females emerging to nest on beaches and/or adult males basking on beaches or other substrates; 2) observations of turtle tracks, hatchlings, or egg shells on beaches; 3) reports of incidental capture by commercial fisheries; 4) incidental observations by fishermen or other mariners; 5) mark-recapture studies of adult females; and 6) radio and satellite telemetry studies of adult males and females. All five species have worldwide extensive ranges. However, genetic analysis of sea turtles has revealed in recent years (i.e., many published accounts) that discrete non-inter-breeding stocks of sea turtles make up these "worldwide extensive ranges" of the various species. It is generally believed that all sea turtle species spend the first few years of their life in pelagic waters, occurring in driftlines and convergence zones, where they find refuge and food in the items that accumulate in surface circulation features (Carr, 1986, 1987). The most accurate abundance estimates in the study region are for adult female green turtles and hawksbills that nest annually on Hawaiian beaches. Leatherbacks and olive ridleys do not nest regularly, or in great numbers, in the Hawaiian Islands, and loggerheads do not nest in the Hawaiian Islands at all. Table 3.2-1 provides estimates for the potential stocks of these five sea turtle species in the area off the north coast of Kauai.

3.2.6 Threatened, Endangered, and Special Status Species

This section presents information on threatened, endangered, and special status species that may occur in the study area. Table 3.2-3~~2~~ lists the threatened, endangered and special status species under the federal Endangered Species Act, the Hawaii Revised Statute (HRS) 195D-4 (Endangered Species and Threatened Species), and the Convention on International Trade in Endangered Species (CITES) that may occur in the study area. 3-13

~~Ten~~ *Twelve* threatened, endangered, and special status marine species potentially occur within the study areas of Kauai and Midway Atoll ~~(letter from NMFS, 7 Feb. 2000)~~ (NMFS Biological Opinion, 26 April 2001). These include ~~three~~ five mysticetes (blue, fin, *sei, northern right* and humpback whales), one odontocete (sperm whale), one pinniped (Hawaiian monk seal), and five sea turtles (leatherback, green, olive Ridley, hawksbill, and loggerhead). In addition, the critical habitat of the Hawaiian monk seal includes all beach areas, sand spits and islets, lagoon waters, inner reef waters, and ocean waters out to a depth of 36.6 m (20 fm) around the following: Kure Atoll; Midway Islands, except Sand Island and its harbor; Pearl and Hermes Reef; Lisianski Island; Laysan Island; Maro Reef; Gardner Pinnacles; French Frigate Shoals; Necker Island; and Nihoa Island (50 CFR 226.11).

Table 3.2-~~2~~3 Threatened, Endangered, and Special Status Species.

Common Name	Scientific Name	Federal Endangered Species Act Status	Hawaiian Endangered Species Act Status	CITES Status
		Mysticetes		
Blue whale	*Balaenoptera musculus*	Endangered		Protected
Fin whale	*Balaenoptera physalus*	Endangered	Endangered	Protected
Sei whale	*Balaenoptera borealis*	Endangered		Protected
Humpback whale	*Megaptera novaeangliae*	Endangered	Endangered	Protected
Northern right whale	*Eubalaena glacialis*	Endangered		Protected
		Odontocetes		
Sperm whale	*Physeter macrocephalus*	Endangered	Endangered	Protected
		Pinnipeds		
Hawaiian monk seal	*Monachus schauinslandi*	Endangered	Endangered	Protected
		Sea Turtles		
Green sea turtle	*Chelonia mydas*	~~Threatened~~ Endangered	~~Threatened~~ Endangered	Protected
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Endangered	Protected
Olive ridley sea turtle	*Lepidochelys olivacea*	~~Threatened~~ Endangered	~~Threatened~~ Endangered	Protected
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Endangered	Protected
Loggerhead	*Caretta caretta*	Threatened	Threatened	Protected
		Seabirds		
Newell's shearwater	*Puffinus auricularis newelli*	Threatened	Threatened	
Short-tailed albatross	*Diomedea albatrus*	Endangered		Protected
Hawaiian dark-rumped petrel	*Pterodroma phaeopygia sandwichensis*	Endangered	Endangered	

3-14

3.4.1 Recreational Activities and Tourism

Kauai's economy is dominated by tourism and agricultural industries. Federal government employment is also a major contributor to the local economy, as discussed in Section 3.3.4.

The tourism industry and associated travel-related services employ approximately 16,000 people on Kauai (Pham, 1991). Average earnings per job in this industry was approximately $17,900 in 1990 (Pham, 1991). The Hawaii Visitors Bureau (1991) estimated that 1.3 million people visited Kauai in 1990. Visitor expenditures for 1990 were approximately $945 million (Hawaii Visitors Bureau, 1991).

According to Townsend (1991), the major recreational activities on Kauai are fishing, boating, diving, snorkeling, surfing, waterskiing, whale-watching, sea kayaking, parasailing (commercial), and riding pleasurecraft (private and commercial). ~~In 1988, the Hawaii Department of Transportation issued regulations limiting commercial pleasurecraft and parasailing operations. Whale-watching operations are subject to federal regulation with respect to humpback whales. At least two whale-watching vessel types are in operation off Kauai:~~ 3-15

- ~~M/V Napali Queen and M/V Navatek II; do not anchor in Hanalei Bay.~~
- ~~Power catamarans; 12 m length overall; two 200 hp outboard motors; anchor in Hanalei Bay.~~

~~Economic activities involving the ocean in Hawaii are highly diversified including tour boats, interisland cruises, charter boat and recreational fishing, yacht racing, competitive ocean swims, Hawaiian canoe races, and wind-, board-, and body surfing events. Total direct revenue estimates for 1992 were estimated at nearly $ 560 million (MacDonald and Deese, 1994).~~ *In 1998, Governor Cayetano closed the Hanalei ocean tour boat industry. A handful of operators were allowed to continue operations on a temporary basis; these operators have sued the State and are continuing to operate under a court order (Utech, 1999). The majority of operators moved their business to the west coast of Kauai, particularly the Port Allen small boat harbor. The results of this shift are that larger vessels are favored because the trip to the Na Pali coast, the main destination for most Kauai ocean tours, is longer from the west coast.*

Direct revenues in 1999 from the respective ocean tours were $0.9 million for whale watching, $17.1 million from snorkeling, and $3.7 million from sunset cruises. The total economic impact from the respective ocean tours was estimated as $1.6 million and 23 jobs for whale watching, $29.3 million and 420 jobs for snorkeling, and $6.4 million and 92 jobs for sunset cruises (Utech, 1999). In April 1999, a large vessel that had operated dinner cruises on Maui shifted to Kauai; however, the total estimate of dinner cruise revenues across these two islands should not be greatly affected by this change (Utech, 1999).

The recent closing of the base at Midway has allowed numerous recreational activities to be offered. Sport fishing, diving and wildlife watching activities now take place on Midway Atoll. Due to its remote location, essentially no commercial fishing occurs in the area, although tuna boats occasionally fish the general region (Environmental Protection Agency [EPA], 1985).

4 ENVIRONMENTAL CONSEQUENCES

4.1.1.1 Construction and Removal of Facilities

Direct physical impacts of the installation or removal of project facilities would be considered important if they could lead to problems with regard to slope instability, safety or other hazards (including hazards to navigation), threat of release of hazardous substances, or other incompatibilities with the physical environment.

The physical installations associated with the Midway Alternative are relatively minor and generally are benign with respect to the physical environment. The Midway Alternative would involve the placement of a sound source with a footprint of 5.95 m^2 (64 ft^2), with no alteration of the seafloor contours. The cable would need to be laid through the shoreline band, with associated trenching (nominally 1 m [3.3 ft] deep) and the installation of a pipe that would protect the cable from wave action and prevent movement. At deeper depths, the cable would be routed through frequent surge channels in the coral atoll to avoid cable suspensions and coral surfaces. Existing physical structures on Midway Island could probably be used for the shore station, reducing the need for additional development within the national wildlife refuge. However, activities associated with the maintenance of the shore station, cable, and sound source could potentially increase use of the national wildlife refuge, but on a limited basis.

The No Action Alternative and the Midway Alternative involve the removal of the sound source and cable presently in place off northern Kauai. Since the cable has been on the seafloor for 6 years, natural processes such as sediment drift are likely to have buried the cable, especially in areas where the seafloor is primarily sand. Depending on the characteristics of the sediment, the cable may be lying on the seafloor surface in some areas and buried 2.54 cm (1 in) to 30.5 cm (1 ft) in other areas. Under the Preferred Alternative, the cable will have been on the seafloor for approximately 12 years, and can be expected to be even more deeply buried and integrated into the benthic (seafloor) environment. ~~Assessing the effect of cable removal on the surrounding environment and the cable itself, Myers et al. (1996) state, "a cable that is well buried on a favorable bottom and left undisturbed will probably last many years. Breaking it out is detrimental in every respect."~~ *PMRF conducted an ROV survey of cables on the west-northwest side of Kauai in 1995 out to water depths of approximately 300 ft (100 m) (Dick, pers. comm., September 14, 2000). Mr. Dick stated that the ATOC cable was encountered during the ROV survey, and that it was buried under sand and barely visible. He said that when the cable was laid, a concerted effort was made to place the cable along the 300 ft (100 m) depth contour where the sediment consists of a prehistoric drowned beach; therefore it is likely that the majority of the cable along this depth contour is buried by sand. Furthermore, the existing seashore interface cable that the ATOC cable was connected to has been in place for approximately 20 years, and photos document massive coral growth on that 0.7 nm section (Dick, pers. comm., 2000). Mr. Dick commented that, to depths of approximately 200 ft (61 m), the ATOC cable also has coral growing on it, but not to the same extent since it hasn't been in place as long as the seashore interface cable. Therefore, removal of the cable could result in damage to the coral that has begun to grow on it.* 4-1

The cable route lies partly within the PMRF-Barking Sands, which is operated by the U.S. Navy. Installation of the cable along a relatively shallow route through the PMRF was expected to avoid any interaction with PMRF activities or facilities. In 1998, PMRF training and testing capabilities were expanded with addition of the Shallow Water Training Range (SWTR), which includes sensitive instrumentation in the region of the ATOC cable's southwestern reach. In February 1999, ATOC project principals learned that cables of the SWTR facilities overlie the ATOC cable in seven locations (Figure 2.1-3, PMRF Shallow Water Training Range cables and ATOC cables). PMRF has advised that the SWTR cables cannot be moved to enable recovery of the ATOC cable because of the high risk of damaging the cables or in-line sensors during the recovery process, and because of the tremendous costs involved (Letter 26 May 1999, PMRF Executive Officer L. B. Barfoot to Dr. P. Worcester, Scripps).

Mitigation Measure 6: For the Midway Alternative, the portions of the cable and any protective casing in the nearshore area and surf zone would be designed to minimize the potential for adverse effects.

Mitigation Measure 7: For the Preferred Alternative and the Midway Alternative, the source cable, and possibly the sound source, would not be removed at the end of the experiment.

4.1.2.2 Underwater Sound

Noise from the source would be expected to add to the ambient noise levels in the vicinity of the source (intermittently during the 2-8 percent of the time the source would be transmitting). Other sources of noise which contribute to the ambient noise levels are either natural (e.g., wind, waves, marine life, seismics) or human-related (e.g., from vessels, aircraft, and onshore and nearshore construction). The potential cumulative effect of noise produced by monitoring aircraft during the course of research would be negligible, contributing less than 1 dB to the total overall ambient noise in the study area while the aircraft are operating.

No other ocean acoustics research activities (past, present, or future) are anticipated to cumulate with potential effects of the NPAL source transmissions on the physical environment. Any effect the ATOC project may have had on ambient noise ceased when transmissions stopped (October, 1999). Furthermore, a single sound source in the mid-Pacific provides adequate coverage to receivers in the eastern and North Pacific for studies of large-scale acoustic thermometry and long-range sound propagation, and additional sources should not be required near Kauai. It can be anticipated that a number of unrelated, regional, short-term, ocean acoustic tomography projects will be conducted at various locations in the North Pacific Ocean over the next five years. The Ocean Acoustic Observatory Federation, for example, deployed an autonomous HLF-5 acoustic source (described in Section 2.1.5) on Hoke Seamount in the eastern North Pacific as part of a system to monitor the California Current. The source was installed in April 1999 and is projected for recovery during May 2000. As a second example, the Farfield Program of the Hawaii Ocean Mixing Experiment is funded by the National Science Foundation to deploy an array of four HLF-5 sources in the central North Pacific to study the role of tidal dissipation in ocean mixing. The plan is to install a triangular array with a fourth source in the center a few hundred kilometers on a side north of the Hawaiian Ridge during May

2001. The entire array would then be picked up and moved south of the Hawaiian Ridge during September 2001. All of the instrumentation would be recovered during April 2002.

In all cases for which definite information is available, the sources operate at significantly higher frequencies (250 Hz for the HLF-5 source) than the proposed NPAL source. They would be located at depths well below the near-surface region, where most of the potentially affected marine species are found, and in mid-ocean locations well outside the coastal zone, in regions where the abundances of potentially affected marine species are very low. The output power level of the HLF-5 sources used in the projects mentioned above is only 132 Watts, 50% of the power level of the ATOC source (192 dB re 1 μPa at 1 m vs. 195 dB re 1 μPa at 1 m). The transmissions typically last only about 2 minutes or less, and the overall duty cycle is typically only about 0.3 percent due to the constraints imposed by the limited battery packs that are feasible for autonomous operation. All of these characteristics are possible because the signals are designed for regional experiments and are not adequate for transmissions over 3000-5000 km ranges, as was discussed in Chapter 2.

The implications are that the individual regional projects would be expected to have only negligible effects on the environment. For the projects described above, the 250-Hz signals would be below the background ambient noise levels at both the Kauai and Midway locations and so no cumulative impacts are anticipated with the transmissions from the proposed NPAL source.

~~*Limited military activities occur in the vicinity of the Kauai source.*~~ PMRF currently has no environmental authorization to conduct active underwater acoustic tests. *Therefore, cumulative effects from their activities are limited to transits of vessels. Since PMRF and its shallow water training range are located approximately 12 nm from the ATOC sound source, the cumulative sound level from the radiated noise of vessels on the range and transmissions from the ATOC sound source would be negligible.* Other military training missions involving active sonar occur throughout the Hawaiian Islands, however none are known to occur within 93 km (50 nm) of the Kauai source. In its Draft EIS, geographic restrictions on the employment of the Navy's Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar state that it would not generate a sound field greater than 180 dB within 22 km (12 nm) of any coastline, nor would it exceed 145 dB in the vicinity of known recreational and commercial dive sites. Therefore, none of these military activities should cumulate with the proposed action. 4-2

Other than potential general increases in vessel traffic through the project vicinity, and onshore development of various kinds, no other human activities (past, present, or future) are anticipated to cumulate with potential effects of the source transmissions on the physical environment. Any cumulative effect of past, current, and future human noise-producing activities (e.g., vessel traffic, oceanographic research, military activities) with the short duty cycle of the sound transmissions are expected to be minimal. While human-related sources of noise may increase over time with increases in population, economic activities and resulting traffic levels, any such increase is speculative.

California and Hawaii MMRPs Results

The California and Hawaii ATOC MMRPs were designed to determine the potential effects of the acoustic transmissions on marine mammals and other marine life. The following components relate to marine mammals:

- Aerial surveys designed to determine any changes in the abundance and distribution of marine mammals in the vicinity of the Pioneer Seamount source;
- Elephant seal tagging studies designed to determine any changes in elephant seal migratory or diving behavior in response to the Pioneer Seamount source transmissions;
- Playback studies to humpback whales off the Kona-Kohala coast of Hawaii designed to look for behavioral changes in response to ATOC-like sounds prior to the actual ATOC source transmissions north of Kauai;
- Aerial surveys designed to determine any changes in the abundance and distribution of humpback whales north of Kauai when the ATOC source was transmitting compared to measurements made in previous years when the source was not transmitting;
- Visual observations of humpback whale abundance, distribution, and behavior north of Kauai to determine if there were any changes in response to the ATOC transmissions;
- Undersea acoustic recordings made with seafloor data recorders north of Kauai to determine any changes in humpback vocalizations in response to the ATOC transmissions; and
- Auditory measurements on small toothed whales (odontocetes) to determine their sensitivity to the frequencies transmitted by the ATOC sources.

Abundance and distribution. Neither MMRP found any overt or obvious short-term changes in the abundance and distribution of marine mammals in response to the transmissions of the ATOC sound sources. Calambokidis et al. (Costa et al., 1998), surveying the waters in an 80 km by 80 km (43 nm by 43 nm) box centered on the California ATOC source, and Mobley et al. (1999b), surveying the waters within 40 km (22 nm) of the Kauai ATOC source, showed no significant changes in the abundance of humpback and sperm whales from the control periods when the source was not operating, to the experimental periods when it was. Only humpback whales were seen in sufficient numbers in the survey area around the Kauai source to permit quantitative assessments of distributional changes from 1994 (source off) to 1998 (source on). The distance from each sighting to the ATOC source and the distance from each sighting to shore were computed, and the mean distances compared between the two years. The mean distance offshore and distance from source were both slightly greater during 1998; however, these distances were not significant (Mobley, 1999b). Intensive statistical analyses of aerial survey data showed some subtle shifts in the distribution of humpback (and possibly sperm) whales away from the Pioneer Seamount source during transmission periods (~~Calambokidis~~ Costa et al., 1998). No statistically significant shifts in distribution were found for any other species of marine mammal. Visual observation data from the Kauai MMRP showed a similar small shift in mean distance of humpback whales away from the Kauai source during transmission periods.

4-3

The Hawaiian aerial survey protocol was designed in consultation with National Marine Mammal Laboratory (NMML) in Seattle, Washington, to allow for line transect-based population estimates. Aerial surveys throughout waters adjoining the eight major Hawaiian Islands were performed in 1993, 1995 and 1998. Comparison of the 1993, 1995, and 1998 population estimates for humpback whales show a nearly statistically significant increase on the order of 8 percent annually (Mobley et al., 1999c). Dr. Mobley is currently flying another set of surveys in the 2000 season to increase the accuracy of the population trend data. Independent photo-id based estimates are showing similar rates of increase in the humpback whale population (Calambokidis, 1999).

Behavioral measures. Neither MMRP found any overt or obvious short-term changes in the behavior of humpback whales *in response to the playback of ATOC-like sounds, n*or elephant seals *or humpback whales* in response to ~~the playback of ATOC-like sounds or to~~ transmissions of the ATOC sound sources. *Northern elephant seals tagged with satellite, swim-speed, time-depth, and acoustic data loggers were released seaward of the operating California ATOC source, and their return to Año Nuevo rookery was studied. No statistically significant changes were found in any behaviors measured (Costa et al., 1998).* In 1996, the behavioral responses of humpback whales to the playback of ATOC-like signals (maximum received level of 130 dB) were studied. Humpback whales showed no overt responses to these ATOC playbacks (Frankel and Clark, 1998). By contrast, the single playback of a humpback whale feeding call provoked dramatic changes similar to those seen in previous playback experiments (Mobley et al., 1988). In 1998, the behavior of humpback whales *during transmissions from the fully-operational Kauai ATOC source* was observed from a shore-station on the north coast of Kauai ~~while the Kauai ATOC source was transmitting~~ (Frankel and Clark, ~~1999a~~*2000*~~) and compared to observations made during 1994 when the Kauai ATOC source was not transmitting (Frankel and Clark, 1999b~~). Intensive statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; Frankel and Clark, ~~1999b~~*2000*). Both studies found that the distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing sound levels. This result is not what would be predicted, in that if the animals were stressed by the sound source, it might be expected that they would remain at the surface longer because of the lower received levels there. Longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors measured. 4-4

Vocalizations. The Hawaii MMRP did not find any overt or obvious short-term changes in the singing behavior of humpback whales in the vicinity of the sound source north of Kauai. No statistically significant changes in the underwater sound output from humpback whales in one of the frequency bands in which they vocalize was found in the vicinity of the Kauai source.

Audiograms. Audiograms of two species of dolphins showed that their hearing is poor at the frequencies transmitted by the ATOC sources (Au et al., 1997). The animals would have to be extremely close to an ATOC source simply to be able to detect the transmissions.

All of the effects detected by the MMRPs were subtle and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, ~~1999~~*2000*).

Acoustic Modeling

To assess the potential environmental impact of the sound source, it was necessary to predict the sound field that a given species could be exposed to over time. This was a three-part process involving:

- the ability to measure or estimate an animal's location in space and time;
- the ability to measure or estimate the sound field at these times and locations; and
- the integration of these two data sets to estimate the potential impact of the sound source on a specific animal. The computer models used to develop these analyses are described below.

Next, the relationship *was developed between* ~~of~~ marine mammal exposure to LF sound ~~to~~ *and the risk of a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.* ~~TTS or prolonged disturbance of biologically important behavior was developed~~. 4-5

Using the results of acoustic modeling, the potential effects of the LF sound source were assessed in relation to received levels (RLs) and repeated exposure. The development of this risk analysis process (risk continuum) is described below.

The acoustical modeling process for this EIS was accomplished using the Navy's standard acoustic performance prediction transmission loss (TL) model--Parabolic Equation (PE) version 3.4. The results of this model are the primary input to the Acoustic Integration Model (AIM).

Parabolic Equation Model

The PE model is one of the validated acoustic propagation loss models in the Navy's Oceanographic and Atmospheric Master Library (OAML). Environmental acoustic inputs to the PE model include the following:

- Sound speed as a function of range and depth in the water column;
- Sound speed, attenuation, and density as a function of range and depth in the sediment (or bottom loss as a function of range in the sediment);
- Bottom depth as a function of range;
- Surface loss as a function of range and wind speed;
- Volume attenuation as a function of range and depth in the water column, or flags instructing PE to compute the volume attenuation based on the acoustic frequency, or to ignore volume attenuation completely; and
- Frequency of the broadcast sound.

For this analysis, standard databases from the Navy's OAML were used for all of the above listed environmental and acoustical inputs. The bathymetry used was the Digital Bathymetric Data Base (DBDB) 1, when available, or DBDB 5 otherwise, which has a resolution of 1.9 km (1 nm) and 9.3 km (5 nm), respectively.

Geometric inputs include stationary-point (source) depth, moving-point (receiver) depth, PE half-beam width and beam shape, or user-supplied initial field, and maximum range of interest.

The output from the PE computation is TL as a function of range and depth. PE plots for the Preferred Alternative are included in Chapter 2, Figures 2.1-5 and 2.1-6.

Acoustic Integration Model

The AIM was used in this analysis to estimate animal sound exposures. The model is based on accepted scientific methodologies for estimating the potential exposure of marine animals to LF sound. In general terms, AIM simulates:

- Characteristics of marine animals (e.g., species distribution, density, diving profiles, and general movement);
- Sound transmissions (e.g., SL, duty cycle, transmission length); and
- The predicted sound field for each transmission.

Thus, AIM simulates acoustic exposure during a typical NPAL source transmission. Tables 4.2-1, 4.2-2, and 4.2-3, respectively, provide AIM input parameters for animal movement, diving behavior, and distribution, abundance, and density. Abundance estimates for the Hawaiian populations in the vicinity of the Preferred and Midway alternatives are scarce (Barlow et al., 1996). Wade and Gerrodette (1993) estimated the abundance of cetacean populations in the eastern tropical Pacific, but there are limited data for a population estimate in Hawaiian waters. Therefore, the aerial survey data of Mobley et al. (1999b) represent the best available data for distribution and abundance of marine mammals in Hawaiian waters (see Table 3.2-1).

In more detail, AIM is composed of three separate elements. The first element calculates the projected 3D sound field from a description of the source and the environment. The sound source can be moving or stationary. The resultant data field is a four dimensional (4D) presentation (position, time) of sound pressure level (SPL).

The second element models the animals' distribution in space and diving behavior. This element assigns the animals to a start point and simulates their movement according to their expected behavior pattern. Programmable features in this element of the model include: (1) number of animals per unit area; (2) size of area in nm^2; (3) individual animal start points, courses, propensity to change course, and speeds. The programmable features in the diving behavior are: (1) the depth of four depth zones within the water column (surface, transition, average diving, and maximum diving zones); (2) percent of time the animal spends in each zone (total among all four =100 percent).

For the NPAL sound source, in which the typical transmission is 20 min in length, each transmission was divided into 20 1-min "pings," to more accurately represent the animals' diving behavior and movement patterns.

The variability in animal behavior with respect to dive pattern, start location, and course/speed are simulated through the use of random variables. Each animal's turning tendencies (labeled

Table 4.2-1 AIM Input Parameters for Animal Movement

Species	Sites	Swim Speed	Interval of Course Change	Angular Range of Course Change
all animals	both sites	3 knots/ 1.5 m/s	1 minute	360°

Table 4.2-2 AIM Input Parameters for Diving Behavior

Species	Dive Profile Zones (ft/m)							
	Surface	%	Transition	%	Avg Dives	%	Max Dives	%
blue, fin, humpback, Bryde's whales	0-50/ 0-15.2	12	50-270/ 15.2-82.3	40	270-522/ 82.3-159.1	43	522-612/ 159.1-186.5	5
minke whale	0-50/ 0-15.2	45	50-120/ 15.2-36.6	5	120-200/ 36.6-61.0	30	200-300/ 61.0-91.4	20
sperm, beaked whales	0-50/ 0-15.2	17	50-1200/ 15.2-365.8	13	1200-1800/ 365.8-548.6	50	1800-3500/ 548.6-1066.8	20
short-finned pilot, melon-headed whales	0-50/ 0-15.2	20	50-800/ 15.2-243.8	20	800-1200/ 243.8-365.8	40	1200-1800/ 365.8-548.6	20
Risso's, rough-toothed, bottlenose, striped, spotted, spinner dolphins	0-50/ 0-15.2	30	50-150/ 15.2-45.7	30	150-300/ 45.7-91.4	30	300-750/ 91.4-228.6	10
Hawaiian monk seal	0-50/ 0-15.2	12	50-120/ 15.2-36.6	50	120-363/ 36.6-110.6	20	363-525/ 110.6-160.0	10

Table 4.2-3 AIM Input for Distribution, Abundance, and Density

Site	Species	Abundance Estimate	Site Estimate[1]	Distribution, Abundance, and Density Information
Kauai	humpback whale	3852[2]	305	64% of humpback whales sighted in water less than 182 m (600 ft).
	fin whale	N/A[3]	1	Primarily pelagic, but found along shelf areas during feeding.
	sperm whale	N/A[3]	33	Found at highest density over waters deeper than 1830 m (6000 ft).
	dwarf and pygmy sperm whales	N/A[3]	4	Especially common along continental shelf breaks.
	Blainville's beaked whale	N/A[3]	4	Found at highest density over waters deeper than 1830 m (6000 ft).
	Cuvier's beaked whale	N/A[3]	2	Found at highest density over waters deeper than 1830 m (6000 ft).
	short-finned pilot whale	N/A[3]	160	More common over waters deeper than 1830 m (6000 ft).
	false killer whale	N/A[3]	55	Especially common along continental shelf breaks.
	melon-headed whale	N/A[3]	44	Found at highest density over waters deeper than 1830 m (6000 ft).
	Risso's dolphin	N/A[3]	3	Not common around the Hawaiian Islands. Even distribution across water depths.
	rough-toothed dolphin	N/A[3]	29	Common in offshore waters, typically occurring over bottom depths greater than 500 m (1640 ft).
	bottlenose dolphin	N/A[3]	41	Found in similar densities over all water depths.
	striped dolphin	N/A[3]	17	Not common around the Hawaiian Islands. Even distribution across water depths.
	spotted dolphin	N/A[3]	137	Especially common along continental shelf breaks. Feed primarily in offshore waters.
	spinner dolphin	N/A[3]	210	Found at highest densities in waters less than 1830 m (6000 ft).
	Hawaiian monk seal	*1423[4]*	*16*	*Found occasionally in waters less than 1000 m (3281 ft), rarely in deeper waters.* 4-6

Note 1: Site estimate derived from aerial survey data in Mobley et al. (1999b).
Note 2: Population estimate of humpback whales wintering around the Hawaiian Islands from 1998 aerial survey data (Mobley et al., 1999c).
Note 3: N/A = Not Available. NMFS has not estimated the abundance of the Hawaiian stock for this species (Barlow et al., 1996).
Note 4: Minimum stock estimate (N_{min}) from 1999 NMFS Stock Assessment Report (Forney et al., 1999).

Table 4.2-3 AIM Input for Distribution, Abundance, and Density

Site	Species	Stock Estimate	Site Estimate	Distribution, Abundance, and Density Information
Midway	blue whale	N/A[3]	4[2]	Primarily pelagic, but found along shelf areas during feeding.
	fin whale	N/A[3]	4[2]	Primarily pelagic, but found along shelf areas during feeding.
	Bryde's whale	N/A[3]	21[2]	Found occasionally in waters less than 1000 m (3281 ft), rarely in deeper waters.
	minke whale	N/A[3]	21[2]	Found occasionally in waters less than 1000 m (3281 ft), rarely in deeper waters.
	sperm whale	N/A[3]	27[1]	Found at highest density over waters deeper than 1830 m (6000 ft).
	dwarf and pygmy sperm whales	N/A[3]	3[1]	Especially common along continental shelf breaks.
	Blainville's beaked whale	N/A[3]	4[1]	Found at highest density over waters deeper than 1830 m (6000 ft).
	Cuvier's beaked whale	N/A[3]	2[1]	Found at highest density over waters deeper than 1830 m (6000 ft).
	melon-headed whale	N/A[3]	39[1]	Found at highest density over waters deeper than 1830 m (6000 ft).
	Risso's dolphin	N/A[3]	2[1]	Not common around the Hawaiian Islands. Even distribution across water depths.
	rough-toothed dolphin	N/A[3]	24[1]	Common in offshore waters, typically occurring over bottom depths greater than 500 m (1640 ft).
	bottlenose dolphin	N/A[3]	26[1]	Found in similar densities over all water depths.
	striped dolphin	N/A[3]	12[1]	Not common around the Hawaiian Islands. Even distribution across water depths.
	spotted dolphin	N/A[3]	103[1]	Especially common along continental shelf breaks. Feed primarily in offshore waters.
	spinner dolphin	N/A[3]	136[1]	Found at highest densities in waters less than 1830 m (6000 ft).
	Hawaiian monk seal	1423[4]	21[2]	Found occasionally in waters less than 1000 m (3281 ft), rarely in deeper waters.

