significantly boost the estimated 1,085 pounds a day of "feed not converted to fish"—that is, fish feces—that the fish farm would produce. Nonetheless, 1,085 pounds of fish feces amounts to more than a half-ton per day, or about 200 tons a year.

But fish feces is not the only waste of concern. As a 2000 report from the National Marine Fisheries Service documents, mariculture suffers from a significant number of diseases and parasites, which tend to spread quickly in cages. Consequently, the food fed to farmed fish is routinely laced with antibiotics and pesticides. According to the World Health Organization, farmed salmon, for example, receive more antibiotics by weight than any other type of livestock.

As happens elsewhere, parasites and diseases can pass from wild fish to captives, and vice versa. Sea lice—which has recently caused the millions of juvenile salmon to die in British Columbia waters—occur on reef fish and open-ocean fish in Hawai'i. The Hawai'i Institute of Marine Biology has investigated about a dozen diseases in 'opakapaka — mentioned as a species for possible cultivation in KBWF's EA. A 2001 HIMB research paper notes that "as the culture of a fish species expands, devastating economic and biological losses due to 'new' or 'unknown' diseases follow." Richard Brock, UH Sea Grant Extension director, told me that in general, little is known about the parasites and diseases that occur in ahi, mahimahi, kahala and other native fish, but, he said, "once you crowd animals you run the risks of having disease sweep through the population."

In fact aquaculture uses a host of chemicals, including parasiticides, fertilizers, anesthetics, spawning hormones, vaccines, algicides and herbicides, according to recent reports by the Environmental Protection Agency. Ten drugs have FDA approval for aquaculture use, and there is strong pressure for additional ones to get a thumbs-up. There is no mention of the chemicals that KBWF plans to use, or would consider using, in their EA. But when disease threatens to wipe out investments, will they medicate sick fish, dump them into the ocean, or haul them to landfills? Given that widespread antibiotic use has resulted in resistant disease organisms and that traces of drugs are increasingly showing up in surface waters, all these options pose health risks.

While the EA is mum on the use of chemicals, it does state that with a running current of one knot, the biological material (that is, fish feces) added daily to surrounding waters would be equivalent to one pound of fish food in 164.563091 Olympic-sized swimming pools. When I asked UH-Hilo physical oceanographer Brent Gallagher about this he called the swimming pool analogy "very simplistic." He said "It assumes the current runs steadily in one direction and all the material will be cleared out every day. But that's not how coastal ocean currents work." Gallagher said the ocean is more like a huge-scale washing machine, He explained that eddies carry water offshore and back in, currents are variable in speed and direction, and twice a day the tidal flow changes."

Further, he said that fish farm sewage would settle out to the bottom, according to the speed and direction of water movement, Gallagher said. "Think of a 2,000 foot-long sewer outfall pouring into the ocean. Pollutant levels will build up to higher concentrations near the site, lower concentrations further out. This is an issue to be concerned about. It is incumbent on the company to do studies on turbulent diffusion to map this out," he said.

Biologist Bill Walsh, of the Division of Aquatic Resources (DAR) also told me that Kona-Kohala currents are highly variable, with speed and direction changing with the season. "Even longtime fishermen often don't know where currents are running until they get out on the water," he said.

Mr. Sarver told me that currents at Keahole Point are "very strong," though they can vary "a great deal." He also acknowledged that currents at the proposed site—a good mile from Keahole—are not well understood. Mr. Sarver told me they had a current meter at the site for a month last summer, but the battery went out, so little data was collected. Having worked for the Monterey Bay Aquarium Research Institute, which annually spends tens of millions of dollars on developing state-of-the art ocean instrumentation, I am not surprised to hear their current meter failed. Ocean instruments are subject to punishing forces and they fail frequently—which should warn us not to depend solely on technology to mitigate the adverse effects of fish farms.

Contradicting the EA, Mr. Sarver told me KBWF is assuming the average current to be about one-half a knot. He said that the company just has to do the best it can with the data it has. And I say, the question of currents is of the highest priority, and it has not been addressed.

To quell concerns about the effects of fish farm operations on water quality, KBWF has referred to the results of the Hawai'i Offshore Aquaculture Research Project (HOARP) conducted off Oahu from 1999-2001. HOARP used a single 50-foot by 80-foot submerged cage and monitored water quality over a two-year period. HOARP documents quoted in the KBWP EA state that researchers found increases in the numbers of seafloor animals that feed on detritus near the site, but concluded that the cage had "little effect on the surrounding waters at distances of more than a few hundred meters." This is roughly 950-1250 feet.