Note 1: Site estimate derived from aerial survey data in Mobley et al. (1999b).
Note 2: Population estimate of humpback whales wintering around the Hawaiian Islands from 1998 aerial survey data (Mobley et al., 1999c).
Note 3: N/A = Not Available. NMFS has not estimated the abundance of the Hawaiian stock for this species (Barlow et al., 1996).
Note 4: Minimum stock estimate (N_{min}) from 1999 NMFS Stock Assessment Report (Forney et al., 1999).

"angular range of course change" in Table 4.2-1) are specified, which sets the general character of its meandering. Thus, an animal's simulated track could range from highly predictable (straight) to highly irregular. While the former would apply to migrating animals, the latter might be more applicable to local feeding or social behavior. To incorporate an animal's dive pattern, for each 1-min time step in the 20-min transmission, an animal is given a depth zone according to the user-provided probabilities, and is assigned a random depth within that zone.

The last element is the calculation of sound exposures. The predicted location of each animal at each 1-min time step is used to select the appropriate RL from the modeled sound field described above. A histogram of RLs for each transmission and for a full day of transmissions (a total of six 20-min transmissions) was computed for each animal, as well as summary statistics. This process was repeated for each species in the region, to estimate possible effects of the sound source transmissions.

The number of animals in each AIM simulation was related to the expected animal densities for each species. For species with low densities, the AIM simulations were run with more animals than would be expected, to ensure that the result of the simulation was not unduly influenced by the chance placement of a few animals. The minimum number of animals used was determined by preliminary experiments in order to develop a statistically significant cumulative distribution function (CDF). The CDF specifies the percentage of received transmissions at a given RL or below. The number of animals necessary to maintain statistical significance was modeled for each species in each site scenario as a ratio of the expected densities.

The results of the AIM modeling process are used as the inputs to the risk continuum to determine the *potential* risk of ~~TTS and prolonged disturbance of biologically important behavior to marine mammals~~ *a biologically significant response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.* 4-7

Risk Continuum Analysis

Marine mammals exposed to LF sound are *potentially* at risk for several types of biologically significant impacts, including injury and ~~non-injurious harassment~~ *a biologically significant behavioral response that affects biologically important activity, such as survival, breeding, feeding and migration, which have a potential to impact on the reproductive success of the animal.* In assessing this potential risk, two questions must be resolved: 4-8

- How does risk vary with repeated exposure?
- How does risk vary with RL?

These questions have been addressed by developing a function that translates the history of repeated exposures to the LF sound source (as calculated in the AIM model) into a RL for a single exposure with a comparable risk. This approach is similar to those adopted by previous studies of risk to human hearing (Richardson et al., 1995; Crocker, 1997).

Effects of Repeated Exposure

There is a very limited basis for determining the potential effects of repeated exposures for marine mammals. Richardson et al. (1995), however, discussed the relationship between repeated exposures of the human ear to impulsive sound, the duration of exposure of the human ear to an intermittent sound, and a temporary threshold shift (TTS) in the subject's hearing. For animals exposed to a signal of duration on the order of 20 min, the risk threshold is lowered by 10 dB per ten-fold increase in the number of 1-min time steps received during the transmission (see below for further discussion on the effects of signal duration). These findings are consistent with qualitative statements by Crocker (1997). Thus, if a ping of level L is repeated N times, the single ping equivalent (SPE) level would be $L + 10 \log_{10}(N)$ in dB. For example, using this formula, 10 pings at 120 dB are equivalent to one ping at 130 dB.

While there is no guarantee that marine mammal behavioral responses exhibit patterns similar to human hearing, the human model is the best objective foundation for an assessment. Thus, the $10 \log_{10}(N)$ formula is ~~considered appropriate~~ *the best available* for assessing the *potential* risk to a marine mammal for ~~TTS and prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity* from coherent LF sound like the NPAL sound source transmissions. 4-9

The following provides some mathematical details of how quantification of this risk assessment was implemented in the subsequent analysis:

- For each animal in the AIM simulation, the RL at each 1-min time step changed as the animal moved in relation to the sound source;
- A histogram of the RLs was created, and the SPE for each RL bin was calculated;
- These RL bin SPEs were converted into raw acoustic intensities (proportional to the energy of the signal, or the variance of the waveform);
- To correctly summarize the intensities, their values were squared and summed together; and
- This sum was converted back to an equivalent dB value by taking the base 10 logarithm of the sum, and multiplying it by 5. This dB value was the overall SPE for that animal.

In this process, a single ping equivalent (SPE) RL is larger than the maximum RL of any single ping in a sequence. Also, the SPE for a sequence consisting of a single loud ping and a long series of much softer pings is almost the same as the level of the single loud ping.

Determination of Risk Function

Up to now, the definition of biological risk to marine mammals has generally been based on an arbitrary received sound level threshold for individual species. For example, TTS values have been used as a threshold. However, *the use of a threshold, or step function, assumes that all animals react to sound in the same manner, and that the same reaction occurs at the same RL for all animals. Therefore,* ~~this approach sets a threshold under which~~ any RL value below the threshold is considered risk-free, and any value above it is considered certain to cause adverse responses by marine mammals. 4-10

In contrast, a more realistic approach to assessing biological risk is to use a smooth, continuous function that maps RL to risk. Scientifically, this ~~acknowledges~~ *reflects the research that has been conducted on terrestrial species demonstrating* that individuals vary in sensitivity, so if an entire population is exposed to a given level of sound, biologically important responses will be observed in a percentage of the population rather than in none of the population or the entire population. *For example, in the third phase of the LFS SRP, discussed in greater detail later, some singing humpback whales showed apparent avoidance responses and cessation of song at RLs ranging from 120 to 150 dB. However, an equal number of singing whales exposed to the same levels showed no cessation of song. To reflect this varied response between individuals, a curvilinear risk continuum is most accurate.* Mathematically, ~~this~~ the curvilinear shape of the risk continuum eliminates the possibility for dramatic changes in estimated impact as a result of small changes in parameter values. As a result, the potential for misleading results is greatly reduced. 4-11

In order to represent a probability of risk, the function should have a value near zero at very low RLs, and a value near one for very high RLs. One class of functions that satisfies this criterion is cumulative probability distributions (CDFs). In selecting a particular functional expression for risk, several criteria were identified:

- The risk function must be parameterized to focus discussion on regions of uncertainty;

- Parameters must be permitted enough control to allow for accurate fits to experimental data; and

- The risk function should be reasonably convenient for algebraic manipulations.

Therefore, a biological risk function and a risk continuum were developed for this LF sound source (Figure 4.2-1, Single Ping Equivalent Probability Function). Risk varies with both RL and number of exposures. No two individuals would react to sound exposure in the same way. The risk continuum ~~estimates~~ *assumes* that 95 percent of the marine mammals exposed to a single ping of LF sound at a received level of 180 dB could incur TTS. This threshold is the first of three conservative assumptions underlying the EIS risk assessment. 4-12

The second assumption is that the risk of ~~prolonged disturbance of~~ *a biologically significant response that affects* biologically important ~~behavior~~ *activity* is zero below 120 dB. The third assumption is that 2.5 percent of a population exposed to a single ping at a RL of 150 dB would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity.* The biological risk function and the risk continuum are based on literature reviews and results of the ATOC MMRPs and other recent studies.

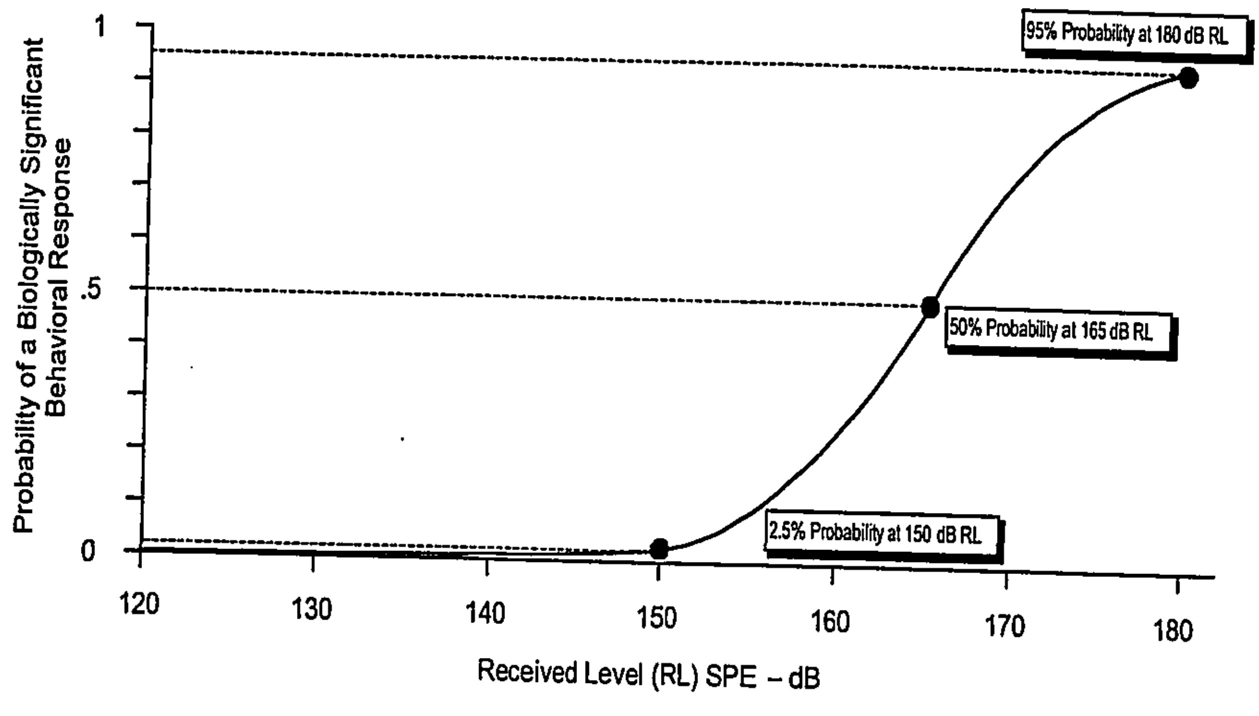

Figure 4.2-1 Single Ping Equivalent Probability Function

The most authoritative study of the effect of underwater sound on small odontocetes at frequencies between 3 and 75 kHz concluded that changes in behavior and temporary shifts in the hearing levels of bottlenose dolphins were observed at the following received levels for 1-sec tones (Ridgway et al., 1997):

Frequency	Change in Behavior	TTS
3 kHz	186 dB	194-201 dB
20 kHz	181 dB	193-196 dB
75 kHz	178 dB	192-194 dB

Since this study occurred in the region of greatest hearing sensitivity for this species, it is believed that the levels identified for behavior change and TTS at 3 kHz would be conservative for small odontocetes below 3 kHz (Ridgway et al., 1999, pers. comm.). *Schlundt et al. (2000) expanded on the research described in Ridgway et al. (1997) to include testing at 400 Hz. Behavioral alterations started at RLs of 180 dB for bottlenose dolphins, but no subjects exhibited TTS at levels up to 193 dB.* Large odontocetes are considered as sensitive as mysticetes while pinnipeds are believed to be less sensitive than odontocetes to underwater sound. Therefore, the threshold that 95 percent of the small odontocetes and pinnipeds exposed to a single ping of LF sound at 180 dB could incur TTS is even more conservative. 4-13

There are no authoritative studies of TTS or PTS in mysticetes. However, studies of human hearing indicate that the normal process of hearing loss with age can be accelerated by chronic exposure to sounds 80 dB above the absolute threshold of hearing (Richardson et al., 1995). Here, chronic is interpreted as about 8 hours per day for about 10 years. For odontocetes, Au et al. (1997) present data indicating that hearing thresholds are about 140 dB at 75 Hz. Hearing thresholds are not known in mysticetes, but the lowest value is speculated to be 80 dB (Ketten, 1998). This suggests that ten years of exposure to 160 dB RL for 8 hours per day would cause auditory damage. Therefore, estimating that 95 percent of baleen whales will experience TTS after exposure to a 1-min ping at 180 dB is conservative.

In order to understand the significance of the risk of ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity,* it is necessary to determine how this risk might affect a population of marine mammals, starting with bioacoustic criteria. First, the animal must be able to hear LF sound. Second, the animal must incur a ~~prolonged reaction~~ *biologically significant behavioral response* to the LF sound. Third, any effect must involve a significant behavioral change in a biologically important activity. For LF sound effects on marine mammals, this would relate primarily to *survival,* feeding, ~~and~~ breeding *and migration,* ~~both~~ *all* of which are essential to the reproductive success of the animal. 4-14

Results from the ATOC MMRPs support the use of 120 dB as the basement value for risk. No overt or obvious short-term changes in behavior, distribution, or abundance in response to source transmissions were found. All of the effects detected by the MMRPs were subtle and found only after intensive statistical analyses.

The third assumption, that 2.5 percent of a population exposed to a single ping at a RL of 150 dB would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that* 4-15 *affects* biologically important ~~behavior~~*activity*, is based on results from the recent Low Frequency Sound Scientific Research Program (LFS SRP). Baleen whales became the focus of the three phases of this program because they are thought to have sensitive LF hearing and because of their endangered status and/or prior evidence of avoidance responses to LF sounds. The choice of study sites was based on research data in which the most discriminating techniques could be used and where previous research yielded substantial documentation of undisturbed patterns of behavior and distribution.

The species and settings chosen for the three phases of the LF sound playback experiments were:

- Blue and fin whales feeding in the Southern California Bight (Phase I) (September-October 1997);
- Gray whales migrating past the central California coast (Phase II) (January 1998); and
- Humpback whales off Hawaii (February-March 1998) (Phase III).

These studies included three important behavioral contexts for baleen whales: feeding, migrating, and breeding. The first phase also involved some studies of northern elephant seals tagged with acoustic data loggers. Elephant seals were considered among the most sensitive pinnipeds to LF sound and are deep divers. The third phase attempted to conduct playbacks with sperm whales, but no animals were encountered during the offshore portions of the cruise schedule. Sperm whales are listed as endangered, and they were suspected to be the toothed whale most sensitive to LF sound since they are the largest. There have also been anecdotal reports of sperm whales being sensitive to manmade transient noise (Watkins et al. 1985; Watkins and Schevill, 1975).

During the first phase of LFS SRP research, there was no pronounced disruption of feeding behavior from whales exposed to RLs from 110 to 153 dB. Over the 19-day period, the distribution of fin and blue whales appeared to be more influenced by the distribution of prey than by the playbacks.

In the second phase of LFS SRP research, migrating gray whales showed responses similar to those observed in earlier research (Malme et al., 1983; 1984) when the source was moored in the migration corridor (2 km [1.1 nm] from shore). The study extended those results with confirmation that a louder SL elicited a larger scale avoidance response. However, when the source was placed offshore (4 km [2.2 nm] from shore) of the migration corridor, the avoidance response was not evident on the track plots. The inshore avoidance model - in which most whales avoid exposure to levels of 115 to 125 dB - is not valid for whales in proximity to an offshore source. Rather, these data suggest that avoidance of an offshore source (≥ 4 km [2.2 nm]) would be minor, even at considerably higher RLs.

The third phase of LFS SRP research examined potential effects of LF transmissions on singing humpback whales. *In five of 18 playbacks of LF transmissions,* ~~These~~ *the* whales ~~showed some apparent avoidance responses and cessation of song occurring at RLs ranging from 120 to 150 dB~~*stopped singing, presumably in response to the playback (Miller et al., 2000).* However, ~~an~~ 4-16

~~equal number of~~ *during 9 of the 18 playbacks,* singing whales exposed to the same levels *(RLs ranging from 120 to 150 dB)* showed no cessation of song. Further analysis is required to establish how often male humpbacks stop singing in the absence of the LF transmissions and to evaluate the significance of the song cessation observed during playbacks. Of the whales that did stop singing, there was little response to subsequent pings. Most joined with other whales or resumed singing within less than an hour of the possible response. *For six whales where at least one complete song was recorded, on average, humpback whales' songs were 29 percent longer during LF playback, but returned to normal after exposure (Miller et al., 2000). The authors suggest that humpbacks sang longer songs during LF transmissions to compensate for acoustic interference.*

Taken together, the three phases of the LFS SRP do not support the predictions that most animals exposed to RLs near 140 dB would exhibit disturbance of behavior and avoid the area. These experiments, which exposed animals to RLs ranging from 120 to 150 dB, elicited only minor, short-term behavioral responses, but not ~~prolonged disturbance of~~ *a biologically significant behavior response that affects* biologically important ~~behavior~~ *activity*. 4-17

It should be noted that the signals used during the LFS SRP were approximately 60 seconds in duration on a 10-15 percent duty cycle in the 100 to 500 Hz frequency band. This differs from the signals of the proposed action. The NPAL signal would be in the 57.5-92.5 Hz and would typically operate on a 2 percent duty cycle (which may increase temporarily to 8 percent; see details in Chapter 2). The typical transmissions would be six 20-min transmissions (one every four hours), every fourth day, with each transmission preceded by a 5-min ramp-up period.

In summary, it is important to recall that risk varies with both level and duration. In terms of biological risk, it is important to note that individuals will vary in their pre-exposure hearing sensitivity, in their actual responses, and in the severity of the consequent biological effects (survivorship and reproduction). No two individuals will react to exposure in the same way. The risk continuum estimates that 95 percent of the marine mammals exposed to a single 1-min time step at 180 dB could suffer a risk of TTS. The second assumption is that the risk of ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity* is zero below 120 dB. The third assumption is that 2.5 percent of a population exposed to a single ping at a RL of 150 dB would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~*activity*. Based on the above discussion, this is a conservative estimate. 4-18

Processing AIM Results Using the Risk Continuum

The AIM results are then processed using the risk continuum to derive percentages given in Tables 4.2-5 and 4.2-6. These percentages estimate the portion of the population that would experience ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior or~~ *activity and* TTS for the Preferred Alternative and the Midway Alternative. These values were corrected to account for the percentage of animals affected in relation to the area's population. A value of zero means that less than 0.01% (i.e., 0.0001) of the marine mammal population is potentially affected. Details of the risk continuum and the analytical processing of the modeling data were discussed above.

Potential for Physical Auditory Effects and Behavioral Disturbance

Physical auditory effects and ~~prolonged disturbance of~~ *a biologically significant behavioral response that affects* biologically important ~~behavior~~ *activity* are the two effects of potential significance regarding the Preferred and Midway alternatives. To quantify the potential for these effects, two estimations were made. The first estimation was the potential for either effect over one 20-min transmission. The second estimation was the potential for either effect over one day of transmission (i.e., one 20-min transmission every four hours for 24 hours). The time scale for the first estimation is supported by observations made during the Kauai ATOC MMRP. First, during one portion of the MMRP, four transmissions occurred every two hours during daylight hours followed by three days of no transmissions. Throughout the day of transmissions, no overt or obvious short-term changes were detected. When possible, the same animal was observed over two consecutive transmissions. Secondly, the majority of humpbacks observed were swimming parallel to the coast (Frankel, pers. comm., 2000) and therefore would probably not receive sound from more than one transmission. However, if animals do not swim out of the area of the source after one transmission, the potential effects of receiving a day of transmissions was estimated. Therefore, as described below, the potential for effects is displayed for both time scales. 4-20

Preferred Alternative

Some general conclusions can be drawn from the relative abundance of various marine mammal species in relationship to the NPAL sound field. The only mysticete expected in the area in substantial numbers is the humpback whale, and because they usually prefer nearshore locations (inside the 100-fathom [188 m] depth contour), few are expected to be exposed to received levels > 120 dB. Similarly, sperm whales are the most common deep-diving odontocetes in the area, but because they usually prefer offshore waters (i.e., greater than 4000 m [12700 ft]), few are expected to be exposed to received levels > 120 dB. These distributional preferences are supported by the Kauai ATOC MMRP results (Mobley, 1999b).

Hawaiian monk seals are the only pinniped species that may be found around Kauai. However, because the majority of monk seals are located around the Northwest Hawaiian Islands feeding at depths of less than 100 m (328 ft), few, if any, are expected to be exposed to received levels ≥120 dB. 4-21

Acoustic modeling and the risk continuum analysis were used to estimate the percentages of marine mammal populations potentially affected by the Preferred Alternative (Table 4.2-5). Note that the species listed under the marine mammal column are those species potentially in the vicinity of Kauai. The column labeled One Transmission provides estimated percentages of individual marine mammal populations that could potentially be affected due to SPE levels <180 dB and ≥180 dB for one 20-min transmission. The column labeled One Day of Transmissions provides estimated percentages of individual marine mammal populations that could potentially be affected due to SPE levels <180 dB and ≥180 dB for six 20-min transmissions. A value of zero means that less than 0.01% (i.e., 0.0001) of the marine mammal population is potentially affected.

Table 4.2-5 Percentages of Marine Mammal Populations Potentially Affected by the Preferred Alternative

Marine Mammals	One Transmission		One Day of Transmissions	
	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)	Biologically Significant Behavioral Response (120-180 dB)	TTS (≥ 180 dB)
humpback whale	0	0	0.01	0
fin whale	0	0	0	0
sperm whale	0	0	0	0
dwarf and pygmy sperm whales	0	0	0	0
Blainville's beaked whale	0	0	0	0
Cuvier's beaked whale	0	0	0	0
short-finned pilot whale	0	0	0	0
fasle killer whale	0	0	0	0
melon-headed whale	0	0	0	0
Risso's dolphin	0	0	0	0
rough-toothed dolphin	0	0	0	0
bottlenose dolphin	0	0	0	0
striped dolphin	0	0	0	0
spotted dolphin	0	0	0	0
spinner dolphin	0	0	0	0
Hawaiian monk seal	*0*	*0*	*0*	*0*

Potential for Masking

Virtually no specific information is available about the nature and effects of masking under field conditions nor about the adaptations that marine mammals may use to reduce masking by low frequency sounds. Masking processes in baleen whales are not amenable to laboratory study, and no data on hearing sensitivity are available for these species. Yet, as noted previously, mysticetes and other marine mammals likely are well-adapted to coping with some increase in masking as a result of natural and human-made noise. However, since baleen whales are assumed to be sensitive to low frequency sound, the maximum radius of audibility of low frequency industrial noise for these species is to be determined by background noise levels. As noted earlier, it is not currently possible to determine with any level of quantitative precision the potential consequences of elevated background noise levels, particularly when they are temporary and local.

Masking as a result of human-made noise can interfere with the detection of acoustic signals, such as communication calls, and other environmental sounds that may be important to marine mammals and, at least in theory, a source of noise will be surrounded by a region within which masking may occur. However, the size of this zone is highly variable, even for a single marine mammal and a single type of noise. The maximum radius of masking depends on several factors. Among the most important of these is the received level of the noise relative to the original signal.

For an animal close to a source of human-made noise, the noise level would be high and the animal would be able to hear only nearby animals. For an animal farther from an industrial site, the noise level would be lower and the animal would be able to hear calls from more distant animals. The same arguments apply to detection of other environmental sounds that may be of interest to the animals.

Dramatic reductions in maximum potential radius of communication could result if ambient noise levels are increased by 10-20 dB throughout that range, while other factors (e.g., the animals' directional hearing ability, and the directionality of the noise source[s]) remain relatively constant. Species that may communicate acoustically over long distances, such as some baleen whales, would be most seriously affected. There is little information about the functions of most marine mammal calls. Hence, it is impossible to predict the effects of a reduction in the range to which these calls are detectable. Payne and Webb (1971) suggested that some baleen whales use powerful low frequency calls to communicate over very long distances. However, there is no evidence that whales respond to one another over ranges greater than about 20-25 km (11-13 nm) (Watkins, 1981), but this may be largely a result of limited observation methods (Richardson, pers. comm., 1994).

During the proposed sound transmissions (mostly 2 percent of the time), sound levels (in the 57.5-92.5 Hz band) in the vicinity of the source, and out to a radius of approximately 10 km (5.4 nm) towards shore (Figure 2.1-7), could be greater than average ambient levels (see discussion of ambient noise in Chapter 2). At these times, masking of communication calls and other environmental sounds which may be important to mysticetes could occur in some portion of the ensonified area if those sounds are in the same band as the NPAL source. _Species in the vicinity of the Preferred or Midway Alternatives that have the potential to be masked (see Figure 3.2-1 for summary of mysticete vocalizations) include blue, fin, sei, Bryde's, minke, northern right, and humpback whales._ However, there is virtually no information about the nature and effects of masking under field conditions, nor about the adaptations that marine mammals may use to reduce masking effects. ~~The few~~ _Most_ relevant data on masking have come largely from studies of high frequency echolocation by toothed whales. The importance to mysticetes of barely-detectable calls from distant conspecifics is unknown, so the biological significance of masking of faint calls is, likewise, unknown, and may be minor or negligible at most times (Richardson, pers. comm., 1994). Thus, the extent to which masking may occur, or the extent to which mysticetes might be affected by such masking is unknown. 4-22

For species with broad spectrum hearing, presumed to be the case for mysticetes, masking from a narrowband source, such as NPAL, may be incomplete. Moreover, the relatively short transmission times and low duty cycle mean that the source only would mask sounds for brief periods; sounds longer than this would not be completely masked (e.g., a ship approaching from a distance). Therefore, in light of the number of mysticetes that may be exposed and the relatively brief and intermittent nature of the NPAL source transmissions, masking effects are uncertain, but presumed to be minor for both alternatives.

Based on studies of high frequency echolocation by toothed whales, echolocation signals are subject to masking by high frequency noises. However, echolocation would not be masked by most industrial noises (or NPAL sound transmissions), which tend to be concentrated at low frequencies. Significant masking only occurs for frequencies similar to those of the masking noise (Richardson et al., 1991).

Studies on captive odontocetes by Au et al. (1974, 1985) indicated that some species may use various processes to reduce masking effects (e.g., adjustments in echolocation signal intensity and/or frequency as a function of background noise). However, since echolocation and communication signals are of higher frequencies, they will not be masked by noises that are concentrated at low frequencies.

Although low frequency hearing has not been studied in many odontocete species, those species that have been tested (white whale, killer whale, false killer whale, and bottlenose dolphin) exhibit low audiometric and behavioral sensitivity to low frequency sound. It is not clear whether sperm and pilot whale vocalizations were masked by the 1991 *Heard Island Feasibility Test* (HIFT) acoustic signals, or if those species simply stopped emitting sounds during the test (Bowles et al., 1994). Vocalization cessation would be expected with sperm whales because they frequently become silent in the presence of human-made noise (Watkins and Schevill, 1975; Watkins et al., 1985). Thus, for sounds dominated by low frequency components, the maximum radius of audibility for most odontocete species often may be determined by their hearing sensitivity, rather than the background noise level. It appears, therefore, that with the possible exception of the sperm and pilot whale *and bottlenose dolphins (see Figure 3.2-3 for summary of odontocete vocalizations)*, the potential for increased masking for any odontocete, as a result of the proposed sound transmissions, is expected to be minimal. 4-23

4.5.3 Cultural and Historical Resources

Under federal regulations implementing the National Historic Preservation Act, analysis of impacts is limited to certain potential effects on certain historic properties. See 16 USC 470 and 36 CFR §§ 800.1-800.16. Historic properties are defined as prehistoric or historic districts, sites, buildings, structures, or objects which are included in, or eligible for inclusion in the National Register of Historic Places. It also includes properties of traditional religious and cultural importance to Native Hawaiians that meet the National Registry criteria. The potential effects in question are those which would alter the characteristics of the historic property that qualify the property for inclusion in the National Register. An adverse effect would occur, for example, where the activity would involve demolition, destruction, relocation, or alteration of a historic property.

As described in Section 3.3.6, a literature and archival review was performed for the proposed project area off the north shore of Kauai and off Midway Atoll. No impacts to prehistoric or historic sites, cultural resources, structures or objects included in or eligible for inclusion in the National Register are anticipated.

Some shipwrecks are recorded in the general vicinity of the north Kauai offshore area and in the vicinity of Midway Atoll (see Section 3.3.6). The precise locations of most of these are unknown. However, the immediate area of the Kauai source site has been thoroughly studied and no shipwrecks are located within at least 10 km (5.4 nm) radius. Baseline analysis of the Midway Atoll site alternative also reveals no known shipwrecks within at least a 10 km (5.4 nm) radius.

ONR has also considered the possibility that the proposed activity could affect a historic property of traditional cultural or religious importance to Native Hawaiians. However, no such properties were identified in the area potentially affected by the project. See Section 6.2.3.

ONR has also considered the question of whether the proposed activity could affect cultural practices of the community or state. No such potentially affected practices were identified during scoping or review of the draft EIS. The issue of whether traditional practices associated with fishing could be affected was considered. As set forth in sections 4.2.1.2.3 and 4.3.1, the evidence does not support a conclusion that there would be such an effect. 4-24

4.5.11 Unavoidable Adverse Effects; Unresolved Issues

As set forth in Chapter 4, the proposed project and monitoring are not anticipated to result in adverse effects on biological resources. This conclusion is based in part upon the available information regarding the marine animal species that could potentially be affected, which is analyzed extensively in Chapter 4. It is further known that the animals that may be exposed to the project source sounds are currently exposed to noise sources of comparable or greater intensity, particularly from commercial shipping and recreational boating. The importance of potential effects on biological resources is also limited by the temporary nature of the proposed experimental activities, which would span at most a five-year period of transmissions, and the limited duty cycle of the source (on only 2% of the time, off the remaining 98%, for most of the experimental period).

There are no other material adverse impacts of the proposed project.

The principal unresolved issue presented by the proposed project is the degree to which LF, subsea sounds could potentially affect marine animals over the long-term *(NRC 1994, 1996, 2000).* Results from the California and Hawaii ATOC MMRPs, which occurred over a time period of two years, are summarized in Chapters 1 and 4. All of the effects detected by the MMRPs were subtle, of short duration, and found only after intensive statistical analyses. Bioacoustic experts concluded that these subtle effects would not adversely impact the survival of an individual whale or the status of the North Pacific humpback whale population (Frankel and Clark, ~~1999~~*2000*). The proposed project is reuse of the sound source and cable for an additional five years of transmissions. This EIS acknowledges that the current level of knowledge on potential long-term effects is relatively sparse. Chapter 4 summarizes the scientific evidence relevant to this issue and evaluates potential long-term impacts based upon the ATOC MMRPs data and, when necessary, reasonable extrapolations from that data. 4-25

The project itself is intended to fill information gaps and reduce uncertainty concerning the possible long-term effects of low frequency sounds on marine animals. The benefits of the proposed project could not be fully realized by any of the other alternatives proposed.

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5 MITIGATION AND MONITORING

5.2 MONITORING TO PREVENT LONG-TERM EFFECTS TO MARINE ANIMALS

The following monitoring measures to prevent adverse changes in distribution and abundance to marine animals would be conducted as a component of the proposed action:

Monitoring Measure 1: The focus of the Marine Mammal Monitoring Studies is to advance the understanding of the potential for long-term effects of man-made sound on marine mammals by monitoring the distribution and abundance of marine mammals in the vicinity of the sound source.

~~The Marine Mammal Monitoring Studies element of the proposed action is designed to advance the understanding of the potential for long-term effects of the sound transmissions on marine life through the conduct of aerial surveys in the vicinity of the sound source. Thus, ONR would seek answers to the most important scientific issues surrounding potential long-term effects: animal abundances and distribution. A total of four aerial surveys would be conducted during each humpback whale season. The Marine Mammal Monitoring Studies would have four components:~~ 5-1

- ~~data analysis: NPAL abundance and distribution data would be statistically analyzed and compared with those data collected during the Kauai ATOC Marine Mammal Research Program (MMRP);~~
- ~~data reporting: NPAL aerial survey results, data compilations and findings would be published in reports (documents and/or electronic versions);~~
- ~~data sharing: ONR/Scripps would make all published reports available in the public domain. Information from the Marine Mammal Monitoring Studies would be provided annually to NMFS for review; and~~
- ~~data monitoring: Marine mammal stranding data in Hawaii would be monitored for any long-term trends.~~

During the years 1993-98, aerial surveys of marine mammals resident in the waters surrounding Kauai were performed as part of the ATOC Marine Mammal Research Program (ATOC MMRP), with focus on endangered humpback whales. Data were collected during the humpback winter breeding season (Feb-Apr) for a total of three baseline years when the Kauai ATOC source was not transmitting (1993, 1994, and 1995) and for one year when it was transmitting (1998). An additional year of baseline surveys was conducted in the area off the north shore of Kauai during the 2001 humpback winter breeding season.

In order to maintain a basis of comparison with previous Kauai surveys, the proposed survey protocol would follow the protocol used in the earlier 1993-98 surveys (Mobley et al., 1999b). North-south tracklines spaced 7 nm apart would be projected within a 40-km radius of the ATOC *source (Figure 5-1, Tracklines Used During the 1998 ATOC MMRP Aerial Surveys). One or two additional lines spaced 3.5 nm apart would be added in the immediate vicinity of the Kauai source. Sightings of all marine mammal and sea turtle species would be made by two experienced observers, one on each side of the aircraft. Sightings would be called to a data recorder who would note the species sighted, number of individuals, presence of absence of a calf, angle to the sighting, and any apparent reaction to the aircraft. Additionally, GPS locations and altitude (measured by a radar altimeter) would be automatically recorded at 30-sec intervals and whenever a sighting is made.*

The NPAL project proposes to conduct eight surveys from February through early April. The surveys would be scheduled eight days apart to match the NPAL transmission schedule. Based on an average of seven humpback sightings per survey observed during the 1998 season, and assuming a moderate sized effect due to the NPAL transmissions, eight surveys should produce a minimum of 56 sightings of humpback whales, which would result in an estimated power of .80 (i.e., there would be an 80% probability of detecting a change in distribution if an effect is present) (Welkowitz et al. 1991). The estimate of 56 sightings is presumed to be a minimum, given previously reported evidence that the Hawaiian wintering population of humpback whales is increasing (Mobley et al., 1999a;1999c).

As described in detail in Chapter 1, the purpose of the Marine Mammal Monitoring and Studies is to conduct studies on the possible long-term effects from sound transmissions on marine life. Annual reports of the results obtained would include numbers and locations of all marine mammal and sea turtle sightings. The annual report would be submitted to NMFS as part of the LOA permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the HIHWNMS. For humpback whales, any apparent avoidance reactions in response to the NPAL source would be assessed by examining distance from the source to each sighting as well as distance offshore, based on GPS position data.

The Marine Mammal Monitoring and Studies would also continue to monitor for acute, short-term effects, even though none were observed during the ATOC MMRP. Visual aerial surveys are capable of detecting the following acute or short-term effects:

- *Animal dead or disabled (primary capability)*
- *Increase in number of beached animals (potential/limited capability)*
- *Increase in number of animals struck by vessels (potential/limited capability)*
- *Repeated/prolonged activity (blowing, time on surface, etc.) (potential/limited capability)*
- *Abnormal number of animals present/absent (primary capability)*
- *Abnormal mother-calf activity (potential/limited capability)*

If at any time a Marine Mammal Monitoring and Studies team member positively identifies the occurrence of an acute or short-term effect, the information would be immediately communicated to the Marine Mammal Monitoring and Studies leader (Dr. J. Mobley, University of Hawaii). If the leader ascertains that an acoustic transmission (i.e., during the 5-min ramp-up or the 20-min transmission) coincided with the observed effect, he would contact the Barking

Sands shore termination site and Scripps, and suspend source operations immediately until further notice. The leader would collate all pertinent information relative to the incident and contact NMFS to inform them of the situation. NMFS, in consultation with the leader, would make the determination as to the severity of the situation, based upon the knowledge of the species type, the animal's location relative to the source, the source level at the time of the incident, the estimated received level at the animal, whether there were any other noise sources in the vicinity, etc. Based upon analysis of the information supplied, NMFS would recommend that one of the following options be executed:

- *Continue experiment as planned;*
- *Continue experiment with modifications to maximum source level or duty cycle; or*
- *Suspend experiment pending consultation with NMFS*

Regardless of the decision, within 24 hours, a written summary of the incident would be forwarded to ONR, Scripps, and NMFS.

Monitoring Measure 2: Monitor marine mammal stranding data.

Coordination with the local marine mammal stranding network would be conducted to detect any long-term trends.

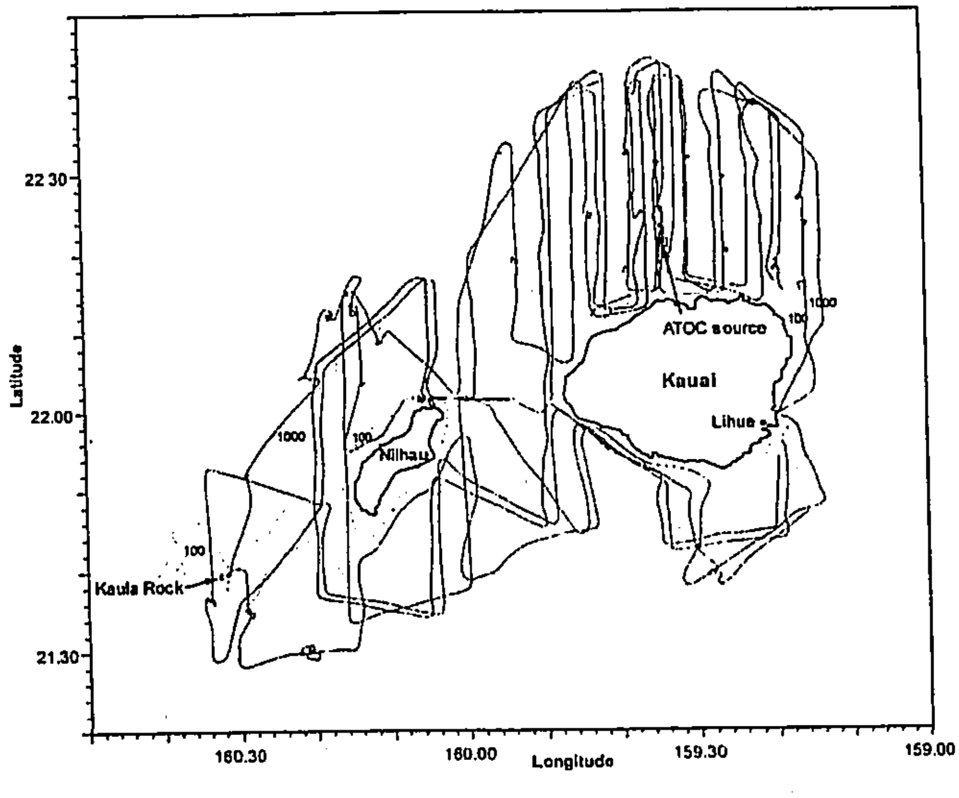

Figure 5-1 Tracklines Used During the 1998 ATOC MMRP Aerial Surveys
North-south tracklines were placed 13 km apart to cover a 40-km radius around the ATOC source. Tracklines for the Marine Mammal Monitoring and Studies for the NPAL project would be based on the same design as shown here.

6 RELATIONSHIP OF THE PROPOSED ACTION TO FEDERAL, STATE AND LOCAL PLANS, POLICIES AND CONTROLS

6.1.2 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA, 16 U.S.C. 1361-1421h) places a moratorium on the taking of marine mammals, without authorization. The term "take" means to harass, hunt, capture or kill, or attempt to harass, hunt capture or kill any marine mammal. The statute also defines the term "harassment" to mean any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering. (16 U.S.C. 1362) Results of the ATOC Marine Mammal Research Programs (see Sections 1.2.2 and 4.2.1.2.1) indicated only subtle effects after intensive statistical analysis. Although the suggested effects do not support ~~a~~ *the need to* request ~~for~~ a *LOA because they do not indicate a biologically significant behavioral response,* ~~ONR/~~Scripps, in coordination with the National Marine Fisheries Service (NMFS), ~~have~~ *has* decided to pursue a letter of authorization (LOA) for incidental taking by harassment because of: the level of controversy associated with NPAL; past history associated with the ATOC effort and Kauai ATOC EIS; and public interest in the state of Hawaii. 6-1

Section 1371(a)(5) directs the Secretary of Commerce to allow, upon request, the incidental (but not intentional) taking by harassment of small numbers of marine mammals by U.S. citizens who engage in a specified activity (exclusive of commercial fishing) if criteria are met. The taking must (1) have only a negligible impact on the species or stock(s) and (2) not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. Before issuing a letter of authorization (LOA) for incidental harassment, the Secretary must issue regulations setting forth the permissible methods of taking and the requirements for monitoring and reporting any taking.

Following publication of the DEIS, Scripps ~~will~~ petition*ed* the Secretary for adoption of necessary regulations and appl*ied*~~y~~ for an LOA to take marine mammals incidentally through operation of the Kauai sound source. 6-2

6.1.3 Endangered Species Act

The Endangered Species Act (ESA, 16 USC §§ 1531-1543) protects wildlife species, including marine mammals and fish, which have been listed as threatened or endangered. Such species cannot be "taken" in United States waters or upon the high seas by anyone subject to United States jurisdiction unless authorization has been obtained under the ESA.

The ESA defines "take" to mean harass, harm, pursue, hunt, shoot, impound, kill, trap, capture, or collect, or attempt any such conduct. "Harass" is defined by regulation to mean an intentional or negligent act or omission which creates the likelihood of injury to wildlife, annoying it to such an extent as to significantly disrupt normal behavior patterns including, but not limited to, breeding, feeding, or sheltering. 50 CFR § 17.3.

The Kauai sound source is located in an area inhabited by species that have been listed as threatened or endangered under the ESA. Continued operation of this sound source would allow continued transmission of acoustic signals in the water column that could cause behavioral reactions by listed species. Because such reactions could come within the ESA definition of "take," the proposed action is subject to provisions of the Act.

The ESA applies to the proposed project in two separate respects. First is the interagency consultation process of § 7 of the Act. Under § 7, federal agencies must consult with the responsible wildlife agency, U.S. Fish and Wildlife Service and/or NMFS, on actions that may affect the existence of threatened or endangered species or adversely modify their critical habitat. In this instance, through discussions with the concerned agencies, it has been learned that all potentially affected species are under the authority of NMFS, either directly or through cooperative procedures with USFWS.

In preparation for the consultation process, NMFS has been requested to provide compilations of listed, proposed, and candidate threatened and endangered species within that agency's cognizance, including their known temporal and spatial movements, and compilations of designated or proposed critical habitats of these species (see Appendix B).

The~~This~~ DEIS ~~will~~ serve*d* as the basis for development of a Biological Assessment, which is the required foundation for § 7 consultation. Upon completion of the DEIS and the filing of notice in the Federal Register, ~~if the project has been approved by ONR,~~ consultation in accordance with § 7 *was* ~~will be~~ requested. Following consultation, NMFS ~~will~~ issue*d* its ~~findings on the question of whether~~*Biological Opinion on April 26, 2001, concluding that* the proposed action *is not* ~~would be~~ likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. 6-3

The ESA also applies to the proposed project through the statute's *provisions for authorization of* ~~requirement for a permit for~~ incidental taking of listed species. Such ~~permits are~~ ~~*authorized*~~*authorizations are available* where any taking is incidental to, and not the purpose of, a lawful activity and adequate provision is made for minimizing and mitigating impacts. A conservation plan is required in conjunction with review of the *request for authorization.* ~~permit application.~~

With respect to marine mammals, where NMFS conducts review under the previously described MMPA letter of authorization and ESA § 7 consultation processes, NMFS also carries out the ESA incidental take review. Similarly, because of overlapping jurisdiction with USFWS, NMFS carries out review of proposals involving listed sea turtles.

6.2.1 Conservation District Use Authorization: DLNR

Chapter 183C, Hawaii Revised Statutes (HRS), establishes a permit program within the Department of Land and Natural Resources (DLNR) for use of "state marine waters." The statute defines that term as waters "extending from the upper reaches of the wash of the waves on shore seaward to the limit of the state's police power and management authority, including the United States territorial sea." (HRS § 190-1.5.) The geographic extent of state marine waters has been subject to debate. State jurisdiction as recognized by the federal government extends to three nautical miles. For certain purposes of international law, the U.S. territorial sea has been extended by executive order to 12 nm. The U.S. Exclusive Economic Zone extends seaward to 200 nm. The effect of these factors on claims regarding the state jurisdiction seaward of the islands remains unresolved.

The sound source and portions of the power supply cable lie seaward of the three-mile sea. Apart from considerations concerning geographic jurisdiction, and in recognition of the State of Hawaii's interest in the full range of the project's activities, the application for a conservation district use permit (CDUP) has included information on the entire complement of facilities proposed to be used.

Scripps' CDUP application seeks DLNR approval for continued use of the power supply cable for the five-year duration of the NPAL research. The application also requests authorization to leave the cable in place at the conclusion of the NPAL research.

Approximately 37 km (20 nm) of the cable lie within the three-mile sea and within the Resource Subzone of the Conservation District. Under DLNR regulations, the Resource Subzone objective is "to develop, with proper management, areas to ensure sustained use of the natural resources of those areas..."Hawaii Administrative Rules (HAR) § 13-5-13. Under HAR §§ 13-5-22 - 24, relevant identified land uses in the subzone are:

- Data collection, research, education, and resource evaluation which does not involve a land use, which involves a land use with incidental disturbance from installation of equipment (e.g., rain gauges or meteorological towers), or involves a land use causing ground disturbances (e.g., exploratory wells)
- Aquaculture
- Artificial reefs
- Astronomy facilities
- Marine construction, dredging, filling on submerged lands
- Mining and extraction
- Moorings and aids to navigation

- Public purpose uses by the State of Hawaii or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district

- Transportation systems, public utility transmission facilities, and other such land uses undertaken by non-governmental entitles which benefit the public and are consistent with the purpose of the conservation district

- Sanctuaries

- Demolition, removal, alteration of existing structures, facilities, equipment

- Operations, repair, maintenance, or renovation of existing facilities or equipment which are different from the original permit

Decision on the application will be made by the Board of Land and Natural Resources (Board). To approve the application, the Board must find the project consistent with the criteria noted in the Administrative Rules 13-5-30C.

Several of the identified land uses provide the Board with the foundation for a finding of consistency. The proposed project involves data collection, research, education, and resource evaluation and is designed to serve important public purposes through advancement of research on global climate change, underwater acoustics, and marine mammals. Given its sponsorship by a federal agency and participation by representatives of the University of Hawaii, this project may also qualify as a "public purpose" use. The proposal would use the seabed lands to transmit electric power for a use beneficial to the public. Further, the proposal is to use an existing facility, the cable, for a proposed project different from the project covered by the earlier CDUP.

For approval of the application, the Board must also find that: (1) the applicant has the capacity to carry out the entire project, and (2) the proposed project is clearly in the public interest upon consideration of the overall economic, social, and environmental impacts. Applicant Scripps is a part of the University of California. Scripps has demonstrated its capacity to carry out the NPAL project through successful completion of the previous ATOC research projects in California and Hawaii as well as numerous other research projects in locations around the world. Grant funding for this project is provided by ONR. The public interest values of the NPAL research objectives have been discussed previously (See Chapter 4). No economic or social impacts have been identified from the continued use of state seabed lands for the sound source power cable. Approximately five years of MMRP studies in connection with the California and Hawaii ATOC projects has shown no adverse impacts on marine mammals. Environmental impacts directly attributable to the cable would be diminished if the cable were abandoned in place, as requested, rather than removed from the seafloor. (See Section 4.1.1.1.) For these reasons, the Board could find, upon consideration of the overall economic, social, and environmental impacts of the proposed project, that it is in the public interest.

Condition 7 of the ATOC Project CDUP requires removal of the cable after termination of the project (extended by permit amendment to September 30, 2001). Because the NPAL Preferred Alternative would abandon the cable in place after conclusion of the research, the Board may choose to consider the proposal under HAR § 13-5-42, which provides for a deviation from any condition of a Conservation District Use Permit only when the proposal is supported b a satisfactory written justification covering four standards. The EIS sets forth the information called for by each of these standards, as follows. 6-4

(1) The deviation is necessary because of the lack of practical alternatives. The presence of the cable on the seabed much longer than originally contemplated, the new information concerning environmental damage from removal of the cable, and the intervening presence of sensitive Navy facilities overlying the ATOC cable have eliminated removal of the cable as a practical alternative. Sections 2.1.1.1 and 4.1.1.1.

(2) The deviation shall not result in any substantial adverse impacts to natural resources. Section 2.1.1.1 provides information on the cable and the natural resources along its route and concludes that, if left on the seafloor, the cable would have no effect on the benthic environment. However, Sections 2.1.1.1 and 4.1.1.1 indicate that removal of the cable could have adverse impacts to natural resources.

(3) The deviation does not conflict with the objective of the subzone. The objective of the Resource Subzone, where the relevant portion of the cable is located, is "to develop, with proper management, areas to ensure sustained use of the natural resources of those area...." Given the benign nature of the cable resting on the seabed (Section 2.1.1.1), the proposed use of these lands for this purpose and to enable the proposed scientific research is consistent with the subzone's objective.

(4) The deviation is not inconsistent with the public health, safety, or welfare. Information and analysis in Sections 2.1.1.1 and 4.1.1.1 demonstrate that abandoning the cable in place would meet this standard.

This EIS and supplementary information provided to DLNR in conjunction with the permit application provide the foundation for substantive evaluation of the project by DLNR staff and the Board. Permit application review and action by the Board will bring together input from other state and local agencies with authority relevant to the project. A public hearing on the application will provide a forum for the Board to consider additional testimony by interested public participants before taking action on the application.

In conjunction with the CDUP application, Scripps has also requested Board approval of an appropriate disposition of the seabed lands underlying the cable to enable abandonment of the cable after completion of the NPAL research. HRS Chapter 171 makes provision for disposition of public lands through lease, license, easement, permit, or sale.

Applying provisions of Chapter 171 in connection with several recently approved CDUPs for permanent installation of cables on state subterranean and seabed lands in the Resource Subzone, the Board has authorized the following dispositions: (i) a perpetual, non-exclusive easement for use of 9.1 acres of land at, and offshore of Spencer Beach Park, Hawaii (CDUP HA-2903, transpacific submarine fiber optic telecommunications system [Southern Cross Cable Network], GTE Hawaiian Telehone International); (ii) an easement and a construction right-of-entry for installation on lands at, and offshore of Kahe Beach, Oahu (CDUP OA 2949, Southern Cross Cable Network, GTE.) In another recent similar decision, on CDUP OA-2938 for AT&T Corporation's Japan-U.S. Cable Network, the Board approved installation of cable at, and offshore of Makaha Beach Park, Oahu, using existing easements for telecommunications cables. In that case, the DLNR staff reported that after investigationit had confirmed that issuance of direct, non-exclusive easements for cable systems on public lands is the most efficient and economically productive land disposition. In contrast, the issuance of leases for public lands requires prior approval from the Governor and the Legislature, and in some cases, a public auction is required.

If the NPAL project application is approved by the Board, the approval will also include the Board's determination as to the appropriate disposition of the seabed lands.

6.2.2 Coastal Zone Management Program: Federal Consistency Review

Hawaii's Coastal Zone Management Program (CZMP) has been approved by the Secretary of Commerce under the Federal Coastal Zone Management Act of 1972. The State thus has authority under the Act, as described in Section 1.3.7, to review federal permit activities conducted within or outside the state's designated coastal zone which affect land or water use or natural resources of the coastal zone. State review of consistency submittals is carried out by Hawaii's designated coastal management agency, the State Office of Planning, within the Department of Business, Economic Development, and Tourism.

The Hawaii CZMP lists permits and licenses under the MMPA as a category of authorization likely to affect the coastal zone and subject to consistency review. Consequently, in connection with its application to NMFS for incidental harassment authorization under the MMPA, Scripps has prepared and will submit to the state Office of Planning a certification of the consistency of the proposed project (Preferred Alternative) with the Hawaii CZMP.

In connection with the original ATOC study, a consistency certification was submitted by Scripps and reviewed by the State. The State's concurrence in that certification anticipated that all ATOC facilities would be removed at the end of the experiment. The current project proposes leaving the cable and possibly the sound source on the seabed. State Office of Planning concurrence with the new consistency certification, in effect, would modify the State's previous consistency action.

Scripps' certification of consistency for the NPAL project (Preferred Alternative) is supported by the information and analysis provided in this ~~draft~~ EIS. The ~~draft~~ EIS contains a detailed description of the proposed project, as well as information and analysis on impacts, mitigation measures incorporated into the project, and project alternatives. The EIS also contains information on the results of the original ATOC feasibility study and the Marine Mammal Research Program which was carried out in conjunction with the ATOC project. 6-5

Scripps ~~has~~ prepared and ~~plans to~~ submit*ted* a certification of the project's consistency with the Hawaii Coastal Zone Management Plan to the Hawaii Office of Planning, Department of Business Economic Development and Tourism. This certification is supported primarily by the information and analysis contained in this ~~D~~EIS. The objectives and policies of the Hawaii CZMP are stated at HRS section 205A-2. In addition, the CZMP incorporates the Hawaii Ocean Resources Management Plan, which provides a policy framework for State management of ocean and coastal uses and resources. Relevant portions of the Hawaii CZMP and related information and analysis appear below.

Managing Development

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

This objective and its implementing policies focus on the development review process, seeking to utilize law in managing coastal zone development, to facilitate timely processing, and to understandably communicate development impacts to the public.

The consistency review process is being carried out concurrently with other environmental review processes applicable to the project. These are the LOA application review by NMFS under the MMPA, ESA § 7 consultation by NMFS, and CDUP review by the Hawaii DLNR. The key environmental information and analysis for these processes are contained in this EIS. The EIS also serves as the basis for the federal consistency certification. Accordingly, the requirements of the other relevant environmental laws are integrated into the analysis under the state and federal coastal zone management authorities.

Other aspects of the regulatory review process began in the early stages of project planning. ONR and Scripps representatives first consulted with NMFS concerning this project in April, 1999. Over the next few months, informal consultation with concerned state and federal agencies was carried out. The Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on June 15, 1999. Public hearings on the proposed project were held at Hanalei, Kauai (June 29, 1999); Lihue, Kauai (June 30, 1999); and Honolulu (July 1, 1999). After submission of a permit application to DLNR, an EIS Preparation Notice was published in the Hawaii OEQC Bulletin of August 8, 1999. Comments from the public received by mail and at the hearings are reviewed and addressed in ~~this~~ *the* draft EIS. *Following completion of the draft EIS, a Notice of Availability (NOA) was published in the Federal Register on June 2, 2000, and in the Hawaii Office of Environmental Quality Control* 6-6

Bulletin on June 5, 2000. Public hearings on the DEIS were held at Lihue, Kauai (July 5, 2000); Honolulu (July 6, 2000); and Kilauea, Kauai (July 8, 2000). Comments from the public received by mail and at the hearings are reviewed and addressed in the final EIS.

Through these means, timely and understandable information has been provided to the public about possible project impacts, consistent with these provisions of the CZMP.

6.2.3 Historic Resources Preservation *and Cultural Practices* 6-7

The State's historic resources preservation program is carried out by the Division of Historic Resources Preservation within DLNR. The Division has advised that it has no record of shipwrecks or other possible historic resources in marine waters around the islands. In connection with the ATOC project, program officials advised that they had no knowledge of historic resources in the vicinity of the proposed action. The Division gave notice that no field check was required because the Division believed that the ATOC project would have no effect on significant historic resources due to its offshore location (14.7 km [8 nm] offshore). In connection with the current proposal, the Division has been queried and has advised that no new information has been developed regarding possible historic resources in the area of the proposed project.

ONR and Scripps have also considered the effect of regulations implementing the National Historic Preservation Act, which were revised recently to increase protections for historic properties of traditional cultural or religious importance to Native Hawaiians. 36 CFR §§ 800.1-800.16. These procedures apply to federal undertakings which may cause effects on historic "properties" which meet specified criteria for inclusion in the National Register of Historic Places. The effects in question must be ones that alter the property's characteristics that qualify it for National Register eligibility. The procedures do not address broad, general areas or practices not connected with a specific historic property.

In considering these standards together with the nature of the proposed project, its impacts as discussed in this EIS, and its location in the open ocean nearly 8 nm north of Kauai, ONR and Scripps have determined that the proposed project does not have the potential to cause effects on any historic property. *Similarly, Scripps and ONR have concluded that there will be no effects upon community cultural practices which may be associated with marine species. The conclusion is based upon the location and nature of the project and upon the evidence, as cited in sections 4.2.1.2.1, 4.2.1.2.2, and 4.2.1.2.3, that the sound transmissions can be expected to have no significant effect upon marine mammals, fish, or other marine species.* 6-8 Nevertheless, opportunity has been provided for potentially interested Native Hawaiian groups to comment on the proposed project in the context of well publicized public scoping meetings in Hanalei and Lihue, Kauai, and in Honolulu. The Office of Hawaiian Affairs (OHA) was invited to comment early in the EIS preparation process and advised that it would reserve comments for the draft EIS. Copies of the draft EIS are being provided to OHA (Honolulu and Kauai offices) and the Hawaiian Civic Club of Kauai.

6.3 HUMPBACK WHALE RECOVERY PLAN

In 1991, NMFS approved a Recovery Plan for the endangered humpback whale. Under provisions of the ESA, recovery plans are prepared to foster and guide the recovery of species listed as endangered. The Recovery Plan is not a regulatory or management program. Instead, it recommends goals for recovery efforts and provides background information for decision-making affecting humpback whales.

The Recovery Plan recommends goals and actions for: (1) maintaining and enhancing the habitats of humpback whales; (2) identifying and reducing death, injury, or disturbance to the whales caused by humans; (3) performing research to evaluate progress toward recovery goals; and (4) implementing the Recovery Plan through improved administration and coordination.

The proposed project's consistency with these goals can be evaluated, in part, in light of the findings of the Marine Mammal Research Programs (MMRPs), which were conducted in connection with the previous California and Hawaii ATOC research projects. The MMRPs showed no incompatibility between the low frequency acoustic transmissions as used in the ATOC research and Recovery Plan objectives of reducing death, injury, and disturbance to humpback whales. MMRP monitoring showed no overt, short-term changes in the behavior of individual whales nor in the species' abundance or distribution. (See further discussion of MMRP findings at Sections 4.2.1.2.1 and of humpback whales at Section 3.2.)

The Marine Mammal Monitoring Studies proposed in connection with the current project would augment the MMRP information on humpback whales with a continued program of aerial surveys and data analysis. Principal objectives would be to monitor species distribution and abundance in areas potentially affected by the acoustic transmissions. The resulting information can be expected to further the Recovery Plan objective of research to evaluate progress toward recovery. Particularly relevant is Goal 3.5, calling for information on habitat use to determine management actions.

Several of the goals of the Recovery Plan require more information on the current acoustic regime of the humpback habitat. Goal 1.14 calls for detailed descriptions of physical and biological characteristics of current habitats, including "acoustic characteristics." Goal 1.3111 focuses on the need to reduce "noise disturbance" in Hawaiian waters; although it is hesitant about recommending additional noise research because of the expense and possible ambiguous results and, therefore, emphasizes reduction of human-produced underwater noise as more direct and cost-effective than additional research.