However, extrapolating results from a one-cage project to the nine acres of submerged and/or surface cages that KBWF is proposing is like comparing Hilo to Honolulu. First, "scaling up," as scientists call it, is not a simple multiplication problem, and the outcomes aren't necessarily predictable or immediate. Second, the HOARP project raised moi, which feeds largely on plant matter, so the wastes are less of a problem than with carnivorous fish. Also, the water-quality results quoted were made when HOARP was producing about 76,000 pounds of moi a year, while KBWF plans on close to 800,000 pounds—an order of magnitude greater production. Furthermore, the HOARP cage—which has been expanded to four cages on 28 acres and turned over to Cates International as the only existing commercial mariculture operation in Hawaii—lies two miles off O'ahu's coast, five times the offshore distance of the proposed KBWF site, and NOT in Class AA waters.

According to DAR biologist Bill Walsh, a vibrant, healthy coral reef extends within 200 yards or so of KBWF's proposed site. How will large amounts of fish-farm sewage affect the reef and marine life? Professor Leon Hallacher, a fish biologist with UH-Hilo, told me there could be significant impacts, but they could take time to show up. Hallacher pointed out that studies on the Great Barrier Reef and elsewhere show that even tiny nutrient increases of a few microliters can shift the balance in the competition between corals and algae, favoring the spread of algae and hampering coral growth. Hawaii has witnessed extreme cases of this in Kaneohe Bay and in West Maui's nearshore waters.

"Nutrient loading" from various sources threatens declining coral reefs around the world. Research by coral biologist Bob Richmond, of the University of Guam, has shown that infinitesimal changes in water chemistry also affect the abilities of corals to reproduce and settle on the seafloor. Other studies have shown connections between excess nutrients and coral bleaching. Last year, I wrote articles for the American Association for the Advancement of Science on two different coral diseases, white pox and black-band disease, which ecologists have linked to sewage bacteria. Surprisingly, these diseases often show up many miles from point sources of sewage, suggesting that reefs are so chemical-sensitive that even the ocean's powers of dilution cannot sufficiently protect them in some circumstances.

More and more we are finding that even low levels of all kinds of harmful chemicals have biological effects. The proposed 81-acre site also lies within the Hawai'i Humpback Whale National Marine Sanctuary, and whales frequent the area during their breeding and calving season. Why would we want to take the risk of subjecting the Kona coast's pristine waters—its coral reefs, spinners and other dolphins, and marine sanctuary for humpback whales—to chemical pollution? For a project whose EA promises, at most, six full-time jobs, and says it will export most of its products to the highest-paying markets overseas?

Members of the Board, it goes without saying that this is not a straightforward land lease of 81 acres. The marine environment is open-ended, and the potential ramifications of a lease are much more slippery to grasp. I urge you to proceed with caution. I urge you to consider the cumulative impacts of a string of floating pig farms off West Hawaii, and to contemplate what tourists will think when they see our breathtakingly beautiful coastal waters sullied by such operations. The decisions you make on this permit application will set a precedent for all future proposals for offshore aquaculture. I urge you to consider postponing your decision until a proper regulatory framework and other standards are in place that will enable you to comply with the applicable laws.

But if you choose to ignore these concerns, I urge you to reject a FONSI. The 2002 report to the Legislature on Act 176 states that "Environmental Impact Statements should be prepared for individual projects. The

extent of the review process should reflect the risks associated with the project under consideration." The risks associated with the Kona Blue Water project are far too great to allow it to go forward with its inadequate EA. If this process is to continue, I urge the board to require the applicants to come up with an alternative site much further offshore, and to prepare an EIS that addresses in full the many issues involved.

The project proponents have already received $1.5 million from the taxpayers in the form of a US Dept. of Commerce grant, as well as a considerable state subsidy to their business through the use of NELHA facilities. If they want to pursue a business that demands opening a Pandora's box on our coastal waters, then they should step up to the plate and justify it in a full EIS.

In closing I want to say that I, too am very concerned about the virtual collapse of fisheries around the world. However, pursuing offshore aquaculture, which is unsustainable over the long term and would threaten the our marine environment is NOT the answer to the demand for fish. The only real answer is not an easy one, but it is doable: we must allow our fishery stocks to regenerate themselves by setting aside marine reserves that will replenish fish numbers and by developing more intelligent and environmentally responsive fisheries management policies.

Thank you.