The proposed project would involve ~~short-term~~ *an* increase in underwater sound *on a 2-8 percent duty cycle* in the area. The change would be closely similar to the increase in underwater sound associated with the previous ATOC research and studied by the MMRP. Intensive statistical analyses through the MMRP revealed some subtle changes in the behavior of humpback whales in response to ATOC sound transmissions. The study results showed that the distance and time between successive whale surfacings increased slightly with increasing sound levels. (See Section 6-9

4.2.1.2.1.) Whether this subtle effect may constitute a "noise disturbance" within the contemplation of the Recovery Plan Goal 1.3111 would appropriately be weighed in light of what is known about the potential effects of low frequency sound on humpbacks as well as the value of the Marine Mammal Monitoring research in providing information to assess more accurately the potential for impacts of noise and implement Goal 1.3111 to reduce noise disturbance in Hawaii. Consideration of this issue may also encompass comparative sound levels of noise-producing sources in the north Kauai area, including whale-watching vessels, recreational and commercial fishing power boats, thrillcraft, and low-flying aircraft.

The Recovery Plan also encourages public education about humpback whales and international cooperation in conserving the whale and its habitat. Goals include mutual exchange of information between nations (Goal 1.73), effective communications with groups interested in marine affairs (Goal 4.3), and increased public education (Goal 4.9). The Marine Mammal Monitoring Studies planned as part of the NPAL project further these goals by gathering and sharing of humpback distribution and abundance data.

APPENDIX H

ENDANGERED SPECIES ACT
SECTION 7 CONSULTATION
BIOLOGICAL OPINION

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ENDANGERED SPECIES ACT
SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: **Department of Defense, Office of Naval Research (ONR) and Marine Mammal Conservation Division, National Marine Fisheries Service**

Activity: **Funding of, and the Continued Use of, the Sound Source for the North Pacific Acoustic Laboratory off Kauai, Hawaii**

Issuance Regulations for a Small Take Authorization under the Marine Mammal Protection Act and for Incidental Take associated with the Continued Use of the Acoustic Thermometry of Ocean Climate Sound Source for the North Pacific Acoustic Laboratory off Kauai, Hawaii

Conducted by: **National Marine Fisheries Service, Southwest Region**

Approved by: Don Knowles

Date of Issuance: 4-26-01

ABSTRACT

To comply with the requirements of the Endangered Species Act of 1973, the National Marine Fisheries Service (NMFS) has prepared a biological opinion on a proposal by the Office of Naval Research to fund, and continue use of, the sound source for the North Pacific Acoustic Laboratory (NPAL) and a proposal by the NMFS' Marine Mammal Conservation Division to issue regulations for a small take authorization under the Marine Mammal Protection Act for the continued use of the sound source. Operation of the NPAL sound source would introduce low frequency sound into the marine environment for the purposes of studying acoustic thermometry and long-range propagation of low-frequency sounds. The portion of the North Pacific Ocean closest to the sound source would have the loudest addition of sounds from the transmissions, with the sounds attenuating to levels below ambient towards the receiving arrays.

The area under consideration in the biological opinion includes the North Pacific Ocean between the NPAL sound source and the receiving arrays used to detect the transmissions, pursuant to the definition of the action area in Interagency Consultation regulations (50 CFR 402.02). However, the area where effects on listed species would be detectable is in the vicinity of the NPAL source. There is no evidence that listed species, particularly the endangered baleen whales which are considered the most sensitive to low frequency sounds, can detect or respond to sounds that have dropped much below the level of ambient noise. The region from any sound source to the point at which sounds reach ambient levels is termed the zone of audibility (Richardson et al., 1995). Listed species would not likely be adversely affected by the NPAL transmissions outside the NPAL zone of audibility.

The potential effects of the transmissions were analyzed for the 25 endangered and threatened species that occur within the action area. The evidence available for this assessment of the effects of sound associated with the NPAL sound source on listed marine species is limited to information on the physics of low frequency sounds in the ocean environment and current, but limited, knowledge of how marine animals behaviorally respond to low frequency sound. The evidence available for the analyses includes results of studies of how marine mammals and other marine organisms respond, physically and behaviorally, to sound sources.

Based on information about the species' geographic distribution and hearing abilities of the listed species, NMFS concludes that the Steller sea lion (eastern and western populations) and listed salmonid species are not likely to be affected by continuation of NPAL sound source operation. Steller sea lions and the listed salmonids are located near the receiving arrays where the NPAL transmissions would be below ambient levels. Based on information on the hearing and diving abilities of the following listed sea turtles, the leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), loggerhead sea turtle (*Caretta caretta*), and olive ridley sea turtle (*Lepidochelys olivacea*) would not likely be adversely affected. These sea turtle species have an insensitive ear and would not likely be within an ensonified area that would elicit behavioral responses.

Based on published and unpublished studies, the NPAL transmissions may result in temporary alterations in communications or behavior of humpback whales (*Megaptera novaeangliae*) and sperm whales (*Physeter macrocephalus*). Response behaviors were observed by these species in the vicinity of the experimental sound sources during studies. Response behaviors include longer dive times of humpback whales during NPAL transmissions and distribution of sperm whales further away from an NPAL sound source when it was operating. The biological significance of these possible response behaviors is not known, but is not expected to affect the reproductive or survival capabilities of these species. There is also potential for blue (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), or right whales (*Eubalaena glacialis*) to experience short-term masking of communication or environmental sounds due to the NPAL transmissions. NPAL transmissions would also result in a low probability of effects to Hawaiian monk seals (*Monachus schauinslandi*), which are occasionally found around Kauai. Any adverse effects that may occur would not likely affect the reproduction and survival of these species and thus, would not result in reductions in numbers and reproduction of these species. Therefore, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of any endangered species or threatened species.

INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, et seq.) requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect a protected species, that agency is required to consult with either the National Marine Fisheries Service or the U.S. Fish and Wildlife Service, depending upon the protected species that may be affected. For the actions described in this document, the action agency is the Office of Naval Research of the Department of Defense and the Marine Mammal Conservation Division of NMFS.

This document constitutes NMFS' biological opinion on our review of the proposed continued use of the sound source off of Kauai, Hawaii, for the North Pacific Acoustic Laboratory's research efforts and the proposed rule for a small take authorization under the Marine Mammal Protection Act for incidental take associated with the sound source. This biological opinion has been prepared in accordance with section 7 of the ESA. It is based on information provided in the Draft Environmental Impact Statement, Biological Assessment, published and unpublished scientific information, and other sources of information. A complete administrative record for this consultation is on file at the NMFS Pacific Islands Area Office.

CONSULTATION HISTORY

On September 28, 1995, the National Marine Fisheries Service (NMFS) completed a section 7 consultation with the Advanced Research Projects Agency of the Department of Defense and the Permits and Documentation Division of the National Marine Fisheries Service for the Acoustic Thermometry of Ocean Climate (ATOC) sound source in Kauai, Hawaii, and the adjunct scientific research permit to examine the potential for effects on protected species from the operation of a sound source. The section 7 consultation assessed the Hawaii project of the Advanced Research Projects Agency ATOC proof of concept study and concluded that although there was the potential for some of the species to be affected by the sound source operation, the likelihood of any effect was low, and the extent of the effects would not jeopardize any listed species.

Two sound sources were installed for the ATOC feasibility study, one at Kauai and other on Pioneer Seamount off central California. The signals transmitted were received by receiving arrays spread over the North Pacific. The Pioneer source began transmitting in late 1995 and was turned off at the end of 1998. The other sound source and its power cable were installed on the sea floor at a depth of 807 m, 14 km north of Kaiehu Point, Kauai, Hawaii, and began transmissions in late 1997. In conjunction with the ATOC proof of concept study, ARPA funded a scientific research project called the Marine Mammal Research Program. The studies examined the potential effects of low frequency sound on marine mammals and sea turtles in waters off the island of Kauai and California.

The Marine Mammal Research Program was designed to study the reactions of cetacean species in the vicinity of the sound sources off California and Hawaii. In Hawaii, the humpback whale was chosen for study because it is presumed to have excellent low-frequency hearing sensitivity. If consistently obvious reactions were noted for the humpback whales, then studies of other species assumed to be less susceptible would be necessary. A variety of techniques were employed to study the behavior and distribution of humpback whales of Hawaii. Baseline studies were conducted around Kauai in 1993, 1994, and 1995 during conditions when the ATOC sound source was not operating. In 1996, playback studies were completed off the Island of Hawaii to test the responses of humpbacks to the source signal. In 1998, behavioral studies were conducted at the Kauai study site using the operational sound source. In these different efforts, humpback whale abundance and distribution was studied with two approaches. Aerial surveys were conducted to examine the statewide distribution of humpbacks and other marine animal species. Shore-based studies were conducted to assess the abundance and distribution of humpback whales in the nearshore waters, where whales are found most often (summary of the research program from Frankel and Clark, unpub. report). Similar studies were also conducted for the Pioneer Seamount sound source.

Neither the California nor the Hawaii Marine Mammal Research Program found any overt, short-term behavioral responses by marine mammals to the transmissions of the sound sources. Calambokidis et al. (1998) surveyed the waters in an 80 km by 80 km (43 nm by 43 nm) box centered on the California sound source, and Mobley et al. (1999a) surveyed the waters within 40 km (22 nm) of the Kauai sound source. Only humpback whales were seen in sufficient numbers in the survey area around the Kauai source to permit quantitative assessments of distributional changes from 1994 (when the source was off) to 1998 (when the source was on). The distance from each sighting to the sound source and the distance from each sighting to shore were computed, and the mean distances compared between the two years. The mean distance offshore and distance from the source were both slightly greater for humpback whales during 1998 (when the source was on); however, these differences were not significant. Statistical analyses of aerial survey data showed some subtle shifts in the distribution of humpback, and possibly sperm, whales away from the Pioneer Seamount source during transmission periods (Calambokidis et al. 1998). No statistically significant shifts in distribution were found for any other species of marine mammal. Visual observation data from the Kauai research program showed a similar small shift in mean distance of humpback whales away from the Kauai source during transmission periods.

On February 7, 2000, NMFS sent a letter to the Office of Naval Research responding to a request for a species list. The list included only the listed species that may occur within 8 nautical miles north of Kauai, Hawaii at the site of the sound source. The request for the species list asked for species in the area surrounding the sound source location. However, during the consultation NMFS determined that the area that needs to be considered is where direct and indirect effects may occur. The Office of Naval Research (ONR) requested formal consultation on the project in a letter dated June 23, 2000.

NMFS provided ONR a draft of the biological opinion on March 14, 2001. ONR transmitted comments on the biological opinion on March 21, 2001. The comments allowed for corrections to the description of the action and expressed concerns for the extent of the action area. NMFS provided another draft of the biological opinion on April 20, 2001 and a discussion on the action area and other issues was held on April 26, 2001.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTIONS

The U.S. Navy's Office of Naval Research proposes to fund the Scripps Institution of Oceanography (Scripps) and the Applied Physics Laboratory of the University of Washington to continue operating the sound source for the North Pacific Acoustic Laboratory (NPAL) program in Kauai, Hawaii. The purpose of the proposed action is to study the way sound behaves as it travels over long ranges in the ocean, and in studying ocean circulation and structure, is to increase fundamental understanding of the U.S. Navy's operating environment. Specifically, the action is designed to study (a) the feasibility and value of large-scale acoustic thermometry; (b) the behavior of long-range underwater sound transmissions; and (c) possible long-term effects from sound transmissions on marine life, particularly marine mammals.

In a separate, but related action, the National Marine Fisheries Service's Marine Mammal Conservation Division proposes to promulgate regulations that would allow Scripps and Applied Physics Laboratory a small take authorization pursuant to section 101(a)(5) of the Marine Mammal Protection Act (MMPA).

Operation of the NPAL Sound Source

In order to study the acoustic thermometry and long range propagation of sound transmissions, NPAL would transmit signals from the sound source located off of Kauai, Hawaii, and pick up the transmissions using receiving arrays. The receiving arrays are located in the North Pacific Ocean south of the Aleutian Islands and along the west coast of the continental United States, as well as other locations, as shown in Figure 1.

Under the proposed action, the seabed power cable and sound source would remain in their present locations at Kauai and transmissions would continue with approximately the same signal parameters and transmission schedule used in the previous ATOC project. The typical transmission schedule involves 20-minute transmissions every four hours (six total over the course of a day), every fourth day, with each transmission preceded by a 5-minute ramp-up period during which the signal intensity would be gradually increased, representing an average duty cycle of 2 percent. Duty cycles could be increased to 8 percent, during short-term testing or short-term long-range acoustic propagation studies. Increases to an 8 percent duty cycle would not occur during the peak humpback season, January through April. (ONR, 2000). The transmissions would continue for 5 years.

The NPAL signals transmitted by the source would have a center frequency of 75 Hertz (Hz) and a bandwidth of approximately 35 Hz (i.e., sound transmissions are in the frequency band of 57.5-92.5 Hz). Approximately 260 Watts of acoustic power would be radiated during transmission. At 1 meter (m) (3.3 feet) from the source, the sound intensity would be about 195 decibels (dB) referenced to the water

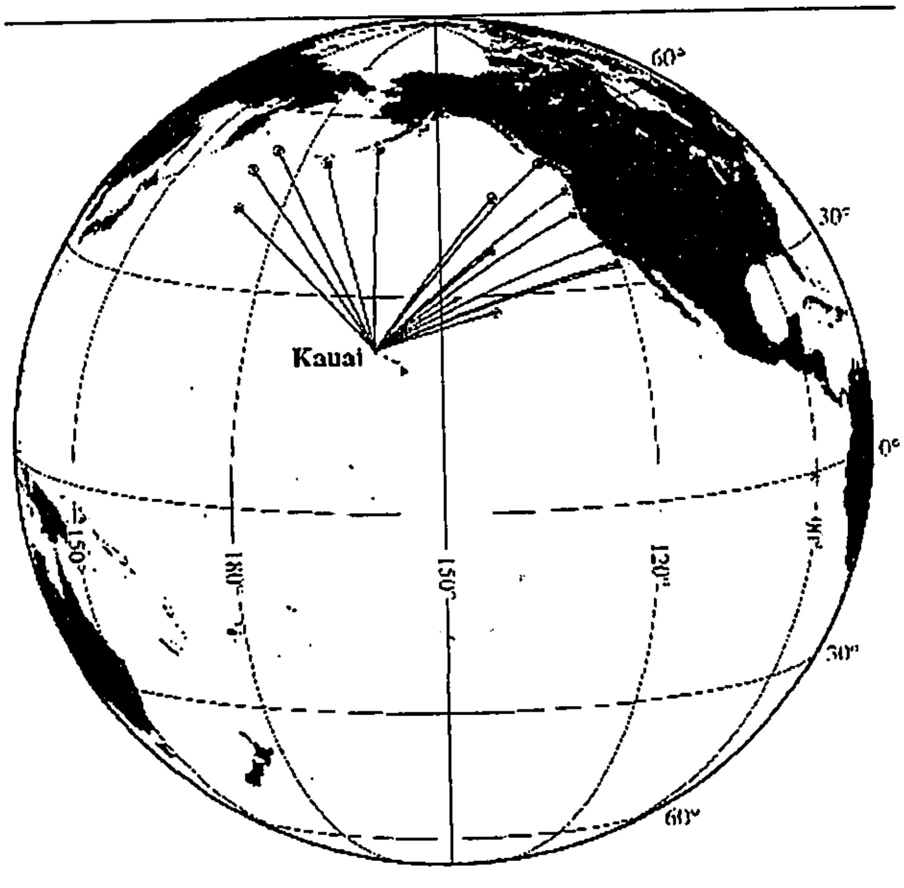

Figure 1. Location of ATOC source and receiving arrays

standard of 1 microPascal (μPa)[1]. The sound levels are reduced to 16-20 dB below ambient levels at the furthest receiving arrays. These signal parameters and source level were found in the ATOC project to provide adequate, but not excessive, signal-to-noise ratios at the receiver ranges of interest.

The source signal is a digital sequence of codes that has been optimized for decoding at the distant underwater receivers. The transmission length of 20 minutes is designed to spread the energy over time, at much lower levels, than if the signals were sent as short, loud pulses of the same total energy. Although the sounds cannot be heard in the usual sense over most of the transmission path or at the receivers, they are detected and timed using advanced digital signal processing techniques, similar to those used by NASA to retrieve data from deep space satellites. Weak but carefully constructed signals of long duration can be extracted from below-ambient noise levels. As a result, the waveform parameters minimize the received levels to which marine animals are exposed while optimizing reception. Results from the first phase of the ATOC feasibility study demonstrate that these source characteristics provide adequate, but not excessive, signal-to-noise ratios at the receiver ranges of interest.

To provide for short-term, long-range acoustic propagation studies, the proposed action includes the possibility of an 8 percent duty cycle for up to 2 months out of each year. The 8 percent duty cycle would not occur during the peak humpback season (January - April). The transmission schedule during the 2-month period would not include transmissions longer than 2 hours in duration. As an example, one possible 8 percent transmission schedule could include 20-minute transmissions at four hour intervals every day, instead of every fourth day. Another possible schedule would involve transmitting the 20-minute signal on the hour for 24 hours followed by 72 hours of no transmissions, repeated up to 15 times over the 2-month 8 percent duty cycle period.

The proposed action also has a component designed to investigate the possible effects of the operation of the sound on marine mammals and sea turtles. This part of the proposed action is called "marine mammal monitoring and studies". The objectives of the monitoring and studies are to advance the understanding of the potential for long-term effects from the acoustic transmissions on listed species, by performing aerial surveys to monitor the distribution, and abundance of marine animals in the vicinity of the sound source (ONR, 2000). The studies would involve 8 aerial surveys per year during the humpback whale winter breeding season. Not all of the methods for analyzing the results of the surveys have yet been determined. Boat-based surveys and on-shore observations would not be a part of the monitoring and studies. The aerial surveys will provide data to be analyzed in combination with survey data from 1993-1998. For this aspect of the monitoring and studies, the same protocol would be followed to maintain a consistent basis of comparison.

During the years 1993-98, aerial surveys of marine mammals resident in the waters surrounding Kauai were performed as part of the ATOC Marine Mammal Research Program, with a focus on humpback whales. Data were collected during the humpback winter breeding season (February - April) for a total of three baseline years when the Kauai ATOC source was not transmitting (1993, 1994, and 1995) and for one year when it was transmitting (1998). The survey followed north-south systematic lines spaced 14 nm apart in channel waters, 7 nm apart in major island regions, and 3.5 nm within a 40-km radius of the sound source (Mobley et al. 1999b).

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[1]Sound measurements can be expressed in two forms: intensity and pressure. The intensity of the sound is the average rate at which energy is transmitted through a unit area in a specified direction, expressed in Watts per square meter (W/m2). Acoustic intensity is rarely measured directly. Instead, when acousticians refer to intensities or powers, they derive it from ratios of pressures. To present sound measurements as ratios of pressures that can be compared to one another, a standard reference pressure needs to be used. The American National Standard and the international (metric) standard is to use 1 microPascal (μPa) as the reference pressure for underwater sound and 20 μPa as the reference pressure for airborne sound. All sound measurements presented in this biological opinion are with reference to 1 μPa.

In the proposed action, the monitoring and studies will include eight surveys from February through early April. The surveys would be scheduled eight days apart to match the NPAL transmission schedule. Based on an average of seven humpback sightings per survey observed during the 1998 season, and assuming a moderate sized effect due to the NPAL transmissions, eight surveys should produce a minimum of 56 sightings of humpback whales, which would result in an estimated power of 0.80 (i.e., there would be an 80 percent probability of detecting a change in distribution if an effect is present) (Welkowitz et al. 1991).

Sightings of all marine mammal and sea turtle species would be made by two experienced observers, one on each side of the aircraft. Sightings would be called to a person recording data who would note the species sighted, number of individuals, presence or absence of a calf, angle to the sighting, and any apparent reaction to the aircraft. Additionally, GPS locations and altitude (measured by a radar altimeter) would be automatically recorded at 30-sec intervals and whenever a sighting is made.

Data collected from proposed surveys would be analyzed with the past survey results to examine long-term population shifts in distribution and abundance. The aerial surveys may also be used to further study behavioral response of marine mammals and turtles. Methods for analyzing the results of the surveys will be developed. The following monitoring program elements are proposed:

1. Annual reports of the results obtained would include numbers and locations of all marine mammal and sea turtle sightings. The annual report would be submitted to NMFS as part of the Letter of Authorization permitting process, with copies submitted to the Hawaii Department of Land and Natural Resources and the Hawaiian Islands Humpback Whale National Marine Sanctuary.

2. For humpback whales, any apparent avoidance reactions in response to the NPAL source would be assessed by examining the distance from the source to each sighting as well as distance offshore, based on GPS position data.

3. Visual aerial surveys capable of detecting the following acute or short-term effects (the capability of the surveys to identify the effects are mentioned in parentheses):

    - Animal dead or disabled (primary capability)
    - Increase in number of beached animals (potential/limited capability)
    - Increase in number of animals struck by vessels (potential/limited capability)
    - Repeated/prolonged activity (blowing, time on surface, etc.) (potential/limited capability)
    - Abnormal number of animals present/absent (primary capability)
    - Abnormal mother-calf activity (potential/limited capability)

4. If at any time a marine mammal monitoring and studies team member positively identifies an acute or short-term effect, the information would be immediately communicated to the monitoring/studies leader. If the leader ascertains that an acoustic transmission (i.e., during the 5-minute ramp-up or the 20-minute transmission) coincided with the observed response, he would contact the Barking Sands shore termination site and Scripps, and suspend source operations immediately until further notice. The monitoring/studies leader would collate all pertinent information relative to the incident and contact NMFS to inform them of the situation. NMFS, in consultation with the leader, would make the determination as to the severity of the situation, based upon the knowledge of the species type, the animal's location relative to the source, the source level at the time of the incident, the estimated received level at the animal, and whether there were any other noise sources in the vicinity, etc. Based upon analysis of the information supplied, NMFS would recommend that one of the following options be executed:

    - Continue experiment as planned;

- Continue experiment with modifications to maximum source level or duty cycle; or
- Suspend experiment pending consultation with Scripps and NMFS.

5. At the conclusion of the five-year period, the seabed power cable would be abandoned in place. This would have the two-fold benefit of avoiding disturbances to sensitive military instrumentation in the vicinity and the benthic environment. The source or transducer would be abandoned in place as well, unless it appeared to still be in sufficiently good condition to warrant recovery. Since the proposed action includes abandoning the seabed power cable in place, there is no potential for physical impacts which are likely to affect listed species. Recovery of the sound source will require separate consultation as appropriate. This part of the proposed action is not considered further in this biological consultation.

Small Take Authorization

To ensure compliance with the MMPA, Scripps applied for a small take authorization under the MMPA for incidental take that may occur during operation of the NPAL source on May 21, 2000. Section 101(a)(5)(A) of the Marine Mammal Protection Act directs the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals if certain findings are made and regulations governing the take are issued. A notice of proposed rulemaking and a request for comments was published in the Federal Register on December 22, 2000 (65 FR 80815).

The regulations would authorize incidental take of the following listed marine mammals as well as other marine mammals: humpback whales, fin whales, blue whales, sperm whales, and Hawaiian monk seals. The proposed rule includes several mitigation measures: (a) operate at the minimum duty cycle necessary for conducting large-scale acoustic thermometry and long-range propagation objectives, (b) not increase its duty cycle for long-range propagation studies during the months of January through April, (c) operate at the minimum power level necessary for conducting large-scale acoustic thermometry and long-range propagation objectives, and (d) precede all transmissions from the acoustic source by a 5-minute ramp-up of the acoustic source's power.

The rules also include several requirements for monitoring and reporting. These are summarized as followed: (a) the holder of the small take authorization must notify the Southwest Regional Administrator at least 2 weeks prior to commencing monitoring activities, (b) the holder must conduct a minimum of eight surveys each year from February through early April in the area off the north shore of Kauai, Hawaii, (c) the holder must, through coordination with marine mammal stranding networks in Hawaii, monitor strandings of marine mammals to detect long-term trends in stranding and the potential relationship to the North Pacific Acoustic Laboratory acoustic source, (d) activities related to the monitoring described in (b) and (c), or in the Letter of Authorization issued under 50 CFR 216.106 and section 216.176 of the proposed rule may be conducted without the need for a separate scientific research permit, (e) at its discretion, NMFS may place an observer on any aircraft involved in marine mammal surveys in order to monitor the impact on marine mammals, (f) the holder must annually submit a report to the Office of Protected Resources, NMFS, no later than 120 days after the conclusion of humpback whale aerial survey monitoring program. This report must contain the results, if any, of coordination with coastal marine mammal stranding networks, (g) a final comprehensive report must be submitted to the Office Protected Resources, NMFS no later than 240 days after completion of the final year of the humpback whale aerial surveys.

As noted in the description of the NPAL operation and marine mammal monitoring and studies, these measures and requirements have been adopted into the proposed NPAL operation.

Action Area

The sound source and cable are located in offshore waters approximately 8 nm north of the island of Kauai, Hawaii. The receiving arrays are located generally along the northern and western rim of the North Pacific Ocean. Figure 2 shows the area over which the transmissions would travel. The action area includes the parts of the North Pacific Ocean between these devices and where direct and indirect effects may occur. Because of uncertainty regarding the sound transmissions, a more precise definition of the action area cannot be stated.

The portion of the action area nearest to the Kauai sound source will have the loudest addition of noise from operation of the NPAL sound source. Average ambient noise levels in the 60-90 Hz band offshore central Kauai can be 76-98 dB (with various degrees of shipping traffic) and are expected to be higher (~ 105 dB) when humpback whales are present. Noise generated by the NPAL source would diminish to 120 dB within an area bounded by 22°00' and 23°00' North latitude and 160°10' and 158°45' West longitude.

The received level from the NPAL source is not expected to exceed 137 dB at the water's surface anywhere in the vicinity of the sound source. The received level in the top 100 m has been measured to decrease to about 120 dB at 5 km (2.7 nm) shoreward of the source. The near-surface received level is predicted to decrease to about 120 dB at 7.5 km (4 nm) seaward of the source. Underwater sound levels in the immediate vicinity of the source are expected to be: 140 dB at 245 m depth (562 m range around the source); 145 dB at 491 m depth (316 m range around the source); 150 dB at 629 m depth (178 m range around the source); and 165 dB at 775 m depth (32 m range around the source (ONR 2000; Advanced Research Projects Agency and NMFS 1995) (See Figure 3).

STATUS OF THE SPECIES AND ENVIRONMENTAL BASELINE

NMFS has determined that the action being considered in this biological opinion may affect the following species and critical habitat provided protection under the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*; ESA):

Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaeangliae*	Endangered
Right whale	*Eubalaena glacialis*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Hawaiian monk seal	*Monachus schauinslandi*	Endangered

Critical habitat has been designated for the right whale in the Atlantic Ocean in Cape Cod Bay, Great South Channel, and off Georgia and Florida (50 CFR 226.203). NMFS concluded that the proposed action is not likely to affect this critical habitat because it is not included in the action area.

NMFS also recognizes that gray whales (*Eschrichtius robustus*) occur in the action area. Although gray whales were removed from the list of threatened and endangered species in 1994 (59 FR 31094), NMFS has a continuing obligation to monitor the status of this species. This biological opinion will not assess whether the proposed acoustic thermometry project plans are likely to jeopardize the continued existence of gray whales; however, this opinion will include a general assessment of the effects of the action on gray whales as part of NMFS' continuing responsibility to monitor the status of the species.

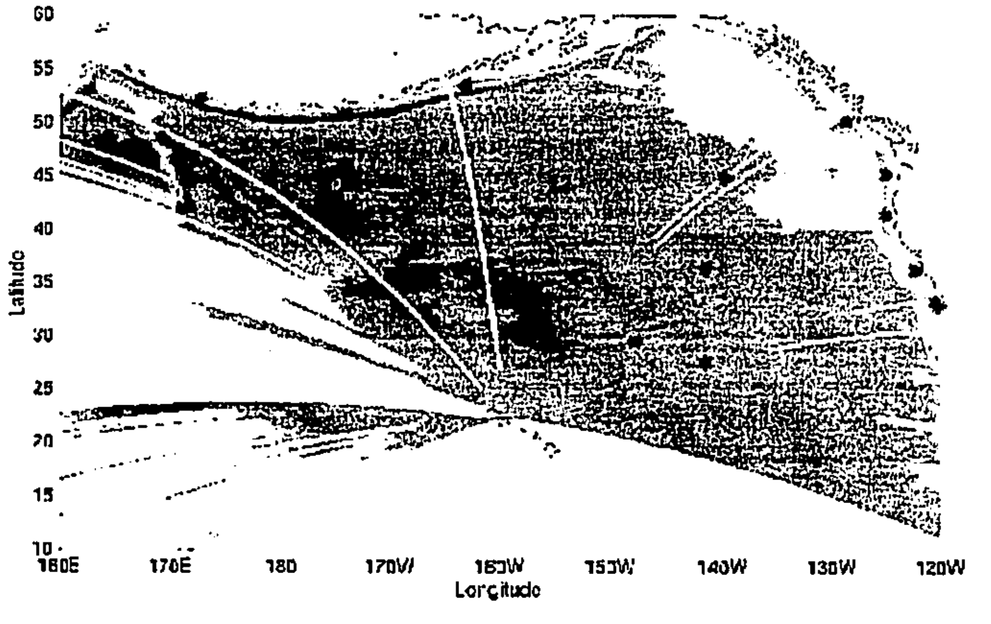

Figure 2. Kauai site shadow plot for bathymetric features 1000m below the sound channel axis (from the Draft Environmental Impact Statement for the North Pacific Acoustic Laboratory, 2000)

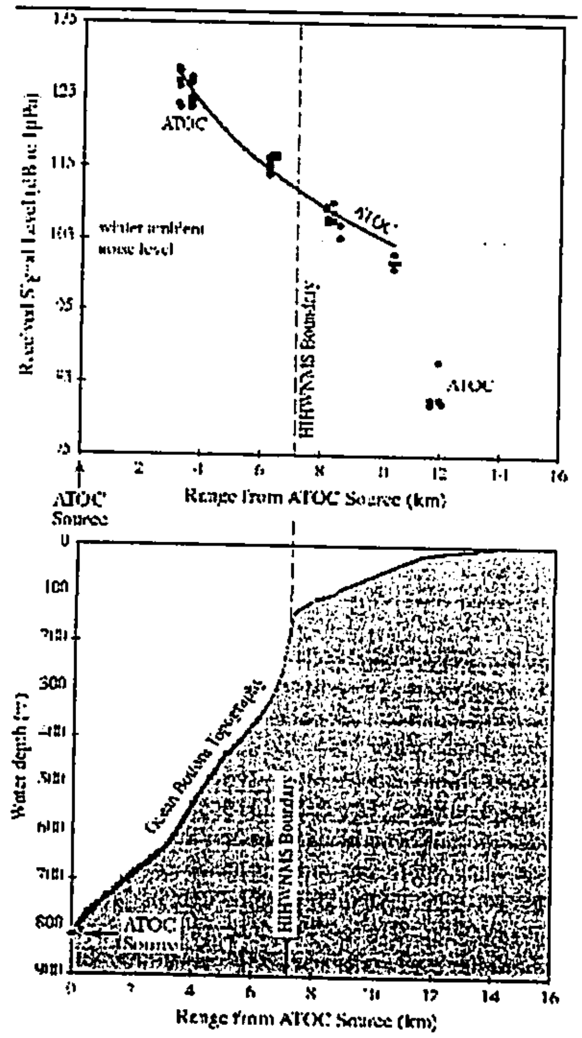

Figure 3. Measured received level as a function of range. The bathymetry underlying the measurements is shown (Frankel and Clark 2000). HIHWNMS refers to the Hawaiian Islands Humpback Whale National Marine Sanctuary

Species not discussed further in this opinion

The species listed below were also considered in this opinion. Brief explanations for why these species are not discussed further in this opinion are provided below.

Steller sea lion (western population)	*Eumetopias jubatus*	Endangered
Steller sea lion (eastern population)		Threatened
Chinook salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Lower Columbia River)		Threatened
Chinook salmon (Upper Columbia River Spring)		Endangered
Chinook salmon (Upper Willamette River)		Threatened
Chinook salmon (Snake River spring/summer)		Threatened
Chinook salmon (Snake River fall)		Threatened
Sockeye salmon (Snake River)	*Oncorhynchus nerka*	Endangered
Steelhead (Upper Columbia River)	*Oncorhynchus mykiss*	Endangered
Steelhead (Middle Columbia River)		Threatened
Steelhead (Lower Columbia River)		Threatened
Steelhead (Upper Willamette River)		Threatened
Steelhead (Snake River Basin)		Threatened
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Green sea turtle	*Chelonia mydas*	Endangered
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Loggerhead turtle	*Caretta caretta*	Threatened
Olive ridley turtle	*Lepidochelys olivacea*	Endangered

Marine habitat of the Steller sea lion (eastern and western populations) and designated critical habitat for this species also occur within the action area, towards the receiving arrays. Sea lions appear to use vocalizations as part of their social behavior and are able to hear well above and below water; however, there are no data on the response of sea lions to low frequency sounds. However, data from studies of the effects of low frequency sounds on elephant seals (*Mirounga* spp.), which are considered more sensitive to low frequency sounds than other pinnipeds (Croll et al. 1999, Kastak 1996, LeBoeuf and Peterson 1969), suggest that elephant seals did not experience short-term changes in behavior in response to low frequency sounds. Based on these data, Steller sea lions probably would not experience behavioral responses to the NPAL transmissions, which would be below ambient levels in their habitat. Further, sea lions generally have shallow dives (Gallo-Reynoso 1994, Reeves et al. 1992), which would protect them from exposure to the transmission. For these reasons, NMFS concludes that the NPAL source is not likely to affect these species or their designated critical habitat.

The evolutionarily significant units of chinook salmon, sockeye salmon, and steelhead listed above also occur within the action area. These anadromous salmon spend portions of their life cycle in freshwater streams, outside of the action area, and a portion in the Pacific Ocean. These species migrate to the Gulf of Alaska and other waters along the edges of the Pacific Ocean. Although salmon have been known to avoid loud, low frequency sounds (see Croll et al. 1999), NPAL signals in the areas occupied by salmon would be weak, at ambient or below-ambient levels. In addition, sound generated by the NPAL source will occur at depths much greater than depths used by salmon rearing in the North Pacific Ocean. The NPAL source will generate sounds 800 meters below the surface while salmon rearing in the ocean use depths less than 100 feet; this vertical separation would prevent salmon from being adversely affected by sounds generated by NPAL source. Any effects from the proposed action to the listed salmon is unlikely to occur. Thus, these species are not likely to be affected.

NMFS determined that several of the species listed above would not likely be adversely affected by the proposed NPAL source transmissions, based on the best scientific and commercial data available. Brief explanations for this determination are discussed below; these species are also not considered further in this opinion.

The following sea turtles were also initially considered for analyses in this consultation: leatherback turtle, green sea turtle, hawksbill sea turtle, loggerhead turtle, olive ridley sea turtle. Although, these species can hear low frequency sounds, such as the NPAL source, they have an insensitive ear. Specifically, the minimum sound turtles can hear is about 132 dB (Gentry, pers. comm., Ridgway et al. 1960, Barthol et al. 1999). Information on the behavioral response is limited. However, green sea turtles were observed to avoid passing through a sound barrier created by an array of air guns with a broad band spectrum of 20-1,000 Hz; received levels were 141-150 dB (O'Hara and Wilcox 1990). The probability that a sea turtle would be within an ensonified area that would elicit a behavioral response is low because most of the turtles make shallow dives (300 m dive observed for the olive ridley sea turtle). As for the leatherback sea turtles, which can dive to depths of 1000 m, the opportunity for a behavioral response is also considered to be low because 95% of their dives are less than 200 m deep, which would prevent their exposure to the NPAL transmission levels that could elicit a behavioral response. Sea turtles were not observed during the aerial surveys conducted during the research program, and the vicinity of the NPAL source is not known as an important feeding or breeding area for sea turtles. Thus, the sea turtles are not likely to be adversely affected by NPAL source transmissions.

Critical habitat has been designated for the Hawaiian monk seal in the Pacific Ocean. In May 1988, NMFS designated critical habitat for the Hawaiian monk seal out from shore to 20 fathoms in 10 areas of the Northwestern Hawaiian Islands. Critical habitat for these species includes "all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 20 fathoms around the following: Kure Atoll, Midway Islands, except Sand Island and its harbor, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island" (50 CFR 226.201). These areas would not be affected by the proposed action because the NPAL source transmits sounds to propagate in the deep sound channel. Designated critical habitat is not near the NPAL source. Thus, sound levels towards the surface (top 20 fathoms) would not be changed by the NPAL transmissions.

Species considered in this opinion

The following subsections are synopses of the current state of knowledge on the life history, distribution, and population trends of these species and that NMFS expects may be incidentally taken as a result of the proposed action. Information on the acoustic communication, diving behavior, and hearing ability of these species is also included to provide the background for the discussion of the effects of the action. In addition, the Status of the Species and the Environmental Baseline, typically two separate sections in a Biological Opinion, are combined here because the status of the species and the factors affecting them are similar both within the action area and throughout their range in the Pacific Ocean.

Blue Whale

Species description and distribution

Blue whales are the largest living mammal species. They may measure over 30 m in length and weigh up to 160 metric tons (Mackintosh 1942). Like other baleen whales, they have fringed baleen plates instead of teeth, and ventral grooves which filter large quantities of water during feeding. Blue whales are found in all major oceans, including the continental shelf in coastal shelves and far offshore in pelagic environments of the North Pacific (Rice 1974, Donovan 1984).

At least three subspecies of blue whales have been designated, but only one *(B. m. musculus*) occurs in the northern hemisphere. In addition to these subspecies, the International Whaling Commission's (IWC) Scientific Committee has formally recognized one blue whale stock in the North Pacific (Donovan, 1991), although there is increasing evidence that more than one stock occurs in the Pacific Ocean (Gilpatrick et al. 1997, Barlow et al. 1995, Mizroch *et al.* 1984, Ohsumi and Wada 1974). There have been no confirmed sightings or strandings of blue whales in the Hawaiian Islands area, but recordings of vocalizations (Thompson and Friedl, 1982) suggest that blue whales are present within the U.S. Exclusive Economic Zone (U.S. EEZ) around Hawaii. The recordings showed peaks in summer and winter. Blue whale calls have also been recorded in Alaskan waters from 1995 to 1999 in every season although the whales have not been seen. Most of these calls occurred in fall and winter in the Gulf of Alaska suggesting that some blue whales remain in the area (as opposed to migrating through it).

Life history information

Blue whale reproductive activities occur primarily in winter (see Yochem and Leatherwood 1985). Gestation takes 10-12 months, followed by a nursing period that continues for about 6-7 months. They reach sexual maturity at about 5 years of age (see Yochem and Leatherwood 1985). The age distribution of blue whales is unknown and little information exists on natural sources of mortality (such as disease) and mortality rates. Killer whales are known to attack blue whales, but the rate of these attacks or their effect on blue whale populations is unknown.

Important foraging areas include the edges of continental shelves and ice edges in polar regions (Yochem and Leatherwood, 1985; Reilly and Thayer, 1990). Data indicate that some summer feeding takes place at low latitudes in "upwelling-modified" waters (Reilly and Thayer, 1990), and that some whales remain year-round at either low or high latitudes (Yochem and Leatherwood, 1985; Clark and Charif, 1998). The euphausiid species *Thysanoëssa inermis*, *Thysanoëssa longipes*, *Thysanoëssa raschii*, and *Nematoscelis megalops* have been listed as prey of blue whales in the North Pacific (Kawamura 1980; Yochem and Leatherwood 1985). Although some stomachs of blue whales have been found to contain a mixture of euphausiids and copepods or amphipods (Nemoto 1957; Nemoto and Kawamura 1977), it is likely that the copepods and amphipods were consumed adventitiously or incidentally. Reports that blue whales feed on small, schooling fish and squid in the western Pacific (Mizue 1951; Sleptsov 1955) have been interpreted as suggesting that the zooplankton blue whales prefer are less available there (Nemoto 1957). Other baleen whales whose range overlaps with the range of blue whales could potentially compete with blue whales for food (Nemoto 1970). However, there is no evidence of competition and the highly migratory behavior of blue whales may help them avoid competition with other baleen whales (Clapham and Brownell 1996).

Diving and social behavior

Generally, blue whales make 5-20 shallow dives at 12-20 second intervals followed by a deep dive of 3-30 minutes (Mackintosh, 1965; Leatherwood et al. 1976; Maser et al. 1981; Yochem and Leatherwood, 1985; Strong 1990; Croll et al. 1999). Croll et al. (1999) found that the dive depths of blue whales foraging off the coast of California during the day averaged 132 m with a maximum recorded depth of 204 m and a mean dive duration of 7.2 minutes. Nighttime dives are generally less than 50 m in depth (Croll et al. 1999).

Blue whales are usually found swimming alone or in groups of two or three (Ruud 1956; Slijper 1962; Nemoto 1964; Mackintosh 1965; Pike and MacAskie 1969; Aguayo 1974). However, larger foraging aggregations and aggregations mixed with other rorquals such as fin whales are regularly reported (Schoenherr 1991; Fiedler et al. 1998; Croll and Tershy pers. obs.). Little is known of the mating behavior of blue whales.

Vocalizations and hearing

Known vocalizations of blue whales include a variety of sounds described as low frequency moans or long pulses (Cummings and Thompson 1971, 1977; Edds 1982, Thompson and Friedl 1982; Edds-Walton

1997). Blue whales produce a variety of low frequency sounds in the 10-100 Hz band (Cummings and Thompson 1971; Edds 1982; Thompson and Friedl 1982; McDonald et al. 1995; Clark and Fristrup 1997; Rivers 1997; Ljungblad et al. in press). The most typical signals are very long, patterned sequences of tonal infrasonic sounds in the 15-40 Hz range. The sounds last several tens of seconds. Estimated source levels are as high as 180-190 dB (Cummings and Thompson 1971). Ketten (1997) reports the frequencies of maximum energy between 12 and 18 Hz. In temperate waters, intense bouts of long patterned sounds are very common from fall through spring, but these also occur to a lesser extent during the summer in high latitude feeding areas. Short sequences of rapid calls in the 30-90 Hz band are associated with animals in social groups (see Croll et al. 1999). The seasonality and structure of long patterned sounds suggest that these sounds are male displays for attracting females and/or competing with other males. The context for the 30-90 Hz calls suggests that they are communicative but not related to a reproductive function. Vocalizations attributed to blue whales have been recorded in presumed foraging areas, along migration routes, and during the presumed breeding season (Beamish and Mitchell 1971; Cummings and Thompson 1971, 1977, 1994; Cummings and Fish 1972; Thompson et al. 1996; Rivers 1997; Tyack 1997; Clark et al. 1998).

Blue whale moans within the low frequency range of 12.5-200 Hz, with pulse duration up to 36 seconds, have been recorded off Chile (Cummings and Thompson, 1971). A short, 390 Hz pulse also is produced during the moan. One estimate of the overall source level was as high as 188 dB, with most energy in the 1/3-octave bands centered at 20, 25, and 31.5 Hz, and also included secondary components estimates near 50 and 63 Hz (Cummings and Thompson, 1971).

The function of vocalizations produced by blue whales is unknown. Hypothesized functions include: 1) maintenance of inter-individual distance, 2) species and individual recognition, 3) contextual information transmission (e.g., feeding, alarm, courtship), 4) maintenance of social organization (e.g., contact calls between females and offspring), 5) location of topographic features, and 6) location of prey resources (review by Thompson et al. 1979). Responses to conspecific sounds have been demonstrated in a number of mysticetes, and there is no reason to believe that blue whales do not communicate similarly (Edds-Walton 1997). The low-frequency sounds produced by blue whales can, in theory, travel long distances, and it is possible that such long-distance communication occurs (Payne and Webb 1971; Edds-Walton 1997). The long-range sounds may also be used for echolocation in orientation or navigation (Tyack 1999).

Cetaceans have an auditory anatomy that follows the basic mammalian pattern, with some modifications to adapt to the demands of hearing in the sea. The typical mammalian ear is divided into the outer ear, middle ear, and inner ear. The outer ear is separated from the inner ear by the tympanic membrane, or eardrum. In terrestrial mammals, the outer ear, eardrum, and middle ear function to transmit airborne sound to the inner ear, where the sound is detected in a fluid. Since cetaceans already live in a fluid medium, they do not require this matching, and thus do not have an air-filled external ear canal. The inner ear is where sound energy is converted into neural signals that are transmitted to the central nervous system via the auditory nerve. Acoustic energy causes the basilar membrane in the cochlea to vibrate. Sensory cells at different positions along the basilar membrane are excited by different frequencies of sound (Tyack 1999). Baleen whales have inner ears that appear to be specialized for low-frequency hearing.

In a study of the morphology of the blue whale auditory apparatus, Ketten (1997) hypothesized that blue whales have acute infrasonic hearing. No studies have directly measured the sound sensitivity of blue whales.

Listing status

Blue whales have been listed as endangered under the ESA since 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine

Mammal Protection Act of 1972. The North Pacific stock is also listed as "low risk, conservation dependent" under the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for blue whales.

Population status and trends

There are no reliable estimates of blue whale abundance in the North Pacific Ocean. Nevertheless, Gambell (1976) estimated there were about 4,900 blue whales in the North Pacific before whaling began. Wade and Gerrodette (1993) and Barlow et al. (1997) estimated there were a minimum of 3,300 blue whales in the North Pacific Ocean in the 1990s.

Impacts of human activity on the species

From 1889 to 1965 approximately 5,761 blue whales were taken from the North Pacific Ocean (NMFS 1998). Evidence of a population decline can be seen in the catch data from Japan. In 1912, 236 blue whales were caught, in 1913, 58 whales, in 1914, 123 whales, and from 1915 to 1965, the catch numbers declined continuously (Mizroch et al. 1984). In the eastern North Pacific, 239 blue whales were taken off the California coast in 1926. And, in the late 1950s and early 1960s, Japan caught 70 blue whales per year off the Aleutian Islands (Mizroch et al. 1984). The IWC banned commercial whaling in the North Pacific in 1966, since that time there have been no reported blue whale takes. Nevertheless, Soviet whaling probably continued after the ban so Soviet catch reports under-represent the number of blue whales killed by whalers (as cited in Forney and Brownell 1996). Surveys conducted in these former whaling areas in the 1980s and 1990s failed to find any blue whales (Forney and Brownell 1996). There are no reports of fisheries-related mortality or serious injury in any of the blue whale stocks. Blue whale interaction with fisheries may go undetected because the whales are not observed after they swim away with a portion of the net. However, fishers report that large blue and fin whales usually swim through their nets without entangling and with very little damage to the net (Barlow et al. 1997).

In 1980, 1986, 1987, and 1993, ship strikes have been implicated in the deaths of blue whales off California (Barlow et al. 1997). In addition, several photo-identified blue whales from California waters were observed with large scars on their dorsal areas that may have been caused by ship strikes. Studies have shown that blue whales respond to approaching ships in a variety of ways, depending on the behavior of the animals at the time of approach, and speed and direction of the approaching vessel. While feeding, blue whales react less rapidly and with less obvious avoidance behavior than whales that are not feeding (Sears et al. 1983). Within the St. Lawrence Estuary, blue whales are believed to be affected by large amounts of recreational and commercial vessel traffic. Blue whales in the St. Lawrence appeared more likely to react to these vessels when boats made fast, erratic approaches or sudden changes in direction or speed (Edds and Macfarlane 1987, Macfarlane 1981). The number of blue whales struck and killed by ships is unknown because the whales do not always strand or examinations of blue whales that have stranded did not identify the traumas that could have been caused by ship collisions. In the California/Mexico stock, annual incidental mortality due to ship strikes averaged 0.2 whales during 1991-1995 (Barlow et al. 1997), but we cannot determine if this reflects the actual number of blue whales struck and killed by ships. Blue whales do not appear to be disturbed by noise from seismic exploration. When noise pulses from air guns were produced off Oregon, blue whales continued vocalizing at the same rate as before the pulses, suggesting that at least their vocalization behavior was undisturbed by the noise (McDonald *et al.* 1993).

Fin Whale

Species description and distribution

Fin whales are distributed widely in the world's oceans. In the northern hemisphere, most migrate seasonally from high Arctic feeding areas in summer to low latitude breeding and calving areas in winter.

Other groups may remain year-round in a particular area, depending on food supply. The IWC's Scientific Committee recognizes two management stocks in the North Pacific: (1) the east China Sea, and (2) the rest of the North Pacific (Donovan,1991). Mizroch et al. (1984a) suggested five possible stocks within the North Pacific based on histological and tagging experiments (1) east and west Pacific that intermingle around the Aleutian Islands; (2) east China Sea; (3) British Columbia; (4) southern/central California to the Gulf of Alaska; and (5) Gulf of California (Rice 1974, Tershy et al. 1993). However, NMFS considers stock structure in the North Pacific to be equivocal, and recognizes three stocks: (1) Alaska (northeast Pacific), (2) California/Oregon/ Washington, and (3) Hawaii (Barlow et al. 1997, Hill and DeMaster 1998).

Fin whales were reported as occurring immediately offshore throughout the North Pacific from central Baja California to Japan and as far north as the Chukchi Sea (Rice 1974). Data indicate that some whales remain year-round at high latitudes (Clark and Charif, 1998) and other areas such as the Gulf of California (J. Urban, UABCS, La Paz, BCS. Mexico, pers. comm.), migrating only short distances of 100-200 km (53.9-107.9 nm) (Agler et al. 1993). In the Gulf of Alaska, fin whales appear to congregate in the waters around Kodiak Island and south of Prince William Sound. In recent years, small numbers of fin whales have been observed south of the Aleutian Islands (Forney and Brownell 1996), in the Gulf of Alaska (including Shelikof Strait), and in the southeastern Bering Sea (Leatherwood et al. 1986). Fin whale concentrations in the northern areas of the North Pacific and Bering Sea generally form along frontal boundaries, or mixing zones between coastal and oceanic waters, which themselves correspond roughly to the 200-m isobath (which is the shelf edge; Nasu 1974).

Acoustic data collected from 1995 to 1999 from hydrophone arrays showed fin whales vocalizing in Alaskan waters during all seasons, with a peak in occurrence in midwinter. Fin whales are rare in Hawaiian waters, but may occur within 200 nm (370 km) of Hawaii during winter months, when some of the fin whales disperse throughout the lowest latitudes of their distribution (Balcomb 1987). Acoustic recordings (Thompson and Friedl 1982) suggest that fin whales migrate into Hawaiian waters (the U.S. EEZ surrounding the Hawaiian Archipelago) primarily during the fall and winter. More recently, McDonald and Fox (1999) reported an average of 0.027 calling fin whales per 1000 km^2 (grouped in 8 hour periods) based on passive acoustic recording within about 16 km of the north shore of Oahu. A single fin whale sighting occurred approximately 37 km (20 nm) north of Kauai in 1994 (Mobley et al. 1996). Two confirmed sightings and one stranding comprise the records for fin whales in this region (not including whaling records) (Nitta 1987).

Life history information

Fin whales become sexually mature between six to ten years of age, depending on density-dependent factors (Gambell 1985). Reproductive activities for fin whales occur primarily in the winter. Gestation lasts about 12 months and nursing occurs for 6-11 months (Perry et al. 1999). The age distribution of fin whales in the North Pacific is unknown. Calving and mating occur in late fall and winter (Millais 1906; Mackintosh and Wheeler 1929; Nishiwaki 1952; Tomilin 1957). Specific breeding areas are unknown and mating is assumed to occur in pelagic waters, presumably some time during the winter when whales are in mid-latitudes. Fin whales commonly travel in herds ranging from between 6-12 individuals, to nearly 100 or more (Balcomb 1987).

Foraging areas tend to occur along continental shelves with productive upwellings or thermal fronts (Gaskin 1972; Sergeant 1977; Nature Conservancy Council 1979). Fin whales tend to avoid tropical and pack ice waters (Meredith and Campbell 1988), with the northern limit set by ice and the southern limit by warm water of approximately 15°C (60°F) (Sergeant 1977). Fin whales in the North Pacific feed on euphausiids, calanoid copepods, and schooling fish such as herring, pollock, Atka mackerel, and capelin (Calkins 1986; Nemoto 1957, 1970; Kawamura 1982). Euphausiids may be preferred prey, and competition may occur with other baleen whales or other consumers of these prey types. Natural sources and rates of mortality are largely unknown, but Aguilar and Lockyer (1987) suggest annual natural mortality rates may range between 0.04 and 0.06 (based on studies of northeast Atlantic fin whales). The occurrence of the nematode, *Crassicauda boopis*, appears to increase the potential for kidney failure in fin whales and may be preventing some fin whale stocks from recovering from whaling (Lambertsen 1992, as cited in Perry et al. 1999). Killer whale or shark attacks may result in serious injury or death in very young and sick whales (Perry et al. 1999). NMFS has no records of fin whales being killed or injured by commercial fisheries operating in the North Pacific (Ferrero et al. 2000).

Diving and social behavior

Generally, fin whales make 5-20 shallow dives 13-20 seconds in duration followed by a deep dive of 1.5 to 15 minutes (Gambell 1985; Strong 1990; Croll and Tershy 1999). Croll and Tershy (1999) recorded dive depths of 100-200 m, with maximum depths of 300 m. Dive depths and duration were significantly shorter at night than during the day, presumably in response to the daily vertical migrations of prey schools. An estimate of dive depth based on the acoustical properties of received fin whale calls was 525 m (Charif et al. submitted).

Fin whales are often found singly or in pairs, but also commonly form larger groupings greater than 3 individuals, particularly while feeding. Tershy et al. (1993) described group foraging behavior where 2-4 animals swam less than 50m apart in an echelon formation and lunged synchronously, right side down. They found that group composition was not stable: membership and group size changed frequently during feeding events.

Vocalizations and hearing

Underwater sounds of the fin whale are one of the most studied *Balaenoptera* sounds. Fin whales produce a variety of low-frequency sounds in the 10-200 Hz band (Watkins 1981; Watkins et al. 1987a; Edds 1988; Thompson et al. 1992). The most typical signals are long, patterned sequences of short duration (0.5-2s) infrasonic pulses in the 18-35 Hz range (Patterson and Hamilton 1964). Estimated source levels are as high as 190 dB (Patterson and Hamilton 1964; Watkins et al. 1987a; Thompson et al. 1992; McDonald et al. 1995). In temperate waters intense bouts of long patterned sounds are very common from fall through spring, but also occur to a lesser extent during the summer in high latitude feeding areas (Clark and Charif 1998). Short sequences of rapid pulses in the 20-70 Hz band are associated with animals in social groups (McDonald et al. 1995; Clark pers. comm.; McDonald pers. comm.). Each pulse lasts on the order of one second and contains twenty cycles (Tyack 1999).

Particularly in the breeding season, fin whales produce series of pulses in a regularly repeating pattern. These bouts of pulsing may last for longer than one day (Tyack 1999). The seasonality and stereotypy of the bouts of patterned sounds suggest that these sounds are male reproductive displays (Watkins et al. 1987a), while the individual counter-calling data of McDonald et al. (1995) suggest that the more variable calls are contact calls. Some authors feel there is geographic differences in the frequency, duration and repetition of the pulses (Thompson et al. 1992). As with other mysticete sounds, the function of vocalizations produced by fin whales is unknown. Hypothesized functions are the same as for the blue whale. Responses to conspecific sounds have been demonstrated in a number of mysticetes, and there is no reason to believe that fin whales do not communicate similarly (Edds-Walton 1997). The low-frequency sounds produced by fin whales have the potential to travel over long distances, and it is possible that long-distance communication occurs in fin whales (Payne and Webb 1971; Edds-Walton 1997). Also, there is speculation that the sounds may function for long-range echolocation of large-scale geographic targets such as seamounts, which might be used for orientation and navigation (Tyack 1999).

A description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. No studies have directly measured the sound sensitivity of fin whales. Presumably fin whales are able to receive sound signals of the same frequency they are producing. In a study of the morphology of the mysticete auditory apparatus, Ketten (1997) hypothesized that large mysticetes have acute infrasonic hearing.

Listing status

In the North Pacific, the IWC began management of commercial whaling for fin whales in 1969; fin whales were fully protected from commercial whaling in 1976 (Allen 1980). Fin whales were listed as endangered under the ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Fin whales are listed as endangered on the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for fin whales.

Population status and trends

Prior to exploitation by whaling vessels, the North Pacific population consisted of an estimated 42,000-45,000 fin whales (Ohsumi and Wada 1974). Between 1914 and 1975, over 26,040 fin whales were harvested throughout the North Pacific (in Perry et al. 1999). Catches in the North Pacific and Bering Sea ranged from 1,000 to 1,500 fin whales annually during the 1950's and 1960's. However, not all Soviet catches were reported (cited in Ferrero et al. 2000). In the early 1970s, the entire North Pacific population had been reduced to between 13,620 and 18,630 fin whales (Ohsumi and Wada 1974). During the early 1970s, 8,520-10,970 fin whales were surveyed in the eastern half of the North Pacific (Braham 1991). If these historic estimates are statistically reliable, the population size of fin whales has not increased significantly over the past 20 years despite an international ban on whaling in the North Pacific. The current status and trend of the fin whale population in the North Pacific is largely unknown. Based on the available information, it is feasible that the North Pacific population as a whole has failed to increase significantly over the past 20 years, despite an international ban on whaling in the North Pacific. The only contrary evidence comes from investigators conducting seabird surveys around the Pribilof Islands in 1975-1978 and 1987-1989. These investigators observed more fin whales in the second survey and suggested they were more abundant in the survey area (Baretta and Hunt 1994). A survey for whales in the central Bering Sea in 1999 tentatively estimated the fin whale population was about 4,951 animals (95% C.I.: 2,833-8,653).

Impacts of human activity on this species

As early as the mid-seventeenth century, the Japanese were capturing fin, blue, and other large whales using a fairly primitive open-water netting technique (Tønnessen and Johnsen 1982, Cherfas 1989). In 1864, explosive harpoons and steam-powered catcher boats were introduced in Norway, allowing the large-scale exploitation of previously unobtainable whale species. The North Pacific and Antarctic whaling operations soon added this "modern" equipment to their arsenal. After blue whales were depleted in most areas, the smaller fin whale became the focus of whaling operations and more than 700,000 fin whales were landed in the twentieth century. In the North Pacific, there are no reports of fin whale deaths caused by fishery-related activities (Hill et al. 1997), although conflicts between fin whales and drift gillnet fisheries may occur (Barlow et al. 1997). Because of their size, strength, and distribution, it would probably be difficult to assess potential interactions between fin whales and fisheries; for example, fishermen have reported that large blue and fin whales usually swim through their nets without entangling and with very little damage to the net (Barlow et al. 1997). It is possible that ship strikes affect all fin whale stocks but go unreported because injured or killed animals do not strand. In the North Pacific, one death due to ship collision was reported in 1991 (Barlow et al. 1997).

Humpback Whale

Species description and distribution

NMFS recognizes four stocks of humpback whales in the North Pacific basin, based on genetic and photo-identification studies: two Eastern North Pacific stocks, one Central North Pacific stock and one Western Pacific stock (Hill and DeMaster 1998).

Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. Humpback whales feed on krill and small schooling fish on their summer grounds. The whales occupy tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding, primarily on small schooling fish and krill (Caldwell and Caldwell 1983). It is believed that minimal feeding occurs in wintering grounds, such as the Hawaiian Islands (Balcomb 1987; Salden 1987). Humpback whales summer throughout the central and western portions of the Gulf of Alaska, including Prince William Sound, around Kodiak Island (including Shelikof Strait and the Barren Islands), and along the southern coastline of the Alaska Peninsula. The continental shelf of the Aleutian Islands and Alaska Peninsula were once considered the center of the North Pacific humpback whale population (Berzin and Rovnin 1966; Nishiwaki 1966). The northern Bering Sea, Bering Strait, and the southern Chukchi Sea along the Chukchi Peninsula appear to form the northern extreme of the humpback whale's range (Nikulin 1946, Berzin and Rovnin 1966).

Humpback whales occur off all eight Hawaiian Islands, but particularly within the shallow waters of the "four-island" region (Kaho'olawe, Molokai, Lanai, Maui), the northwestern coast of the Big Island, and the waters around Niihau, Kauai and Oahu (Wolman and Jurasz 1977; Herman et al. 1980; Baker and Herman, 1981). The largest concentrations of humpbacks in Hawaiian waters can be found on Penguin Bank west of Molokai (Balcomb 1987). The whales are generally found in shallow water shoreward of the 182 m depth contour (Herman and Antinoja 1977), although Frankel et al. (1989) reported some vocalizing individuals up to 20 km (10.8 nm) off South Kohala on the west coast of the Big Island, over bottom depths of 1400 m. Cow/calf pairs appear to prefer very shallow water less than 18 m (10 fm) (Glockner and Venus 1983). At Kuili off the Big Island, Smultea (1989) found significantly more cow/calf pairs in water <55 m deep. Some results suggest that habitat use patterns of nearshore waters by females and calves near Maui may have changed (decreased), potentially due to increasing vessel and other human activities (Salden 1988; Glockner-Ferrari and Ferrari 1990).

Life history information

Humpback whale reproductive activities occur primarily in winter. They become sexually mature at age four to six. Annual pregnancy rates have been estimated at about 0.40-0.42 (NMFS unpublished and Nishiwaki 1959) and female humpback whales are believed to become pregnant every two to three years. Cows will nurse their calves for up to 12 months. The age distribution of the humpback whale population is unknown, but the portion of calves in various populations has been estimated at about 4-12% (Chittleborough 1965, Whitehead 1982, Bauer 1986, Herman et al. 1980, and Clapham and Mayo 1987). The information available does not identify natural causes of death among humpback whales or their number and frequency over time, but potential causes of natural mortality are believed to include parasites, disease, predation (killer whales, false killer whales, and sharks), biotoxins, and entrapment in ice. Humpback whales exhibit a wide range of foraging behaviors, and feed on a range of prey types including small schooling fishes, euphausiids, and other large zooplankton. Fish prey in the North Pacific include herring, anchovy, capelin, pollock, Atka mackerel, eulachon, sand lance, pollack, Pacific cod, saffron cod, arctic cod, juvenile salmon, and rockfish. In the waters west of the Attu Islands and south of Amchitka Island, Atka mackerel were preferred prey of humpback whales (Nemoto 1957). Invertebrate prey include euphausiids, mysids, amphipods, shrimps, and copepods.

Diving and social behavior

In Hawaiian waters, their distribution is almost exclusively within the 1820 m isobath and usually within 182 m. Maximum diving depths for humpbacks are approximately 150 m (but usually <60 m), with a very deep dive (240 m) recorded off Bermuda (Hamilton et al. 1997). They may remain submerged for up to 21 minutes (Dolphin, 1987). Dives on feeding grounds ranged from 2.1 - 5.1 minutes in the north Atlantic (Goodyear unpubl. manus.). In southeast Alaska average dive times were 2.8 minutes for feeding whales, 3.0 minutes for non feeding whales, and 4.3 for resting whales (Dolphin 1987). In the Gulf of California humpback whale dive times averaged 3.5 minutes (Strong 1989). Because most humpback prey is likely found above 300 m most humpback dives are probably relatively shallow.

Humpback social behavior is reviewed by Clapham (1996). They form small unstable groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of times. There is good evidence of some territoriality on feeding grounds (Clapham 1994, 1996), and on wintering ground (Tyack 1981). On the breeding grounds males sing long complex songs directed towards females, other males or both. The breeding season can best be described as a floating lek or male dominance polygyny (Clapham 1996). Intermale competition for proximity to females can be intense as expected by the sex ratio on the breeding grounds may be as high as 2.4:1.

Vocalizations and hearing

Humpbacks produce a great variety of sounds. During the breeding season males sing long complex songs, with frequencies in the 25-5000 Hz range and intensities as high as 181 dB (Payne 1970; Winn et al. 1970; Thompson et al. 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson et al. 1979). The songs appear to have an effective range of approximately six to 12 mi (10 to 20 km). Animals in mating groups produce a variety of sounds (Tyack 1981; Tyack and Whitehead 1983, Silber 1986). Sounds are produced less frequently on the summer feeding grounds. Feeding groups produce distinctive sounds ranging from 20 Hz to 2 kHz, with median durations of 0.2-0.8 sec and source levels of 175-192 dB (Thompson et al. 1986). These sounds are attractive and appear to rally animals to the feeding activity (D'Vincent et al. 1985; Sharpe and Dill 1997). In summary, humpback whales produce at least three kinds of sounds: 1) complex songs with components ranging from at least 20Hz - 4 kHz with estimated source levels from 144 - 174 dB; these are mostly sung by males on the breeding grounds (Payne 1970; Winn et al. 1970; Richardson et al. 1995), 2) social sounds in the breeding areas that extend from 50Hz to more than 10 kHz with most energy below 3kHz (Tyack and Whitehead 1983, Richardson et al. 1995), and 3) feeding area vocalizations that are less frequent, but tend to be 20Hz - 2 kHz with estimated sources levels in excess of 175 dB (Thompson et al. 1986; Richardson et al. 1995). Sounds often associated with possible aggressive behavior by males (Tyack and Whitehead 1983; Silber 1986) are quite different from songs, extending from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz. These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead, 1983).

A description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. Humpback whales respond to low frequency sound. Humpback whales have been known to react to low frequency industrial noises at estimated received levels of 115 - 124 dB (Malme et al. 1985), and to conspecific calls at received levels as low as 102dB (Frankel et al. 1995).

Listing status

The IWC first protected humpback whales in the North Pacific in 1965. Humpback whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Critical habitat has not been designated for the species.

Population status and trends

An estimated 394 humpback whales constitute the western North Pacific stock (Calambokidis et al. 1997). Waite et al. (1999) identified 127 individual humpback whales in the Kodiak Island region between 1991 and 1994 and estimated there were 651 whales in this region (95% CI:356-1,523). Waite et al. (1999) also estimated that 200 humpback whales regularly feed in Prince William Sound. Subsequently, based on mark-recapture analysis of photo-identification studies, several investigators concluded that the central North Pacific stock consists of at least 4,000 humpback whales (Calambokidis et al. 1997, Ferrero et al. 2000). Other than these estimates of the size of the humpback whale population, the available information is not sufficient to determine population trends.

Estimates of the number of individuals in the Northern Pacific stock have recently risen. Estimates in the 1980's ranged from 1407 to 2,100 (Baker, 1985; Darling and Morowitz, 1986; Baker and Herman, 1987), while recent estimates of abundances were approximately 6,000 in the North Pacific (Calambokidis et al. 1997; Cerchio 1998; Mobley et al. 1999b).

Cerchio (1998) estimated that about 4,000 animals visit Hawaii annually. Aerial surveys using line-transect methodologies were conducted in 1993, 1995 and 1998. Hawaii population estimates derived from the sighting data show an increase from 2717 (+/- 608) in 1993, to 3284 (+/- 646) in 1995 and 3852 (+/- 777) in 1998 (Mobley et al. 1999b). The high numbers observed in 1998 can be attributed to better sighting conditions in 1998 than in the previous years.

Impacts of human activity on the species

In the 1990s, no more than 3 humpback whales were killed annually in U.S. waters by commercial fishing operations in the Atlantic and Pacific Oceans. Between 1990 and 1997, no humpback whale deaths have been attributed to interactions with groundfish trawl, longline and pot fisheries in water around Alaska (Hill and DeMaster 1999). Humpback whales have been injured or killed elsewhere along the mainland U.S. and Hawaii (Barlow et al. 1997). In 1991, a humpback whale was observed entangled in longline gear and released alive (Hill et al. 1997). In 1995, a humpback whale in Maui waters was found trailing numerous lines (not fishery-related) and entangled in mooring lines. The whale was successfully released, but subsequently stranded and was attacked and killed by tiger sharks in the surf zone. In 1996, a humpback whale calf was found stranded on Oahu with evidence of vessel collision (propeller cuts; NMFS unpub. data). Also in 1996, a vessel from Pacific Missile Range Facility in Hawaii rescued an entangled humpback, removing two crabpot floats from the whale; the gear was traced to a recreational fisherman in southeast Alaska. No information is available on the number of humpback whales that have been killed or seriously injured by interactions with fishing fleets outside of U.S. waters in the North Pacific Ocean.

Humpback whales seem to respond to moving sound sources, such as whale-watching vessels, fishing vessels, recreational vessels, and low-flying aircraft (Beach and Weinrich 1989, Clapham et al. 1993, Atkins and Swartz 1989). Their responses to noise are variable and have been correlated with the size, composition, and behavior of the whales when the noises occurred (Herman et al. 1980, Watkins et al. 1981, Krieger and Wing 1986). Several investigators have suggested that noise may have caused humpback whales to avoid or leave feeding or nursery areas (Jurasz and Jurasz 1979, Dean et al. 1985), while others have suggested that humpback whales may become habituated to vessel traffic and its associated noise. Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle et al. 1993; Wiley et al. 1995). In Hawaii, regulations prohibit boats from approaching within 91 m of adult whales and within 274 m in areas protected for mothers with a calf. Likewise, in Alaska, the number of cruise ships entering Glacier Bay has been limited to reduce possible disturbance.

Many humpback whales are killed by ship strikes along both coasts of the U.S. On the Pacific coast, a humpback whale is killed about every other year by ship strikes (Barlow et al. 1997). On the Atlantic coast, 6 out of 20 humpback whales stranded along the mid-Atlantic coast showed signs of major ship strike injuries (Wiley et al. 1995). Almost no information is available on the number of humpback whales killed or seriously injured by ship strikes outside of U.S. waters.

Right Whale

Species description and distribution

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes. The IWC currently recognizes two species of northern right whales: *Eubalaena glacialis* in the North Atlantic and *E. japonica* in the North Pacific. However, right whales in the North Atlantic, North Pacific, and the southern hemisphere of both oceans are currently listed under the ESA as one species: right whales (which includes *E. glacialis*, *E. japonica*, and *E. australis*). For the purposes of ESA Section 7(a)(2) consultations, NMFS recognizes three major populations of right whales: North Pacific, North Atlantic, and Southern Hemisphere.

Very little is known of the size and distribution of right whales in the North Pacific and very few of these animals have been seen in the past 20 years. In 1996, a group of 3 or 4 right whales (which may have included a calf) were observed in the middle shelf of the Bering Sea, west of Bristol Bay and east of the Pribilof Islands (Goddard and Rugh 1998). In June 1998, a lone whale was observed on historic whaling grounds near Albatross Bank off Kodiak Island, Alaska (Waite and Hobbs 1999). Surveys conducted in July of 1997 - 2000 in Bristol Bay reported observations of lone animals or small groups of right whales in the same area as the 1996 sighting (Hill and DeMaster 1998, Perry et al. 1999). Historical whaling records (Maury 1852, Townsend 1935, Scarff 1986) indicate the right whale ranged across the North Pacific above 35°N lat. They summered in the North Pacific Ocean and southern Bering Sea from April or May to September, with a peak in sightings in coastal waters of Alaska in June and July (Maury 1852, Townsend 1935, Omura 1958, Klumov 1962, Omura et al. 1969). Their summer range extended north of the Bering Strait (Omura et al. 1969). However, they were particularly abundant in the Gulf of Alaska from 145° to 151°W (Berzin and Rovnin 1966), and apparently concentrated in the Gulf of Alaska, especially south of Kodiak Islands and in the Eastern Aleutian Islands and southern Bering Sea shelf waters (Braham and Rice, 1984).

The winter distribution patterns of right whales in the Pacific are virtually unknown, although some right whales have been sighted as far south as 27°N in the eastern North Pacific. They have also been sighted in Hawaii (Herman et al. 1980), California (Scarff 1986), Washington and British Columbia. Their migration patterns are unknown, but are believed to include north-south movements between summer and winter feeding areas. The scarcity of right whales is the result of an 800-year history of whaling that continued into the 1960s (Klumov 1962). Of all of the large whales, right whales are believed to have the highest risk of extinction in the foreseeable future. Recent data suggest an estimated population of 300 in the North Atlantic and a small, unknown number of individuals in the North Pacific. The southern right whale, in contrast, has shown signs of a slow recovery over the past 20 years.

Life history information

In both northern and southern hemispheres, right whales have been observed in the lower latitudes and more coastal waters during winter, and then tend to migrate to higher latitudes during the summer. Calving may occur in winter months when their distribution is more coastal, but the lack of sighting information suggests that calving may occur farther offshore. In summer and fall in both hemispheres, the distribution of right whales appears linked to the distribution of their principal zooplankton prey (Winn et al.1986). Essentially no information is available on the calving grounds or feeding habits of right whales in the North Pacific. Right whales in the North Pacific are known to prey on a variety of zooplankton species including *Calanus plumchrus*, *C. cristatus*, *Euphausia pacifica*, *Metridia* spp., and copepods of the genus *Neocalanus*. This is similar to the feeding habits of right whales in the Gulf of Maine, which feed on zooplankton (primarily copepods) (see NMFS 1991b, Murison and Gaskin 1989). Right whales may compete with sympatric sei whales and many other predators or consumers of zooplankton in the eastern North Pacific and Bering Sea. Killer whales are suspected as possible predators, but no data from the North Pacific support this speculation (Scarff 1986).

Diving and social behavior

Northern right whales dive as deep as 306 m (Mate et al 1992). In the Great South Channel, average diving time is close to two minutes; average dive depth is 7.3 m with a maximum of 85.3 m (Winn et al. 1994). In the U.S. Outer Continental Shelf the average diving time is about 7 minutes (CETAP 1982).

Northern right whales are mostly seen in groups of less than 12, most often singles or pairs (review by Jefferson et al. 1993). Larger groups may form on feeding or breeding grounds (review by Jefferson et al. 1993). In the North Pacific, most recent sightings have been of singles or pairs; however, two groups numbering six to ten and more than three whales were sighted in the northeastern Pacific (Goddard and Rugh 1998).

Vocalizations and hearing

A description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. Limited data indicate that northern right whales produce moans of less than 400 Hz in frequency (Watkins and Schevill 1972; Thompson et al. 1979; Spero 1981). Apparently, right whales use low frequency sounds as contact calls while summering in the Bay of Fundy (Spero 1981).

Listing status

Since 1949, the northern right whale has been protected from commercial whaling by the IWC. Right whales (both E. *glacialis* and E. *australis*) are listed as endangered under the ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. NMFS designated critical habitat for the North Atlantic population of right whales on June 3, 1994 (59 FR 28793). Critical habitat has not been designated for right whales in the Pacific Ocean.

Population status and trends

The population dynamics of right whales are unknown. The recovery plan for this species suggests that its pre-exploitation abundance was higher than 11,000, based on a known harvest of over 11,000 by U.S. whalers with additional numbers struck and lost (Brownell et al. 1986). Current population estimates range from a low of 100-200 (Braham and Rice 1984) to a high of 220-500 (Berzin and Yablokov 1978 [in Berzin and Vladimirov 1981]), but Hill and DeMaster (1998) argue that is it is not possible to produce a reliable estimate of population size or trends for the right whale in the North Pacific. No population projections are available. Several researchers have suggested that the recovery of right whales in the northern hemisphere has been slowed by other whales that compete with right whales for food (Rice 1974, Scarff 1986). Mitchell (1975) analyzed trophic interactions among baleen whales in the western north Atlantic and noted that the foraging grounds of right whales overlapped with the foraging grounds of sei whales and both preferentially feed on copepods. Reeves et al. (1978) noted that several species of whales feed on copepods in the eastern north Pacific, so that the foraging pattern and success of right whales would be affected by other whales as well. Mitchell (1975) argued that the right whale population in the north Atlantic had been depleted by several centuries of whaling before steam-driven boats allowed whalers to hunt sei whales; from this, he hypothesized that the decline of the right whale population made more food available to sei whales and helped their population to grow. He then suggested that the larger sei whale population competes with the smaller right whale population and slows or prevents its recovery.

Impacts of human activity on the species

Before whaling began in the North Pacific Ocean, right whales were considered common or abundant in the North Pacific (Webb 1988). By 1900, observations of right whales in the North Pacific had become so rare, it was impossible to know their population status or trend. In the Atlantic Ocean, the major known sources of anthropogenic mortality and injury of right whales include entanglement in commercial fishing gear and ship strikes. Scarff (1986) concluded that entanglement in fishing gear, noise, or continued hunting by countries who are not members of the IWC were not serious threats to right whales in the North Pacific. However, Scarff (1986) concluded that right whales in the North Pacific are particularly vulnerable to ship strikes and marine pollution because of their habit of feeding at, or near, the water surface. Undersea exploration and development of mineral deposits, and the dredging of major shipping channels are continued threats to the coastal habitat of the right whale in both the North Atlantic and North Pacific. Offshore oil and gas activities have been proposed off the coast of the mid- and south-Atlantic U.S. and are currently being conducted in the Bering Sea and in eastern North Pacific. In Russian waters, two fishery-related mortalities have been reported and offshore oil and gas development could potentially affect northern right whale habitat (Perry et al. 1999).

Sei Whale

Species description and distribution

Sei whales are distributed in all of the world's oceans, except the Arctic Ocean. The IWC's Scientific Committee groups all of the sei whales in the entire North Pacific Ocean into one stock (Donovan 1991). However, some mark-recapture, catch distribution, and morphological research indicated that more than one stock exists; one between 175°W and 155°W longitude, and another east of 155° W longitude (Masaki 1976, 1977). During the winter, sei whales are found from 20° to 23° N and during the summer from 35° to 50° N (Masaki 1976, 1977). Horwood (1987) reported that 75 to 85% of the total North Pacific population of sei whales resides east of 180° longitude. In the North Pacific Ocean, sei whales have been reported primarily south of the Aleutian Islands, in Shelikof Strait and waters surrounding Kodiak Island, in the Gulf of Alaska, and inside waters of southeast Alaska (Nasu 1974, Leatherwood et al. 1982). Sei whales have been occasionally reported from the Bering Sea and in low numbers on the central Bering Sea shelf (Hill and DeMaster 1998). Masaki (1977) reported sei whales concentrating in the northern and western Bering Sea from July through September, although other researchers question these observations because no other surveys have ever reported sei whales in the northern and western Bering Sea. Horwood (1987) evaluated the Japanese sighting data and concluded that sei whales rarely occur in the Bering Sea. Within the U.S. EEZ, there is a significant lack of information regarding the distribution of sei whales in the eastern north Pacific (see Perry et al. 1999).

Life history information

Reproductive activities for sei whales occur primarily in winter. Gestation is about 12.7 months and the calving interval is about 3 years (Rice 1977). Sei whales become sexually mature at about age 10 (Rice 1977). The age structure of the sei whale population is unknown. Rice (1977) estimated total annual mortality for adult females as 0.088 and adult males as 0.103. Andrews (1916) suggested that killer whales attacked sei whales less frequently than fin and blue whales in the same areas. Sei whales in the North Pacific feed on euphausiids and copepods, which make up about 95% of their diets (Calkins 1986). The balance of their diet consists of squid and schooling fish, including smelt, sand lance, Arctic cod, rockfish, pollock, capelin, and Atka mackerel (Nemoto and Kawamura 1977). Rice (1977) suggested that the diverse diet of sei whales may allow them greater opportunity to take advantage of variable prey resources, but may also increase their potential for competition with commercial fisheries. Endoparasitic

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
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IMMEDIATELY FOLLOWING

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Diving and social behavior

Generally, sei whales make 5-20 shallow dives of 20-30 sec duration followed by a deep dive of up to 15 minutes (Gambell 1985). The depths of sei whale dives have not been studied, however the composition of their diet suggests that they do not perform dives in excess of 300 m.

Sei whales are usually found in small groups of up to 6 individuals, but also commonly form larger groupings on the feeding grounds (Gambell 1985).

Vocalizations and hearing

No studies have been published on the vocal behavior of sei whales. No studies have directly measured the sound sensitivity of sei whales (Croll et al. 1999). A description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above.

Listing status

In the North Pacific, the IWC began management of commercial taking of sei whales in 1970 (Allen 1980). Sei whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. They are listed as endangered under the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for sei whales.

Population status and trends

Sei whale abundance prior to commercial whaling in the North Pacific has been estimated at 42,000 sei whales (Tillman 1977). Japanese and Soviet catches of sei whales in the North Pacific and Bering Sea increased from 260 whales in 1962 to over 4,500 in 1968 and 1969, after which the sei whale population declined rapidly (Mizroch et al. 1984). When commercial whaling for sei whales ended in 1974, the population of sei whales in the North Pacific had been reduced to between 7,260 and 12,620 animals (Tillman 1977). Current abundance or trends are not known for stocks in the North Pacific. In California waters, only one confirmed and five possible sei whale sightings were recorded during 1991, 1992, and 1993 aerial and ship surveys (Carretta and Forney 1993, Mangels and Gerrodette 1994). No sightings were confirmed off Washington and Oregon during recent aerial surveys. Several researchers have suggested that the recovery of right whales in the northern hemisphere has been slowed by other whales that compete with right whales for food. Mitchell (1975) analyzed trophic interactions among baleen whales in the western north Atlantic and noted that the foraging grounds of right whales overlapped with the foraging grounds of sei whales and both preferentially feed on copepods. Mitchell (1975) argued that the right whale population in the north Atlantic had been depleted by several centuries of whaling before steam-driven boats allowed whalers to hunt sei whales; from this, he hypothesized that the decline of the right whale population made more food available to sei whales and helped their population to grow. He then suggested that the larger sei whale population competes with the smaller right whale population and slows or prevents its recovery. Reeves et al. (1978) noted that several species feed on copepods in the eastern north Pacific, so the foraging pattern of sei whales may affect the foraging success of right whales.

Impacts of human activity on the species

From 1910 to 1975, approximately 74,215 sei whales were caught in the entire North Pacific Ocean (Horwood 1987, Perry et al. 1999). From the early 1900s, Japanese whaling operations consisted of a large proportion of sei whales: 300 to 600 sei whales were killed per year from 1911 to 1955. The sei whale catch peaked in 1959, when 1,340 sei whales were killed. In 1971, after a decade of high sei whale catch numbers, sei whales were scarce in Japanese waters. In the eastern north Pacific, the sei whale population appeared to number about 40,000 animals until whaling began in 1963; by 1974, the sei whale population had been reduced to about 8,000 animals (Tilman 1977). No recent reports indicate sei whales are being killed or seriously injured as a result of fishing activities in any eastern North Pacific fishery (Perry et al. 1999). However, Barlow et al. (1997) note that a conflict may exist in the offshore drift gillnet fishery. It is possible that ship strikes affect all stocks of sei whale, but go unreported because the injured or killed animals do not strand.

Sperm Whale

Species description and distribution

Sperm whales are distributed in all of the world's oceans. Several authors have recommended three or more stocks of sperm whales in the North Pacific for management purposes (Kasuya 1991, Bannister and Mitchell 1980). However, the IWC's Scientific Committee designated two sperm whale stocks in the North Pacific: a western and eastern stock (Donovan 1991). The line separating these stocks has been debated since their acceptance by the IWC's Scientific Committee. For stock assessment purposes, NMFS recognizes three discrete population "centers" of sperm whales: (1) Alaska, (2) California/Oregon/Washington, and (3) Hawaii. Sperm whales are found throughout the North Pacific and are distributed broadly from tropical and temperate waters to the Bering Sea as far north as Cape Navarin. Mature female and immature sperm whales of both sexes are found in more temperate and tropical waters from the equator to around 45°N throughout the year. These groups of adult females and immature sperm whales are rarely found at latitudes higher than 50°N and 50°S (Reeves and Whitehead 1997). Sexually mature males join these groups throughout the winter.

A 1997 survey to investigate sperm whale stock structure and abundance in the eastern temperate North Pacific area did not detect a seasonal distribution pattern between the U. S. EEZ off California and areas farther west, out to Hawaii (Forney et al. 2000). A 1997 survey, which combined visual and acoustic line-transect methods, resulted in estimates of 24,000 (CV=0.46) sperm whales based on visual sightings, and 39,200 sperm whales (CV=0.60) based on acoustic detections and visual group size estimates (Forney et al. 2000). An analysis for the eastern tropical Pacific estimates abundance at 22,700 sperm whales (95% C. I. = 14,800-34,000; Forney et al. 2000).

For all stocks, the sperm whale is generally believed to engage in summer migrations, with mature males migrating north to the Gulf of Alaska, Aleutian Islands, and the Bering Sea, or south to the Antarctic. Females, calves and younger males, which usually remain below 40°N latitude in more tropical and temperate waters (Rice, 1989), may be restricted in their migrations by an intolerance to low water temperatures. Mature males return to the warmer waters of the lower latitudes south of 40°N during the winter breeding season. Sperm whales may be found singly and in groups as large as fifty or more individuals, with solitary mature breeding males joining groups only during the breeding season (Gosho, et al. 1984). During this time, sperm whales in the Pacific Ocean are usually distributed below 40°N Latitude. Historically, sperm whaling grounds in the Pacific were from 20- 40°N and from 150- 160°W and were located around the Hawaiian Islands, among other areas (Leatherwood, et al. 1988).

Sperm whales have a strong preference for the 1,000 m depth contour and seaward. Berzin (1971) reported that they are restricted to waters deeper than 300 m, while Watkins (1977) and Reeves and Whitehead (1997) reported that they are usually not found in waters less than 1000 m deep. While deep water is their typical habitat, sperm whales have been observed near Long Island, NY, in waters of 41-55 m (Scott and Sadove, 1997). When found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling occurs and biological production is high, implying the presence of a good food supply (Clarke, 1956). They can dive to depths of at least 2000 m, and may remain submerged for an hour or more (Watkins et al. 1993).

Sperm whales have been sighted in the Kauai Channel, the Alenuihaha Channel between Maui and the island of Hawaii, and off the island of Hawaii (Lee, 1993; Mobley et al.1999; Forney et al. 2000)). Additionally, the sounds of sperm whales have been recorded throughout the year off Oahu (Thompson and Friedl 1982). Twenty-one sperm whales were sighted during aerial surveys conducted in Hawaiian waters conducted from 1993 through 1998. Sperm whales sighted during the survey tended to be on the outer edge of a 50 - 70 km distance from the Hawaiian Islands, indicating that presence may increase with distance from shore (Mobley, pers. comm. 2000). However, from the results of these surveys, NMFS has calculated a minimum abundance of sperm whales within 46 km of Hawaii to be 43 individuals (Forney et al. 2000). In the past five years, there is only one observed stranding of a sperm whale off Kauai which occurred in 1995 (NMFS, unpublished data).

Life history information

Female sperm whales take about 9 years to become sexually mature (Kasuya 1991, as cited in Perry et al. 1999). Male sperm whales take between 9 and 20 years to become sexually mature, but will require another 10 years to become large enough to successfully compete for breeding rights (Kasuya 1991). Adult females give birth after about 15 months gestation and nurse their calves for 2 to 3 years. The calving interval is estimated to be about 4 to 6 years (Kasuya 1991). The age distribution of the sperm whale population is unknown, but sperm whales are believed to live at least 60 years (Rice 1978). Estimated annual mortality rates of sperm whales are thought to vary by age, but previous estimates of mortality rate for juveniles and adults are now considered unreliable (IWC 1980, as cited in Perry et al. 1999). Sperm whales are known for their deep foraging dives (in excess of 3 km). They feed primarily on mesopelagic squid, but also consume octopus, other invertebrates, and fish (Tomilin 1967, Tarasevich 1968, Berzin 1971). Perez (1990) estimated that their diet in the Bering Sea was 82% cephalopods (mostly squid) and 18% fish. Fish eaten in the North Pacific included salmon, lantern fishes, lancetfish, Pacific cod, pollock, saffron cod, rockfishes, sablefish, Atka mackerel, sculpins, lumpsuckers, lamprey, skates, and rattails (Tomilin 1967, Kawakami 1980, Rice 1986b). Potential sources of natural mortality in sperm whales include killer whales and papilloma virus (Lambertson et al. 1987).

Diving and social behavior

Sperm whales are likely the deepest and longest diving mammal. Typical foraging dives last 40 minutes and descend to about 400m followed by approximately 8 minutes of resting at the surface (Gordon 1987; Papastavrou et al. 1989). However, dives of over 2 hr and as deep as 3,000 m have been recorded (Clarke 1976; Watkins et al. 1985). Descent rates recorded from echo-sounders were approximately 1.7m/sec and nearly vertical (Goold and Jones 1995). There are no data on diurnal differences in dive depths in sperm whales. However, like most diving vertebrates for which there is data (e.g. rorqual whales, fur seals, chinstrap penguins), sperm whales probably make relatively shallow dives at night when deep scattering layer organism move towards the surface.

The groups of closely related females and their offspring have group specific dialects (Weilgart and Whitehead 1997), alloparental guarding of young at the surface (Whitehead 1996b), and alloparental nursing (Reeves and Whitehead 1997).