Noreen Parks
HCR2 Box 6841
Keaau, HI 96749
808 966-6916

Hi Debbie,

As you may know, I have been researching and writing about the KBWF proposal for an 81-acre site off the Kona coast for a fish farm. There are many environmental concerns, not to mention a void of regulatory and monitoring framework. The way this is handled will surely set a precedent for future applications, so I'm very concerned that this project be required to submit a full EIS.

Knowing how familiar you are with the CDUA process, I have a question. Does the applicant usually have access to the comments to the DLNR before a decision is made? I found it very curious that Dawn Hegger at DLNR wanted me to send my comments directly to the project partners; I had to reiterate that I was making comments on the proposal to the state! KBWF's web pages include comments made to DLNR along with KBWF's responses. The fact that they have access to all the comments before the public hearing (next Tuesday) smacks of complicity between the permittee and the state agency that will ultimately be "regulating" the business if the permit is granted. What's up with that?

Appreciative of your reply,
Noreen

Noreen Parks, Writer & Editor
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Kona Blue Water Farms

Kona, Hawai'i

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KBWF/Noreen Parks 2.doc
June 13, 2003

Ms Noreen Parks
HCR2 Box 6841
Keaau, HI 96749

Aloha, Ms Parks,

Thank you for your comments that you presented at our public hearing, and followed up with written testimony, on our CDUA application. We have addressed many of your in-principle objections to ocean aquaculture in response to the two articles that you have published in Hawaii Island Journal and Honolulu Weekly in the weeks surrounding our public hearing date. You obviously believe very passionately that what we are proposing can have only one outcome, and that would be disastrous.

However, we believe that we can build a fish farming industry here in Kona that can be sustainable, that can be environmentally friendly, and that can help to wean our islands away from the dependence on the tourist-industry. Given that the proper monitoring and enforcement is in place, there is no reason why this cannot be true. Certainly, there may be weak links in the monitoring and enforcement processes as they now stand, but environmental watchdog groups and conservation organizations such as those represented by Dr David Holzman have taken constructive steps to ensure that these shortfalls are addressed.

Other testimony received at our public hearing also offered cautious approval. These other speakers usually recognized that we have to move forward with open ocean aquaculture, but that it must be done in a responsible, conscientious manner. It was unfortunate that you did not stay throughout the entire public hearing, so that you could have heard this message repeated by speaker after speaker.

Instead of simply trying to stop our project, we would like you to therefore please join with us, with Dr Holzman, and other like-minded conservationists, in moving forward with this project in a way that provides assurances of compliance, and consequences for failure to meet these assurances. Dr Holzman – and the Sierra Club, whom he represents – have agreed to let our project go forward uncontested, so long as the monitoring and enforcement is transparent and independent. We embrace this principle. I would refer you to our response to Dr Holzman, which is included elsewhere in the Final Environmental Assessment, for more details on how this arrangement can work to all our mutual benefits and assurances. These improvements would certainly allay – or at least, seem to allay - most of the fears that you have raised in your letter, your testimony, and your published two articles.

It is also unfortunate that you have tried to sway public opinion on open ocean fish farming in Hawaii by odious comparisons with pig farms, sewer outfalls and salmon farms in British Columbia. Please be assured, we are not proposing a pig farm, or a cold-water salmon farm in some protected, low-circulation fjord in B.C. We are proposing open ocean fish farming in the tropics, in deep water, with strong currents. We believe that there is almost nothing else that can compare in terms of ecological sustainability and economic viability for the waters surrounding our islands. Open ocean fish farming is an opportunity that Hawaii should embrace, and take a lead in developing, not a bane that we should flee from.

The State of Hawaii has worked to make the most of this opportunity, yet has done so in a responsible, conscientious manner. There is only one operating fish farm of three cages in the oceans off Hawaii so far. This is hardly a "red carpet", a "flood", or a "Pandora's box". The strict requirements for applicants under Chapter 190D will naturally deter most prospective farmers. Notably, while you complain about the lack of a regulatory framework in this state, Hawaii was one of only three states that was commended by the recent Pew Oceans Commission report for having such a plan in place (to wit, page 78: "Few states ... have a comprehensive regulatory plan for marine aquaculture. Notable exceptions are Maine, Hawaii and Florida.")

Furthermore, while you express concern in your letter about the compounding effects of fish farms ("... this is but the first of many (of) a string of similar projects ...."), we are only asking the State for approval of our one, small project. There is no approval of other farms, either explicit or implied, in approval of this project. Indeed, our draft EA specifically states that there are no cumulative impacts. Any subsequent fish farm proposals will still have to pass through the same extensive environmental assessment and public review process that we have undertaken.