Vocalizations and hearing

Sperm whales produce loud broad-band clicks from about 0.1 to 20 kHz (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). These have source levels estimated at 171 dB (Levenson 1974). Current evidence suggests that the disproportionately large head of the sperm whale is an adaptation to produce these vocalizations (Norris and Harvey 1972; Cranford 1992; but see Clarke 1979). This suggests that the production of these loud low frequency clicks is extremely important to the survival of individual sperm whales. The function of these vocalizations is relatively well-studied (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). Long series of monotonous regularly spaced clicks are associated with feeding and are thought to be produced for echolocation. Distinctive, short, patterned series of clicks, called codas, are associated with social behavior and intragroup interactions. They are though to be for intra-specific communication, perhaps to maintain social cohesion with the group (Weilgart and Whitehead 1993).

Generally it is believed that most odontocetes use whistle vocalization as "signature calls" to convey information about the specific identity of the sender. Sperm whales may use clicks rather than whistles for echolocation as well as for signature calls, and unique stereotyped click sequence "codas" have been recorded from individual whales over periods lasting several hours (Mullins et al. 1988; Watkins and Schevill, 1977b; Adler-Fenchel, 1980; Watkins et al. 1985b). According to Weilgart and Whitehead (1988), sperm whale clicks may convey information about the age, sex, and reproductive status of the sender.

A recent study indicates that sperm whale clicks may have a wider dB range than previously thought. Clicks recorded off the coast of Norway in 1997 and 1998, an area thought to be utilized by adult foraging males, were measured for directionality and sound levels. The recorded sound levels for sperm whale clicks exceeded 220 dB. The results of these studies are 40 to 50 dB higher than the sound levels previously recognized for this species (Møhl et al. 2000). Sperm whale clicks range from <100 Hz to 30 kHz, with most energy at 2-4 kHz and 10-16 kHz, outside of the *range of the NPAL sound source. Clicks* are repeated at rates of 1-90 per second (Backus and Schevill, 1966; Watkins and Schevill, 1977b; Watkins et al. 1985a).

A description of the anatomy of the ear for ceteceans is provided in the description of the blue whale above. The only data on the hearing range of sperm whales are evoked potentials from a stranded neonate (Carder and Ridgway 1990). These data suggest that neonatal sperm whales respond to sounds from 2.5-60 kHz. Sperm whales have been observed to frequently stop echolocating in the presence of underwater pulses made by echosounders and submarine sonar (Watkins and Schevill 1975; Watkins et al. 1985). They also stop vocalizing for brief periods when codas are being produced by other individuals, perhaps because they can hear better when not vocalizing themselves (Goold and Jones 1995). Sperm whales have moved out of areas after the start of air gun seismic testing (Davis et al. 1995).

Because they spend large amounts of time at depth and use low frequency sound they are likely to be vulnerable to any negative effects of low frequency sound in the ocean (Croll et al 1999). Even though sperm whales are abundant (Reeves and Whitehead 1997), because their potential rate of reproduction is so low, even small negative impacts of low frequency sound could cause population declines. Furthermore, because of their apparent role as important predators of mesopelagic squid and fish, changes in their abundance could affect the distribution and abundance of other marine species.

Listing status

Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). Sperm whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Critical habitat has not been designated for sperm whales.

Population status and trends

Current estimates for population abundance, status, and trends for the Alaska stock of sperm whales are not available (Hill and DeMaster 1999). Sperm whales along the coast of California do not indicate a trend (NMFS, in press). Approximately 258,000 sperm whales in the North Pacific were harvested by commercial whalers between 1947 and 1987 (Hill and DeMaster 1999). In particular, the Bering Sea population of sperm whales (consisting mostly of males) was severely depleted (Perry et al. 1999). Catches in the North Pacific continued to climb until 1968, when 16,357 sperm whales were harvested. Catches declined after 1968 through limits imposed by the IWC.

Impacts of human activity on the species

In U.S. waters in the Pacific, sperm whales are known to have been incidentally taken only in drift gillnet operations, which killed or seriously injured an average of 9 sperm whales per year from 1991-95 (Barlow et al. 1997). Interactions between longline fisheries and sperm whales in the Gulf of Alaska have been reported over the past decade (Rice 1989, Hill and DeMaster 1999). Observers aboard Alaskan sablefish and halibut longline vessels have documented sperm whales feeding on longline-caught fish in the Gulf of Alaska. During 1997, the first entanglement of a sperm whale in Alaska's longline fishery was recorded, although the animal was not seriously injured (Hill and DeMaster 1998). The available evidence does not indicate sperm whales are being killed or seriously injured as a result of these interactions, although the nature and extent of interactions between sperm whales and long-line gear is not yet clear. In 2000, the Japanese Whaling Association announced that it proposed to kill 10 sperm whales in the Pacific Ocean for research purposes, which was the first time sperm whales have been taken since the international ban on commercial whaling took effect in 1987. Despite protests from the U.S. government and members of the IWC, the Japanese government plans to conduct this research. The implications of this action for the status and trend of sperm whales is uncertain.

Hawaiian monk seal

Species description and distribution

The Hawaiian monk seal is the most endangered pinniped species in U.S. waters and the second most endangered pinniped in the world, next to the Mediterranean monk seal. Hawaiian monk seals are found primarily in the Northwestern Hawaiian Islands (NWHI), which extend more than 2000 km northwest of the Main Hawaiian Islands (MHI; includes the Islands of Niihau, Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, and Hawaii). Major breeding populations occur at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll (Forney et al. 1999). Smaller breeding populations are found at Nihoa and Necker Islands, and a number of seals are distributed throughout the MHI (Forney et al. 1999). Reported sightings on the MHI have become increasingly more common, and births have been reported on all of the main Hawaiian islands except Lanai and Hawaii (NMFS, unpubl. data). In 1994, twenty-one adult male Hawaiian monk seals were relocated from Laysan Island to the MHI in an attempt to equalize the sex ratio at Laysan Island. Some of these males were radio tagged, and all were flipper-tagged. All but two were resighted near their release sites, but their survival to 1997 is unknown (Forney et al. 1999). Sporadic sightings of monk seals on the MHI indicate total abundance (including the twenty-one released males) to be approximately 40 seals (Forney et al. 1999). Additionally, sightings of Hawaiian monk seals have occurred on at least three occasions at the remote Pacific location of Johnston Atoll (excluding nine adult males translocated from Laysan Island in 1984).

Life history information

There is no obvious sexual dimorphism between male and female Hawaiian monk seals. Sex is determined by observing their ventral sides (Kenyon and Rice, 1959). Females have two pairs of teats, often appear larger and fatter than adult males (Kenyon and Rice, 1959), and may have dorsal mating scars (Hiruki et al. 1993). Males have a penile opening, often have scars along their necks inflicted by other males (Hiruki et al. 1993), and may be darker than females (Kenyon and Rice, 1959). Adults weigh up to 270 kg and may be more than 7 feet long (Kenyon and Rice, 1959).

Hawaiian monk seals do not form breeding colonies or harems (Kenyon and Rice, 1959; Johanos et al. 1994). Mating, which occurs in water and is rarely observed, is inferred from male-female association patterns and from mounting injuries (Johanos et al. 1994). As members of the genus *Monachus*, the only tropical phocids, they experience an asynchronous breeding season lasting from February through September (Johanos et al. 1994).

Pupping patterns vary wildly; not all females give birth in consecutive years (Kenyon and Rice, 1959; Johanos et al. 1994). Females that do give birth in consecutive years pup later each season, while female that skip a year or more give birth earlier the next season (Johanos et al. 1994). The mean interval for births in consecutive years was found to be 381 days (Johanos et al. 1994). Birth rates vary depending on breeding location and year, with approximately 30 - 70 % of all adult females giving birth in any given year (Johanos et al. 1994; Ragen and Lavigne, 1999). Females give birth from February to August, with the peak of births occurring in late March/early April (Johanos et al. 1994), although pupping has been recorded year round (U.S. Dept. of Commerce, 1986). They prefer to give birth on beaches with shallow water next to the shoreline and coral reefs surrounding the area, apparently to afford protection to the pup (Westlake and Gilmartin, 1990).

Newborn pups weigh 15 - 17 kg and measure 95 - 100 cm long (Kenyon and Rice, 1959). Pups are black at birth and undergo a post-natal molt late in the nursing period. Nursing lasts, on average, 39 days (Johanos et al. 1994), during which time the mother remains constantly near her pup in and out of water (Kenyon and Rice, 1959). The mother appears to fast and rapidly loses weight through lactation. At the end of lactation, she abandons her pup and swims offshore to feed (Kenyon and Rice, 1959; *Wirtz, 1968; Johnson and Johnson, 1984*). At weaning, pups normally weigh between 59 - 90 kg (Kenyon and Rice, 1959).

Their distribution, destinations, routes, food sources, and causes of the movements when not traveling between islands are not well known (Johnson, 1979). Approximately 10 - 15% of monk seals migrate among the breeding populations (Johnson and Kridler, 1983; NMFS unpubl. data). At the breeding islands, monk seals feed on octopus, spiny lobster, eels, bottom-dwelling fish and reef fish (Rice, 1960; Gilmartin, 1983; Goodman-Lowe, 1998).

Population status and trends

Two periods of human-related decline of the Hawaiian monk seal are recorded. The first occurred in the 1800's, where sealers, crews of wrecked vessels, and guano and feather hunters hunted the population to near extinction (Dill and Bryan, 1912; Kenyon, 1959). During subsequent years, expeditions to the NWHI reported increasing numbers of seals (Bailey, 1952). A survey in 1958 indicated partial recovery of the species to over 1000 seals (Rice, 1960).

A second period of human-related decline occurred from the late 1950's to the mid- 1970's. During this period, beach counts of Hawaiian monk seals in the NWHI declined by 50% primarily due to human disturbance at the western most populations, where military and U.S. Coast Guard operations occurred. Human disturbance on these beaches caused pregnant females to abandon preferred pupping sites and nursing females to abandon their pups (Kenyon, 1972; Gerrodette and Gilmartin, 1990). As a result of this decline, the Hawaiian monk seal was listed as endangered in 1976 under the U.S. Endangered Species Act of 1973 and depleted under the Marine Mammal Protection Act of 1972 (Gilmartin 1983).

Between 1958 and 1997, a decline of 60% was observed in the total mean beach counts at the main breeding populations. From 1985 to 1997, the species declined by 4% per year, and is therefore characterized as a strategic stock (Forney et al. 1999). This downward trend is expected to continue, mainly due to poor pup and juvenile survival in recent years at the largest breeding population, French Frigate Shoals (Forney et al. 1999; Craig and Ragen 1999).

In 1987, the population for five of the major breeding populations and Necker Is. was estimated to be 1,718 seals, including 202 pups of the year (Gilmartin 1988). This compares with 1,488 seals estimated for 1983 (Gerrodette 1985). In 1992, the Hawaiian monk seal population was estimated to be 1580 (SE = 147) (Ragen 1993). The best estimate of total abundance for 1993 was 1,406 (SE = 131). In 1997, a total of 1295 seals, including pups, were observed at the main reproductive populations, representing 90% or more of the seals (NMFS, unpubl. data). The current total monk seal population is estimated to be between 1,300 and 1,400 individuals (NMFS, 2000).

Small numbers (one to four) of monk seals are regularly seen around Kauai and each of the other MHI (Nitta, pers. comm., 1995). On Niihau, a single aerial survey conducted in September 2000 counted 29 seals hauled out on the beach, potentially indicating a population up to three times that number; the same survey counted 7 seals on Kauai (NMFS, unpubl. data). Pupping in the MHI was first recorded in 1962 with a birth reported on Kauai. In 1988, a single female gave birth to a female pup on the north coast of Kauai, Haiena Point (Reeves et al. 1992). In 1991, one pup was born on Kauai in the Poipu Beach area, one pup was born on the North shore of Oahu, and one pup was born on Niihau. In 1992, a pup was born on Kauai (North Kapa'a). In 1996, one pup was born on Oahu (Kaneohe Bay) and one was born on Molokai. In 1997, one pup was born on Oahu (Paradise Cove), one was born on Molokai, and one was born on Maui. In 1998, the only documented birth of twins occurred on Oahu (both pups died around the time of birth). Two other pups were born in 1998, one on Molokai and one on Maui. In 1999, one pup was born on Kauai at the Pacific Missile Range Facility; one pup was born on Molokai and one pup was born on Maui. In 2000, seven pups were born in the MHI. Two were born on Niihau, four were born on Kauai, and one was born on Molokai (NMFS Southwest Fishery Science Center Honolulu Laboratory, unpubl. data). The increase in documented births may be due to increased awareness and a better-educated public (i.e., knowing where to report monk seal sightings), but seems to reflect a genuine increase in the monk seal population in the MHI. Monk seal sightings on Kauai have increased in recent years, with frequent haul-out behavior observed at the south shore. For example, in the winter of 2000, eight monk seals (all molting) were observed at one time on Kauai at Poipu Beach (NMFS Southwest Fishery Science Center Honolulu Laboratory, unpubl. data). This contrasts with only one monk seal observation off the north shore of Kauai during 1994 shore-based MMRP surveys (Smultea et al. 1994).

Diving behavior

Data from a study conducted on seven adult male Hawaiian monk seals at Lisianski Island in 1980, in which radio tags and maximum-multiple-depth recorders were used, revealed a majority (59%) of dives were in the 10 to 40 m depth range. The remaining dives were deeper than 40 m, with a maximum depth of 121 m recorded (Delong et al. 1984). In 1982, an additional eight seals were similarly tagged at Lisianski, which included five adult males, one subadult female, one juvenile male, and one juvenile female (Schlexer, 1984). All seals made dives to depths greater than 36 m; no adult male seals made dives deeper than 70 m. The subadult and juvenile females showed a dive pattern different than the adult males whereby fewer dives were made in the shallow range (0 to 40 m) and many dives were made to depths greater than 40 m, with the deepest dive recorded at 150- 180 m (Schlexer, 1984). Recent time-depth recorder information from tagged monk seals revealed that some seals dive to deeper than 300 m, with some dives recorded deeper than 500 m (Parish et al. 2000). Hawaiian monk seals can stay submerged for at least 20 minutes (Reeves et al. 1992).

Vocalizations and hearing

Studies on the vocal behavior of monk seals are limited. A six month study on a young captive male Hawaiian monk seal revealed an audiogram showing a somewhat narrower hearing range than for other pinnipeds. The seal's hearing was most sensitive (20 dB above maximum sensitivity) underwater between 12 and 28 kHz. Below 8 kHz, the Hawaiian monk seal's hearing was less sensitive than measured in other pinnipeds (Thomas et al. 1990). Job *et al.* (1995) found that female Hawaiian monk seals do not identify pups from their vocalizations.

Impacts of human activity on the species

Hawaiian monk seals have been reduced to near extinction. The main threats could include commercial hunting, intentional harassment, entanglement in fishing gear, habitat modifications on breeding beaches on Midway and French Frigate, pollution, and unintentional human disturbance (Kenyon 1981; Gerrodette and Gilmartin 1990; Riedman 1990; Reeves *et al.* 1992).

EFFECTS OF THE ACTIONS

This biological opinion assesses the effects of the Navy's proposed employment of the NPAL sound source on endangered species of cetaceans and critical habitat that has been designated for them. In the *Description of the Action* section of this Opinion, NMFS provided an overview of the Navy's proposed program and NMFS' proposed authorization for incidental take of cetaceans by the NPAL sound source for the purposes of the Marine Mammal Protection Act. In the *Status of the Species* section of this Opinion, NMFS provided an overview of the numerous species that may be adversely affected by the NPAL sound source.

In this section of a biological opinion, NMFS assesses the probable direct and indirect effects of the NPAL sound source and of interrelated, and interdependent actions on threatened and endangered species and designated critical habitat. The purpose of this assessment is to determine if it is reasonable to expect that the Navy's NPAL sound source will have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild [which is the "jeopardy" standard established by 50 CFR 402.02]. The purpose of this assessment is also to determine if it is reasonable to expect the Navy's NPAL sound source will appreciably diminish the value of designated critical habitat for both the survival and recovery of threatened and endangered species in the wild [which is the "destruction or adverse modification" standard established by 50 CFR 402.02].

NMFS approaches these analyses by first evaluating the available evidence to identify the direct and indirect physical, chemical, and biotic effects of a proposed action on individual members of listed species or aspects of a species' environment. NMFS then evaluates the available evidence to identify the species' probable responses to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution by changing its vital rates (rates of birth, death, immigration, or emigration). NMFS then uses the evidence available to determine if these reductions, if there are any, could reasonably be expected to reduce a species' likelihood of surviving and recovering in the wild. If NMFS concludes that an action could reasonably be expected to reduce a species' likelihood of surviving and recovering in the wild, NMFS' final task is determining whether that reduction is likely to be "appreciable."

Approach to the Assessment

The NPAL sound source will introduce low frequency sound into the marine environment. These sounds will have physical effects on the marine environment, but only in the form of sound energy. There is no evidence of other direct or indirect physical, chemical, or biotic effects of the proposed action. Therefore, this section of this opinion will examine the effects of the low frequency sound on the marine environment and the probable responses of listed cetaceans to these sounds to determine if the action can be expected to affect the species' likelihood of surviving and recovering in the wild. Specifically, we will evaluate the available evidence to determine if the proposed action can be expected to physically injure, harm, or harass listed cetaceans.

NMFS defines harm to include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). The ESA does not define harassment nor has NMFS defined this term, pursuant to the ESA, through regulation. However, the Marine Mammal Protection Act of 1972, as amended, defines harassment as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [16 U.S.C. 1362(18)(A)]. The latter portion of this definition (that is "...causing disruption of behavioral patterns including...migration, breathing, nursing, breeding, feeding, or sheltering") is almost identical to the U.S. Fish and Wildlife Service's regulatory definition of "harass"[2].

For this biological opinion, we will define harassment as a disturbance resulting from a human action that disrupts one or more behavioral patterns that are essential to an individual animal's life history or to the animal's contribution to a population, or both. We are particularly concerned about injuries that may manifest themselves as an animal that fails to feed successfully, breed successfully (which can result from feeding failure), or complete its life history because of changes in its behavioral patterns. In the latter two of these examples, the effects on an individual animal could disadvantage a population because the individual's breeding success will have been reduced.

Evidence available for the assessment

The evidence available for this assessment of the effects of sound transmissions associated with the NPAL sound source was variable. Many investigators have studied the physics of low frequency sound in ocean environments and we can address these effects with a fairly high level of confidence. Many investigators have also begun to study how marine mammals and other marine organisms respond, physically and behaviorally, to sound sources. Despite these studies, we remain largely ignorant of how marine mammals respond to human-generated sounds in the marine environment. We still need more information on the basic hearing capabilities of marine mammals, on how marine mammals use natural sound to communicate and its importance to their normal behavioral routines, on whether low-frequency sounds affect marine mammal behavior and physiology (including the non-auditory physiology), and on sound pressure levels that produce temporary and permanent hearing loss in marine mammals (see NRC 2000 for further discussion of these unknowns).

We also remain ignorant of how marine mammals interpret sounds generally, including human-generated sounds, and how sounds affect their cognitive processes and their behavior. We do not know – and, perhaps, cannot know – how marine mammals interpret various sounds in the ocean environment and the relationship between those interpretations and marine mammal behavior. On a basic level, we do not know if or when marine mammals would classify a sound as a pollutant in their environment (noise), although this information is relevant to an analysis of the effects of the NPAL sound source on threatened and endangered species. Despite its relevance, this information is not available for this biological opinion and may never become available because we may never learn how marine mammals interpret sounds and how they adjust their behavior based on the sounds they hear. Therefore, while we recognize the limitations of the available data, we have drawn conclusions from the information available on the physics of low frequency sounds in the ocean environment and current knowledge of how marine mammals behaviorally respond to low frequency sound.

The primary sources of information on the effects of low frequency sound on marine mammals were three National Research Council reports (NRC 1994, 1996, 2000), a book published by Richardson et al. (1995) on marine mammals and noise, the Navy's Low Frequency Sound Scientific Research Program (which was developed to address questions associated with SURTASS LFA), ATOC Marine Mammal Research Program (which was developed to address questions associated with the ATOC project, which

[2] An intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3)

also used low frequency sound), several models the Navy developed for its Environmental Impact Statement on SURTASS LFA, and several scientific papers (Croll et al. 1999, Frankel and Clark 1998, Tyack 2000, Whitlow et al. 1997).

Effects Analysis

In order to understand the biological significance of the risk of the effects of sound, it is necessary to determine how this risk might affect a population of marine mammals, starting with acoustic criteria. First, the marine mammal must be able to hear low frequency sound. There is no evidence that listed species, particularly the endangered baleen whales which are considered the most sensitive to low frequency sounds, can detect or respond to sounds that have dropped much below the level of ambient noise. Richardson et al. (1995) state that it is unlikely that man-made sounds with received levels slightly less than the background noise level in the corresponding band would cause disturbance even if faintly audible. Thus, listed species would not likely be adversely affected by the NPAL transmissions outside of the NPAL zone of audibility (Richardson et al. 1995). The effects on listed marine mammals and the Hawaiian monk seal focuses on the portion of the action area that is within this zone of audibility.

Second, the animal must experience a reaction to the low frequency sound that is more than momentary. Third, any effect from low frequency sound must involve a significant behavioral change in a biologically important activity, such as feeding, breeding, or migration, all of which are potentially important for reproductive success of the population. The following is a discussion of the effects of continuation of the NPAL source transmissions on the endangered mysticetes, sperm whale, and Hawaiian monk seal.

The typical transmission schedule involves 20-minute transmissions every four hours (six total over the course of a day), every fourth day, with each transmission preceded by a 5-minute ramp-up period during which the signal intensity would be gradually increased, representing an average duty cycle of 2 percent. Duty cycles could be increased to 8 percent, during short-term testing or short-term long-range acoustic propagation studies. Increases to an 8 percent duty cycle would not occur during the peak humpback season, January through April. The transmissions would continue for 5 years. The NPAL signals transmitted by the source would have a center frequency of 75 Hertz (Hz) and a bandwidth of approximately 35 Hz (i.e., sound transmissions are in the frequency band of 57.5-92.5 Hz). At 1 meter (m) (3.3 feet) from the source, the sound intensity would be about 195 dB. The 8 percent duty cycle would not occur during the peak humpback season (January - April). The transmission schedule during the 2-month period would include no single transmission longer than 2 hours in duration. As an example, one possible 8 percent transmission schedule could include 20-minute transmissions at four hour intervals every day, instead of every fourth day. Another possible schedule would involve transmitting the 20-minute signal on the hour for 24 hours followed by 72 hours of no transmissions, repeated up to 15 times over the 2-month 8 percent duty cycle period.

The proposed action would only add sound to the marine environment. Existing loud frequency sound sources in the Pacific Ocean include, but are not limited to, natural seismic activity, vessel traffic, airgun arrays, and oil exploration and drilling. Ambient sound levels in portions of the Pacific Ocean north of Kauai would be increased during transmission of the NPAL source. This action is not expected to alter the chemical component of the ocean but may have biotic effects on marine organisms. The ocean is an environment in which sound is the best form for communication over distances, as sight can be for terrestrial animals. Marine animals, having adapted to living in water, probably obtain much information about their environment by listening to the sounds from other natural sources, aside from members of their own species. Examples include surf noise and sounds from predators such as killer whales. Marine mammals, and other animals rely on vocalization and hearing in order to communicate among a species or obtain information about their environment. Acoustic communication plays a significant role in the life history of cetaceans and other marine species. Whales may hear one another at ranges of up to hundreds of kilometers, but they see one another underwater at ranges of no more than tens of meters. As mentioned in the status of the species, baleen whales, sperm whales, and monk seals use a variety of songs, calls, echolocation pulses, and other sounds in communication and navigation.

Our analyses tried to determine the potential for injury and behavioral impacts from received sound levels, masking of sounds used in communication and echolocation, and indirect effects associated with changes in the abundance and distribution of the prey base for threatened or endangered species. Finally, our analyses tried to determine if these effects could change or disrupt biological important behavioral activities, such as feeding, nursing, or breeding, that could cause populations of listed species to decline. The analysis examines effects of the addition of noise to ambient conditions on individual humpback, fin, blue, sei, and sperm whales or Hawaiian monk seals. The analysis was organized to address the following categories of effects:

- Permanent or temporary shift in the threshold of audibility (permanent threshold shift or temporary threshold shift)
- Avoidance or other direct behavioral responses to the sound source, as well as habituation
- Masking of communication or echolocation pulses
- Reduction of prey resources

The analyses for each species utilizes the results of the Marine Mammal Research Program available as published articles and unpublished reports, as well as other acoustic and cetacean behavior information, as it represents the best scientific and commercial information available for understanding the potential for impacts on the species in the action area. For the topics for which there is no data on the species, inferences have been made from existing data on other marine mammals, because the marine mammals have similar ear structures and are adapted to similar underwater environments.

Project Effects on Mysticetes

Although there are no direct measurements of auditory thresholds in mysticetes, it generally is believed that they are adapted for hearing at low frequencies (below 1 kHz)(Ketten, 1994), and likely hear best in the frequency range of their calls (Myrberg, 1978; Turl, 1980). Baleen whale vocalizations range from below 10 Hz, to 25 kHz, with principal energy in the 50-300 Hz band (Ljungblad et al. 1980). Refer to the status of the species discussions for information on the each listed species considered here.

Direct effects on mysticetes

Changes to hearing sensitivity

Few data on the effects of non-explosive sounds on hearing thresholds of marine mammals have been obtained. However, it is generally accepted that received sound levels must far exceed the animal's hearing threshold for there to be any non-serious injury such as a temporary threshold shift (TTS; temporary reduction in hearing sensitivity). Received levels must be even higher for the risk of permanent threshold shift (PTS; permanent reduction in hearing sensitivity) to exist.

Some marine mammals tolerate, at least for a few hours, continuous sound at received levels above 120 dB. However, others exhibit avoidance when the noise level reaches approximately 120 dB. It is doubtful that many marine mammals would remain for long in areas where received levels of continuous underwater noise are 140 dB or higher at frequencies to which the animals are most sensitive (Richardson et al. 1995). The NPAL source, located 800 m below sea level, is expected to emit sounds at 195 dB at 1 meter. The level is expected to attenuate to140 dB approximately 550 m above the source (250 m below the surface), which is the maximum known dive depth of a humpback whale. This is the same received level it would experience at a distance of 100 m from another vocalizing humpback whale. Humpback whales emit vocalizations at 180 dB. The received levels from the Kauai source are, therefore, similar to those experienced by humpback whales in their day-to-day activities.

Humpback whales are the most commonly observed large cetacean in the vicinity of the NPAL sound source. Humpbacks generally transit the area, swimming parallel along the coast. Although humpbacks may be capable of diving past 200 m, it is unlikely that they would be found in the area around the sound source where received levels exceed 160 dB. Blue, fin, and right whales are believed to dive deeper than 500 m on occasion. Sei whales may dive to 300 m. Blue, right, and sei whales were not observed in the area near the NPAL source (Mobley et al. 1999a). It is unlikely that these whales would be exposed to levels near the NPAL source that has the possibility of causing PTS or TTS because these species are rare in the area and, if they were in the area, they would have to dive deeply during the transmission of the NPAL signal to be exposed. The number of individual animals that could sustain displacement or even TTS would be negligible.

Auditory interference or masking

Masking refers to environmental noise that interferes with the ability of an animal to detect a specific sound signal. The masking occurs when the environmental noise frequencies are similar to the signal that the animal uses or when ambient levels are much higher than the signal. Masking in marine mammals is a function of the animal's hearing sensitivity, ambient noise source level, and animal distance from the source. Masking processes in baleen whales are difficult to study, and little or no data on hearing sensitivity are available for these species. Mysticetes and other marine mammals are likely adapted to cope with some masking.

During the proposed sound transmissions (maximum 8% duty cycle), noise intensity in the vicinity of the sound source, and out to a radius of approximately 12 to 25 km, would be greater than ambient levels. This increase in noise has the potential to interfere with the detection of acoustic signals, such as communication calls, and other environmental sounds that may be important to mysticetes.
For an animal close to the operating NPAL source, it would be able to hear only nearby animals. Thus, for humpback whales that are close to the NPAL source, it is likely that animals close to one another will be able to continue communications. This is an important adaptation that will allow calf and pod interactions to continue during the NPAL transmissions or other natural or anthropogenic sound.

Given that humpbacks use low frequency songs to advertise themselves to improve their chances of mating, masking could be expected to result in interruption of the advertisements and reduce the chances of mating. The reduction of the chances for mating is not expected to be substantial because it would only occur during the 5 minute ramp-up and 20 minute transmission of the NPAL source and is likely to mask only singers in a limited area around the NPAL source.

Outside of the vicinity of the sound source, the blue, fin, sei, and right whale may be affected by masking from the NPAL source. As described in the Status of the Species section, blue and fin whales can apparently respond to one another over distances of at least 20-25 km (Watkins, 1981). There is a potential to reduce the radius of the communication ranges of mysticetes if ambient noise levels are increased, and other factors such as directionality of the noise source, and the animal's hearing sensitivity and directional hearing capability remain relatively constant. Masking of their communication could disrupt social interactions or lead to disorientation if sounds were being relied upon to navigate. The masking effects are expected to be limited. For species with broad spectrum hearing, such as mysticetes, masking from the NPAL source would mask only likely affect a narrow bandwidth because the frequency range of the NPAL source is 35 Hz. These species could be reasonably expected to have adapted to some masking of low frequency communication from natural sources (such as earthquakes). Because the NPAL source has a duty cycle of 2% and most transmissions would be 25 minutes long, fin and blue whales could be expected to use their adaptations to remedy any missed opportunities in mating or disorientation occurring as a result of NPAL transmissions.

Thus, the interruptions in behavior from the masking effects would be minor during the 2% duty cycle for humpback whales, fin, blue, sei, and right whales and would not likely result in declines in population numbers of these species. During periods of operation above the 2% duty cycle (up to 8%), the potential for masking effects would be greater. However, the higher duty cycle would occur only for a portion of the year outside of the humpback breeding season. Any adverse effects are expected to affect individuals temporarily, during exposure to the masking properties of the transmission signal.

Behavioral effects

Previous studies of mysticete responses to human-made noise have examined short-term behavioral responses to broadband industrial and recreational vessel noise extending from below 75 Hz to 1000 Hz.

Possible short-term reactions of mysticetes disturbed by human-made noise include interruption of feeding, resting, or social activities, and abrupt diving or swimming away (Finley, 1982; Calkins, 1983). Various studies and reported observations for a number of different mysticete species indicate variability in the responses to sounds of relatively high intensity (Bowles, et al. 1994; Malme et al. 1984; Maybaum, 1989; Mobley et al. 1988; Richardson et al. 1985; Richardson et al. 1995). In most instances, responses are affected by species, age and sex class, social context, habitat, habituation, and sound source characteristics.

There is variability in sensitivity and response to human-made noise between and within marine mammal species and a paucity of information about the consequences of short-term disruptions on marine mammals. Disturbance of marine mammals as a result of human-made noise, if intense enough, can result in interruption (at least briefly) of normal behavioral and social interactions with conspecifics, an increase in energy cost (whether or not feeding was disrupted or a fleeing response was elicited), and displacement to a less preferred habitat. Displacement also can have the benefit of removing the animal from a location where there might be more serious consequences had the animal remained (e.g., by reducing the masking effect of the human-made noise or the physiological stress that might continue if the animal remained close to the noise source).

Although there is little definitive information about the long-term effects of short-term disturbance reactions, isolated disturbance incidents probably have minimal or no lasting effects and the energetic consequences of most single disturbance incidents are likely insignificant. However, recurrent incidents of interrupted feeding, nursing and resting, if sufficiently frequent, can have negative effects on individual animals. The threshold at which the frequency and duration of disturbance that might initiate negative effects are not well known, and would likely depend on the species, area, feeding requirements, and reproductive status of the marine mammals involved. Animals most severely affected would likely be pregnant or lactating females and other animals subject to heavy natural energy drain.

A few marine mammal species exhibit extreme avoidance reactions to very low levels of industrial noise. Bowhead whales avoid airgun arrays by distances (up to 20 km) at which airgun sounds barely exceed background noise levels (LGL, 1998). Also, gray whales avoid industrial sounds in their migratory pathway when received levels reach approximately 120 dB (Malme et al. 1984). Experiments with migrating gray whales found that for animals exposed to industrial sounds placed directly in their migratory path, there was a 50% probability that a whale would avoid the area around the source when the received level was 116-124 dB (Malme et al. 1983; Malme et al. 1984). Similar response levels were measured for bowhead whales (summarized in Richardson et al. 1995; Richardson and Malme 1993). However, when similar noises were played to feeding humpbacks in Alaska, they did not show any response, even at received levels of 116 dB (Malme et al. 1985) and humpback whales on the breeding ground did not stop singing during underwater explosions (Payne and McVay 1971). Many other species tolerate, at least for a few hours, continuous sound received at levels greater than 120 dB (Richardson et al. 1995). Richardson et al. (1995) predicted that most marine mammals with hearing sensitivity below 100 Hz would not remain in areas where received levels of continuous noise remain at or above 140 dB, unless hearing was previously impaired. These results lead to a cautionary rule-of-thumb that whales would show an avoidance response to man-made sounds at received levels greater than 120 dB (Frankel and Clark, unpub. report).

As for the blue and fin whales, the Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar research program (U.S. Navy, 2000. SURTASS LFA Sonar Final Environmental Impact Statement) indicate that these species do not exhibit obvious responses from the LFA source array of 18 projectors (received levels were from 120 to 155 dB). Some cessation of humpback whale song and some apparent avoidance responses were displayed as a result of the LFA sound transmissions (received levels ranged from 120 to 150 dB). Of the whales that did stop singing, "most" resumed singing within less than an hour of the possible response. Those humpback whales that did not stop singing sang longer songs during the period of LFA transmissions, and returned to baseline conditions after transmissions stopped. It is therefore not likely that blue, fin, or humpback whales will show pronounced responses to the 120 dB sound field at the surface above the NPAL source. Sei and right whales are expected to respond, or not respond, similar to the whales that have been tested.

Neither the California nor the Hawaii Marine Mammal Research Program found any overt or obvious short-term changes in the behavior of humpback whales or elephant seals in response to the playback of NPAL-like sounds or to transmissions of the sound sources. In 1996, the behavioral responses of humpback whales to the playback of ATOC-like signals (maximum received level of 130 dB) were studied. Humpback whales showed no overt responses to these ATOC playbacks (Frankel and Clark, 1998). By contrast, the single playback of a humpback whale feeding call provoked dramatic changes similar to those seen in previous playback experiments (Mobley et al. 1988). In 1996 and 1998, the behavior of humpback whales was observed from a shore-station on the north coast of Kauai while a low-frequency noise similar to the ATOC source was played (Frankel and Clark 1998) and the Kauai ATOC source was transmitting (Frankel and Clark 2000). Both experiments were conducted using similar methods. Observations of humpback whale movements were made during control (no playback or transmissions) and experiment conditions. Statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; 2000). Both studies found that the distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing received levels. This result is not what would be predicted if the animals had been stressed by the sound source. Rather, it would be expected that the animals would have remained at the surface longer because of the lower received levels there as longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors. The biological significance of the increase in distance and time between successive surfacings is not known.

Costa et al. (1998) and Mobley et al. (1999) showed no statistically significant changes in the abundance of humpback and sperm whales from the control periods, when the source was not operating, to the experimental periods, when it was on. Aerial surveys around the ATOC source reveal no statistically significant shift in distance from the source when it was on or off for the humpback whale (Mobley et al 1999). However, statistical analyses of aerial survey data showed some shifts in the distribution of humpback whales away from the Pioneer Seamount ATOC source during transmission periods (Calambokidis 1998). The Pioneer Seamount surveys is based on 372 sightings as opposed to 28 sighting reported by Mobley et al. (1999) and therefore is statistically more powerful. Any responses by humpback whales that may result during NPAL transmissions is expected to result in temporary disruption of essential biological behaviors. The transmissions occur at a 2% duty cycle during the humpback breeding season and, thus, minimal disturbance to humpback whales are anticipated. Therefore, the NPAL transmissions may adversely affect humpback whales, but would not lead to population level effects.

Given the apparent low seasonal presence of blue, sei, right, and fin whales near the main Hawaiian islands, it is unlikely that any of these species will be present within the sound field over the five year period of sound source operation. Therefore, they should be not be exposed to the NPAL source at the high levels and operation of the source is not expected to result in direct behavioral responses by these species.

Habituation to the NPAL source

Richardson et al. (1995) defined habituation as the development of reduced response when there is repeated or continuous exposure to a stimulus and when the stimulus is not accompanied by anything that the animal "perceives" as threatening. Although relatively few studies of habituation in marine mammals have been done, several cases of apparent habituation have been reported for baleen whales (Watkins, 1986; Dolphin, 1987; Malme et al. 1985; Richardson et al. 1985, 1990) which suggest they tend, over time, to become less sensitive to certain types of repeated noise and disturbance which they perceive as non-threatening. Animals are also more likely to habituate to a sound with relatively steady characteristics than to a highly variable sound. The rate and intensity of exposure to a stimulus to maintain habituation (e.g., whether animals exposed and habituated to a disturbance during one year would still be habituated the next year) is not known.

Around Cape Cod, Watkins (1986) suggested that reactions of various species of baleen whales changed over the years as whale-watching cruises became popular. Some species, particularly humpback and fin whales, appear to have become less wary of boats in recent years. Dolphin (1987) reported that humpbacks off southeast Alaska initially reacted to an outboard motorboat used in his research, but soon accommodated to it. Malme et al. (1985) suggested that reactions of humpbacks to noise pulses from an airgun waned after the first exposure. Richardson et al. (1985, 1990) found that some bowheads remained near dredges and drill ships that were producing continuous noise, even though bowheads exhibited at least weak avoidance reactions at the onset of about the same levels of drill ship or dredge noise. These observations suggest that marine mammals, like other animals, over time, tend to become less sensitive to noise and disturbance to which they are repeatedly exposed in some cases, unless there is a threat associated with the stimulus.

The effects of substantial disturbance, which might result from a stationary and continuously noisy human activity near a marine mammal concentration area, could be mitigated in part by the degree to which the marine mammals habituate. Habituation effects can also limit the direct impact of a stimulus, in this instance the received levels. Habituation can be detrimental, however, if it leads to a lack of response to hazardous situations or results in masking. If animals fail to habituate and are excluded from an important concentration area or are subject to ongoing stress while in that area, then there could be long-term effects on the individuals and the population. Studies to date show that humpback whales at least respond with longer dive times to the ATOC source, and no change in distribution or abundance were observed during ATOC transmission. Habituation of the humpback whales to the NPAL sounds could occur, but these whales generally move along the coast and will not likely remain in the area of the NPAL sounds, reducing the chances of habituation.

The habituation of blue, fin, sei, and right whales to the NPAL source would not be detectable. These species would generally be exposed to NPAL transmissions at a reduced level because they are rare around Kauai.

Long-term effects

It is difficult to identify the specific cause of an apparent long-term effect (e.g., prolonged displacement), and even the occurrence of displacement can be difficult to detect. However, there are a few reports of probable or possible long-term displacements of marine mammals from local areas in which underwater noise was presumably a major factor. The best documented of these reports was the abandonment by gray whales of a calving lagoon in Baja California for several years, and their return after vessel traffic diminished (Gard, 1974; Reeves, 1977; Bryant et al. 1984).

Depending upon the circumstances, changes in marine mammal use of an area may be quite slow and difficult to detect, particularly if abandonment thresholds are not acute. If marine mammals did react to noise from human activities by reduced use of certain areas, in many cases there would be insufficient reliable and systematic information (including baseline data) to document the trend. Conversely, it may be easier to document cases where marine mammals remain in an area where sounds are introduced.

Although the potential significance of permanent displacement is difficult to determine, Richardson et al. (1995) speculated that in an area of small size relative to range, where the density of animals is low, and similar to the densities in many other areas, permanent displacement is unlikely to be critical either to individuals or to the population. They noted, however, that effects of displacement would be problematic in areas consistently used by high concentrations of animals or areas important to a small, but critical component or function of the population (e.g., mothers with calves, or mating).

Animals that appear to tolerate human-made noise are presumed to be less affected by the noise (e.g., through habituation) than are others whose behavior is changed overtly, sometimes with displacement. However, as noted by Richardson et al. (1995), the presence of marine mammals in an ensonified area does not prove that the population or individuals therein are unaffected by the noise. For example, the number of animals in the ensonified area may be only a fraction of the numbers that would have been there in the absence of the noise. Also, marine mammals may stay in an area despite the presence of a noise disturbance if there are no alternative areas that meet their requirements (Brodie, 1981). In response to such situations, animals may experience stress, resulting in physiological responses. Todd et al. (1996) found that humpback whales on feeding grounds did not alter short-term behavior or distribution in response to explosions with received levels of about 150dB at 350Hz. However, at least two individuals were likely killed by the blasts and extensive had mechanical injuries in their ears (Ketten et al. 1993; Todd et al. 1996). The explosions may also have increased the number of humpback whales entangled in fishing nets (Todd et al. 1996).

The long-term health effects of chronic noise exposure in marine mammals are unknown, although it appears that marine mammals do exhibit some of the same stress symptoms as terrestrial mammals (Thomson and Geraci, 1986; St. Aubin and Geraci, 1988, Curry, 1999). Studies of terrestrial mammals have shown that physiological reactions, such as elevated heart rate, may occur even in the absence of overt behavioral responses (MacArthur et al. 1979).

The potential for long-term impacts from exposures to the project sound fields is unknown, but is being examined concurrently with the NPAL transmissions. So far, the aerial surveys from 1994-1998 (Mobley et al. 1999a) do not indicate a change in abundance of humpback whales, which are expected to be affected more so than other mysticetes.

Indirect effects on mysticetes

There are likely to be few if any indirect effects on listed mysticetes from the project. The principal indirect effect would be any potential impact on the food chain that ultimately could affect mysticetes in the vicinity of the study area. Since the waters off the north shore of Kauai are not known to include significant feeding areas for baleen whales during the winter breeding season, particularly off the north shore of Kauai, no effects on mysticete prey are expected from the proposed project.

Project Effects on the Sperm Whale

The generally accepted method for determining the potential for harm to the auditory system from introduced sound is to first characterize the hearing capabilities of the subject species. As with humpback whales, it is assumed that a species can hear the noises it is capable of producing. For odontocete species, however, additional studies have been conducted (on species other than sperm whales) to determine hearing sensitivities. These studies indicate the odontocete hearing sensitivity is best above about 10 kHz. It is hypothesized that the sensitivity of odontocetes to high frequency sounds is related to their use of very high frequency (VHF) sound pulses for echolocation and moderately high frequency calls for communication.

Direct effects on sperm whales

Changes to hearing sensitivity

Although the sperm whale inner ear resembles that of most dolphins, and is tailored for ultrasonic (>20 kHz) reception, there are indications that the sperm whale may have hearing capability at low frequencies (Carder and Ridgway, 1990), and the species is known to be sensitive to changes in its acoustic environment (Watkins and Schevill, 1975; Watkins et al. 1985a, 1985b). Sperm whales have been found to react to sounds at frequencies below 28 kHz, including 3.5 kHz submarine sonar signals (Watkins et al. 1993). Based on inner ear anatomy Ketten (1994) noted that the predicted functional lower limit of hearing for sperm whale should be near 100 Hz.

Sperm whales are capable of diving deeper than 800 m. Such dives near the NPAL source could result in PTS or TTS. Aerial survey data from 1993 to 1998 indicated that sperm whales are generally found relatively far offshore of Kauai many kilometers outside of the calculated 120 dB sound field for the previous ATOC project. The data for all the surveys combined (1993-1998) show that most sperm whale sightings were on the fringes of the survey area, at about 50 - 70 km from shore. Thus, most of the sightings were of individuals located outside the area where sound levels would be potentially harmful. There was, however, an observation of three sperm whales near the ATOC sound source which occurred when the sound had been off for at least 24 hours.

Because sperm whales are not normally located within the affected area around the ATOC source, it is unlikely that any individuals will be present in the area during transmissions. Furthermore, in the unlikely event that individuals are within the affected 120-dB area, it is expected that the individuals would depart the area during ramp-up. Therefore, the probability of repeated sound exposures to the same animal sufficient to cause a PTS injury or a TTS hearing impairment, given that the proposed duty cycle is no greater than 8 percent and that the occurrence of sperm whales in the area is low, is extremely small.

Masking and auditory interference

Auditory interference or masking in odontocetes is governed by the same general principles that apply to mysticetes. Significant masking only occurs for frequencies similar to those of the masking noise. The maximum radius of influence of an introduced sound on marine mammals is the distance from the source at which the noise can barely be heard. This range is determined by either the hearing sensitivity of the animal, and/or the background noise level (Richardson et al. 1995). Communication signals in beluga are subject to masking by low frequency noises of icebreakers based on laboratory, field, and modeling studies (Erbe, 2000).

Masking for sperm whales could affect communication between individuals, ability to receive information from their environment, or echolocation effectiveness. Sperm whale clicks can range to below 100 Hz, but most of the energy is concentrated at 2-4 kHz and 10-16 kHz. Although some of the lower ranges of clicks from sperm whales may be subject to masking from the sound source frequencies, due to the limited range of high sound transmissions (in an approximately 178 m radius around the sound source at 807 m depth) little, if any masking would occur as a result of NPAL source transmissions. Even if masking did occur, the effects are expected to be temporary, as sperm whales vocalize on a regular basis and the NPAL source transmits on a less than 8 percent duty cycle. Therefore, any missed opportunities for communication would be short in duration. Masking of echolocation signals are not expected to be affected by the NPAL source because sperm whales use clicks at higher frequencies than that used for NPAL project.

Potential for behavioral effects

Behavioral disruption has the potential to affect important behavioral patterns that are essential to an individual animals' life history or to the animal's contribution to a population, or both. Impacts of this sort include behavioral manifestations which cause failure of feeding, reproduction, or another life history element due to changes in its behavioral patterns. Adoption of habitual coping behaviors may prove successful in adapting to the disturbance if the adoption fits the normal range of behavior for the individual.

As with other marine mammals, odontocetes exhibit disturbance reactions such as cessation of resting, feeding, or social interactions and/or changes in surfacing, respiration, or diving cycles, and avoidance behavior in response to certain frequencies and intensities of sound. For example, odontocetes have been observed both approaching and avoiding noisy sources, but are also relatively unresponsive to noise at low frequency (Awbrey et al. 1983). Sperm whales, however, may react to sounds at low frequencies because they can hear at low frequencies, and have been known to react to received levels of 100 dB at 3.5 kHz generated by submarine sonar (Watkins et al. 1993).

Calambokidis et al. (1998) noted sperm whales to be distributed further away from the ATOC source during experimental periods when the source was operating off of the coast of California, based on a total of 337 sperm whale sightings. The consequences of this shift is not known. A total of 8 pods were sighted within a 40-km radius during the 1994 and 1998 aerial surveys. The sightings closest to the ATOC source occurred when the source was not transmitting. A response to the ATOC source can not be detected because of the low sample size. The proposed action may result in behavioral responses in a few sperm whales over the duration of the transmissions. However, because the ATOC source area seems to support only a few sperm whales, any avoidance response would be exhibited by a few whales. If avoidance response is only a shift in the position of the whales away from the ATOC source, the consequences are expected to be minor because sperm whales are specialists of deep water habitats, and displacement to areas further off shore are not expected to disrupt biologically significant activities, such as feeding. Thus, adverse effects may occur to a few sperm whales, but would not result in population level effects.

Potential for habituation

There have been relatively few studies of habituation in marine mammals. In toothed whales, one apparent example of habituation is the tolerance by white whales of the many boats that occur in certain estuaries versus the extreme sensitivity of this species to the first icebreaker approach of the year in a remote area of the high Arctic. Also, in certain areas, wild dolphins have become unusually tolerant of humans, and may even actively approach them (Lockyer, 1978; Conner and Smolker, 1985; Shane et al. 1986).

Sperm whales occur in the vicinity of the NPAL source and occur within the action area. Habituation of the whales to the NPAL source transmission is possible, which may result in individuals closer to the NPAL source than previously recorded. Implications of habituation are not known. Changes over long periods of time of habitat utilization could be difficult to detect and the cause of the changes detected difficult to ascribe.

Potential indirect effects

The principal indirect effect in this case would be any potential impact on the food chain that could ultimately affect odontocetes in the vicinity of the study area. Any effects on prey items for the sperm whale which include primarily mesopelagic squids and fish, would be localized around the sound source. Since the sound source is not in an area known as a nursery ground for these species, these species are unlikely to be affected by the sound transmission in a way that would affect prey abundance. In addition, NPAL source area is not known to be an important sperm whale feeding area, and it is unlikely that an indirect effect of the project would be reduction in prey availability.

Project effects on the Hawaiian monk seal

There have been no studies measuring the underwater vocalizations of monk seals, therefore, analogies must be made to other phocids for which information has been obtained. In general, phocids are capable of producing relatively intense underwater sounds at source levels of 95 to 178 dB at 1 m, at frequencies between 90 Hz and 150 kHz. For monk seals, there has been only one study conducted to determine hearing sensitivities. Underwater audiograms of Hawaiian monk seals indicate their best hearing is between 12 and 28 kHz at about 65 to 95 dB at 1 m (Thomas et al. 1990).

Direct effects on Hawaiian monk seals

Changes to hearing sensitivity

The best data available on TTS in phocids is by Kastak et al. (2000) who showed that elephant seals experience TTS after a 20 minute exposure to octave-band noise at a level of about 145 dB. Presumably monk seals would respond similarly.

Monk seals can stay submerged for 20 minutes. Recent satellite tagging and time-depth recordings of monk seals show that about 10 percent of monk seal dives exceed 100 m (Parrish et al. 2000). Moreover, 3 out of 24 seals were recorded as exceeding 300 m and Ragen (ARPA/NMFS, 1994) detected monk seals diving to at least 500 m. Therefore, while it seems likely that monk seals could dive to depths where they could receive some sound levels from the NPAL source, exposure from the NPAL source is unlikely to be able to cause a TTS impairment because the monk seal would have to remain at a depth where the received level is 145 dB (approximately 316 m below sea level) for 20 minutes.

There is still potential that one or more monk seals could sustain a TTS impairment, if monk seals could incur TTS with exposures at less than 145 dB. However, because few monk seals are found off Kauai, and because current research indicates that monk seals normally feed on demersal and benthic organisms in waters shallower than 100 m (although 3 of 24 tagged seals made dives greater than 300 m), there is a low likelihood that any monk seal will experience either a TTS or PTS injury as a result of the action.

Auditory interference or masking

Significant masking occurs for frequencies similar to those of the masking noise. The maximum radius of influence of an industrial noise or NPAL sound transmission on a marine mammal is the distance from the source at which the noise can barely be heard. This range is determined by either the hearing sensitivity of the animal, and/or the background noise level and frequency (Richardson et al. 1995).

It is not known to what extent monk seals experience masking from existing noise sources, including shipping. There is no evidence of a significant effect from current noise sources, but it should be recognized that such effects would be exceedingly difficult to observe. Even if direct observation of masking is possible, any masking effects on Hawaiian monk seals would be expected to be minor because of the low duty cycle of the NPAL source.

Behavioral effects

There have been few studies on the effects of low frequency underwater sound on the behavior of pinnipeds. Behavior of some species has been described relative to oil drilling and production activities. Ringed seals were observed in lower densities within 3.7 km around artificial islands during drilling operations in one instance and showed no differences in density in others (Kingsley, 1986; Frost and Lowry, 1988). Ringed and bearded seals were observed approaching and diving within 50 m of an underwater sound projector emitting a steady low frequency drilling sound (>350 Hz) with a received level of about 130 dB at that distance (Richardson et al. 1995).

Pinnipeds may sometimes tolerate intense impulsive sounds with strong low frequency components in water, particularly when they are attracted to a specific area for activities such as feeding or reproduction. The limited audiometric data for Hawaiian monk seals and the variation in response by different species of pinnipeds to low frequency sounds makes it difficult to extrapolate behavioral effects. However, given the relatively poor sensitivity of monk seals to frequencies lower than 8 kHz and their limited distribution around Kauai, any potential behavioral effects would likely be limited.

Indirect effects on monk seals

The principal indirect effect on Hawaiian monk seals would be the potential impact on the food chain that could ultimately affect any of the individual animals in the vicinity of the study area. The common prey species for monk seals that might occur in the study area include benthic and reef dwelling fish, eels, octopus, squid, and spiny lobsters (Rice 1964; NMFS 1980; MacDonald 1982; Watson and Peiterson 1983).

If low frequency sound transmissions were to affect any of these prey species, the impacts should be limited to the immediate vicinity of the project area with the highest received levels. Therefore, the distribution, fecundity, or other factors affecting prey availability would be within a small area and would not affect the overall availability of prey. It is unlikely that monk seals would be indirectly affected by effects of the project on prey items.

Summary of the potential effects on listed species

Summary of effects on mysticetes (humpback, blue, fin, sei, and right whales)

Humpback whales are usually limited to the upper 150 m of the water column, though they have been known to dive as deep as 200 m. Average feeding depth appears to be 41-60 m. Humpbacks migrate through the project vicinity during the winter breeding season in Hawaiian waters and possibly on their way to and from their summer feeding grounds in Southeast Alaska. Humpbacks, like other baleen whales, are thought to have good, low frequency hearing. They produce sounds from 40 Hz to 8 kHz, primarily centered around 100-300 Hz. Therefore, it is possible that some sound transmissions could mask their vocalizations and interrupt communication among individuals. Such masking and interruption would be temporary because transmissions are 25 minutes long and operate up to an 8% duty cycle. Because of their relatively shallow diving capabilities, it is unlikely that they would experience any acute impacts such as TTS from the transmissions. As discussed above, the likelihood of an individual humpback whale remaining in the area is remote, since humpback whales typically swim parallel to the shore and at a distance from shore that is not within the area in which received levels are expected to be over 120 dB. This characteristic reduces the possibility of habituation of humpback whales to the NPAL signal. Humpback whales have been observed to increase dive times during ATOC transmission. No other response behaviors were detected. The lack of observable response behaviors does not indicate that the ATOC source is benign. However, aerial surveys conducted to date show that the distribution and abundance of humpback whales near the NPAL source has not changed. The NPAL transmissions may adversely affect humpback whales but the effects are expected to be temporary.

The potential for some masking in relation to any of the mysticetes (humpback, blue, fin, sei, or right whale) is possible, but the effects would be temporary interruptions of communication or navigation and would not likely result in the survival or reproductive abilities of individuals.

Summary of effects on sperm whales

The sperm whale is the only listed odontocete with the potential to experience any impacts from the source transmissions. Sperm whales dive to depths of more than 2000 m and can remain submerged for an hour or more. They are usually found in the ocean at or beyond the 1000 m depth contour. Therefore, it is possible that some sperm whales could be exposed to maximum source transmissions which could result in TTS or PTS, but these effects are unlikely to occur. Limited data indicate that sperm whales may be able to hear frequencies <100 Hz, although the construction of their inner ear indicates best reception of high frequencies and ultrasonic sounds. The sounds produced by sperm whales center around two frequency bands, 2-4 kHz and 10-16 kHz, well above the frequency of the sounds transmitted. It is very unlikely that the sound transmissions would interfere with, or mask, the most common sperm whale sounds, but may affect the lowest frequencies sperm whales may use in communication, echolocation, or mechanoreception. Therefore, although the proposed sound transmissions may have the potential to adversely affect sperm whales, the likelihood of such an effect appears low because of the low numbers of sperm whales in vicinity of the NPAL sound source and the low duty cycle of transmissions. For those sperm whales that are affected, the effects would be temporary and would not lead to a reduction in the survival or reproductive capabilities of the individuals.

Summary of effects on Hawaiian monk seals

The Hawaiian monk seal is the only pinniped likely to be found in the vicinity of the NPAL project site and study area. Based on known distribution and density of monk seals around Kauai few if any individual seals would likely be exposed to the NPAL sound source. Even if a monk seal were to dive to 500 m directly over the sound transducer, the maximum received level at that depth would be 144 dB, a level the animal would have to experience for 20 minutes continuously to experience TTS (based on Kastak and Schusterman, 2000 for elephant seals). Monk seals have not been shown to have diving capabilities for such a duration. Further, any distributional or behavioral changes, should they occur, would be extremely difficult to detect given the few individual seals that might be found within the study area. The NPAL source has a small probability of affecting individuals temporarily and in such as way that would not affect the reproductive or survival capability of the individuals.

Potential effects of NMFS' proposed take regulations

A small take authorization under the MMPA has been requested, and NMFS is proposing to issue regulations permitting the incidental taking of marine mammals during project operations. The potential effects on listed species are being evaluated in the issuance process. Some adverse effects, such as minor disturbance may occur during the course of aerial surveys to assess impacts to humpback whales, but these should be minor and not result in take. The take being authorized is for "harassment that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (MMPA definition of Level B harassment). This type of harassment is not expected to result in injury to animals and the disruptions to behavioral patterns are expected to be unlikely (due to the low duty cycle as well as other factors discussed previously), and if it occurs, temporary.

Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

At this time, NMFS has no information on projects or activities of this kind in the action area. NMFS expects commercial and recreational fisheries managed by Hawaii, Alaska, and other Pacific coasts states to continue within the action area for the foreseeable future. Due to lack of good data, it is not possible to accurately estimate injury and mortality rates on humpback whales due to fisheries interactions. NMFS expects whale watching operations, vessel traffic, aircraft and helicopter tours, and research activities to continue for the foreseeable future, mostly in the winter in Hawaii and summer in Alaska. The best scientific and commercial data available provide little specific information on any long-term effects of these potential sources of disturbance on whale populations. Information on the effects of repeated harassment by research activities, vessel traffic, and whale watchers is also lacking. It appears that the number of humpback whales is not decreasing and there is insufficient information on the trends of fin, blue, sei, right, and sperm whales. Hawaiian monk seals continue to decline. Therefore, at the present time, continuation of these activities in the action area do not appear to pose any threat to humpback whales and conclusions on the cumulative effects of these disturbances can not be drawn at this time for the fin, blue, sei, right, and sperm whales, and the Hawaiian monk seal.

CONCLUSION

Based on the status of the species, environmental baseline, effects of the action, and cumulative effects, NMFS concludes that the proposed action as described is not likely to jeopardize the continued existence of the endangered humpback, *fin, sei, blue, right, and sperm whales or the Hawaiian monk seal*, or result in the destruction or adverse modification of critical habitat considered in this biological opinion.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

NMFS is not including an incidental take authorization at this time because the incidental take of marine mammals has not been authorized under section 101(a)(5) of the Marine Mammal Protection Act and/or its 1994 amendments. Following issuance of such regulations or authorizations, NMFS may amend this biological opinion to include an incidental take statement for marine mammals, as appropriate.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information.

The following conservation recommendations are provided pursuant to Section 7(a)(1) of the Act to assist the project coordinators in reducing or mitigating adverse impacts to listed species that may be found within the project site resulting from the proposed project.

1. The effects of masking by low frequency anthropogenic sounds on baleen whales should be investigated through studies of similar species that are sensitive to low frequency sound. These studies should be published in scientific journals.

REINITIATION OF CONSULTATION

Reinitiating of consultation and initiation of sound source shutdown procedures will be required if (1) the amount or extent of incidental take is exceeded; (2)new information reveals effects of this action that may affect listed species or critical habitat in a manner or to an extent not previously considered herein, including but not limited to information, data, or analysis indicating significant adverse impacts upon listed species or marine mammals related to low frequency sound transmissions or the initiation of a shutdown, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

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CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
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IMMEDIATELY FOLLOWING

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