You indicate in your letter that you have enthusiasm for land-based aquaculture at NELHA. We have worked here for the last 13 years, and our company has been here for 11 years. If there was any way that land-based fish farming was economically feasible, we would be already doing it. There is certainly room for some small niche-species, such as aquarium-fish, seahorses, or particularly high-priced food fish, but for food production, such as can sustain our communities and alleviate the pressure on fisheries around the world, we need to move offshore. This was recently underscored when, just last week, one of the two other marine fish farms at NELHA declared insolvency.

In your letter and your articles, you infer that because the currents around Keahole Point are unpredictable, we know nothing about them. However, my business partner and I have worked at Keahole Point, within sight of our project, for the past 13 years, and have observed the currents on a daily basis. We have deployed a current meter on our proposed site. There are also reams and reams of current data compiled by NELHA. You are correct in that we cannot predict the amplitude or direction of the currents. However, we know from this vast body of knowledge and experience that the currents around Keahole are very strong, nearly all the time; this is the crucial fact. The weather is unpredictable, too, but that does not mean that we know nothing about the weather. We still plant crops that depend on rainfall and sunshine, even though we cannot predict whether it will rain or shine next Saturday.

In addressing your concerns about whales and dolphins, I would refer you to our responses to the letters from DLNR Division of Aquatic Resources, the Hawaii Islands Humpback Whale National Marine Sanctuary, and Jan Ostman-Lind. We believe that our location, our taut mooring array, and the taut mesh used in the submersible cages will all prevent any significant negative interaction between our project and the dolphins or humpback whales.

Please also note that the $1.5 million grant that we have received from the Advanced Technology Program, (part of the Federal Department of Commerce), is not for development of our commercial projects, but is intended solely for the research and development of innovative new larval feed systems, to improve our capacity to produce marine fish in the hatchery. It would be illegal for us to use this grant for the purposes of conducting an EIS. To claim that we should do this perhaps reflects your misunderstanding of the goals, regulations and frameworks for Federal funding for aquaculture, and science in general.

So far, from our ATP research, our company has been able to produce flame angelfish, mahimahi, kahala, golden trevally and opakapaka in the hatchery. For several of these species, it is the first time ever that they have been produced in the hatchery, or in any significant numbers. We hope that further research, fuelled by the open ocean fish farming potential, will allow us to rear more species, and develop a stock enhancement program for many presently-overfished species. Improved management of wild fish stocks must also happen, but many of these populations will take 30 or 40 years to fully recover. The only alternative is truly sustainable open ocean aquaculture.

We believe that an EIS is unnecessary, as there is no credible evidence of any significant environmental impact from our proposed project. To insist on an EIS would be to ignore the research and development and ongoing monitoring that has taken place at the fish farm site off Ewa Beach, in Oahu. This monitoring data, summarized and presented by Professor Emeritus Chuck Helsely in Hawaii Fishing News' March issue, provided detailed information on the lack of any significant environmental impact from these cages. Indeed, most of the time they could not even detect any of the fish farm effluent!

Furthermore, an EIS would be an onerous requirement on a small Kona company that is trying to develop locally-owned and –operated diversified aquaculture. If you are to insist on EIS's for all open ocean fish farming, then you will most surely exclude local companies from participation, and will instead limit entry to the very same multinationals and offshore investor groups that you complain about dominating aquaculture elsewhere.

We believe that local companies can do this well, and we believe that, with adequate monitoring, they should be given the opportunity to try.

Finally, in response to your email message to "Debbie" (dated May 27th, 2003), it is our understanding that the normal CDUA procedure is for the applicant to respond directly to comments made on the draft Environmental Assessment. Your comments allow us to improve our proposal, so that it is more acceptable to the community, and to the environment. We hope we have done that.

Aloha, sincerely,

Neil Anthony Sims
Vice-President / Research Director

May 27, 2003

Ms. Dawn Hegger
Division of Land and Natural Resources
1151 Punchbowl St.
Honolulu, Hawaii, 96813

Re: Kona Blue Water Farm
Draft Environmental Assessment

The following are Sierra Clubs concerns and objections to the January 17, 2003 draft Environmental Assessment entitled Offshore Open Fish Farm Project submitted by Kona Blue Water Farm (KBWF) to the Land Division, State Department of Land and Natural Resources.

Concerns

A review of the draft EPA regulations for aquaculture in the Federal Register Vol. 65 and 67, July 13, 2000 & Sept. 12, 20002 reveals an almost total focus on human health and cleaning up of rivers, streams, and lakes to assure clean drinking water. There is a dangerous lack of attention on marine life because EPA lacks the data on the effects of aquaculture waste and chemical use on coral and marine life in the ocean.

The State Department of Health's Clean Water Branch (CWB) which issues the NPDES is also primarily concerned with human health and has set their tolerances for pollution levels to protect humans not marine life. In addition, CWB today lacks the resources even when human health is at risk to monitor compliance with those required to apply for NPDES on the Big Island.

This lack of specificity on damage to marine life and oversight can also be said for the Food and Drug Administration and Department of Agriculture which have regulatory responsibility for chemicals and *pesticides used in aquaculture.*

Objections

Therefore the Sierra Club requests more transparency and specific information on water quality monitoring in KBWF Environmental Assessment Section 6.1.1 if we are to protect our coral reefs and marine life.

Specifically:

* Please state who will supervise KBWF water quality requirements for an NPDES permit and what consultant or entity will collect the water quality samples and do the analysis.
* We request that KBWF agrees to conduct CWB-ZOM analysis quarterly for each year of the permit.
* We request a copy of all water quality reports pursuant to this lease including boundaries of the ZOM be available in the Kailua-Kona Public Library and to the DAR Kona office.
* We request that when new EPA water quality standards and reporting requirements for fish farms are available KBWF will immediately implement them in their next quarterly report.
* We ask that EA Section 6.1.1 clearly state that KBWF will not use hormones or unapproved FDA growth enhancements and that KBWF will not introduce genetically modified fish.
* We ask that bulk chemicals not be added to the water for the control of pathogens or parasites.
* We ask that in Section 6.1.1 KBWF agrees to notify DAR Kona office and DOH CWB 14 days in advance of the use of any chemicals or drugs either FDA approved or unapproved. Furthermore, KBWF will conduct additional CWB water quality analyses during the period of their use particularly for veterinarian prescribed extra-label drugs.
* We request in Section 6.2.2 KBWF state that they will provide right of entry to their site and surrounding area to DAR for an annual longitudinal data collection to analyze changes in the DAR baseline comprehensive survey of marine biota.
* We request that KBWF agree to a five year review by DAR of their environmental impact. If evidence proves KBWF adversely affected the marine environment or threatened endangered species their lease will be terminated.
* Furthermore, that KBWF will agree that all of the above be inserted as provisions in their DLNR lease. That any violation of these provisions *will also be grounds for terminating their lease.*

Dr. David Holzman
Sierra Club Moku Loa Chapter
Spokesperson for Kakoo

recieved 6/27/03

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

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KBWF/David Holzman 1.doc
June 17, 2003

Dr David Holzman
Sierra Club Moku Loa Chapter / Kakoo
77-6459 Walua Rd
Kailua-Kona, HI 96740

Aloha, David,

Thank you for your written concerns and objections (letter of May 27th, 2003), and your oral testimony at our public hearing of the same date, regarding our open ocean fish farm proposal.

Before responding to your specific points, I wish to first restate Kona Blue Water Farms' position on providing transparency and independence for the water quality monitoring program for our proposed farm (the following excerpt is taken from our Powerpoint presentation at the May 27th public meeting):

"Furthermore, through discussions with local environmental leaders, KBWF has agreed to increase local input, transparency and independence of the monitoring program. We want the community to have full access to our monitoring results.

"Therefore, where possible, we will :

- Use objective, third party experts to collect the water quality samples for us.
- Use local water quality laboratories – such as NELHA Water Quality Lab, or local private laboratories - for conducting the sample analysis.
- Place copies of all Federally or State-mandated environmental quality reports at local repositories, such as the DAR office at Honokohau, or the NELHA library, so that local residents can review this data.
- Make publicly available at the local repository copies of all the mandated monitoring programs, detailing frequency of sample collections, types and numbers of samples, handling protocols, allowable limits and other guidelines.
- Provide reasonable access to Federal, State and County officials for monitoring and oversight purposes.

"We see this process here as an excellent opportunity to establish precedents for local involvement and oversight of monitoring of fish farms.

"We believe that through such local involvement, we will be able to demonstrate that this can be an environmentally friendly industry, which the community in Kona can support."

We have made appropriate changes to our Final Environmental Assessment, by inserting this section into 7.2.1, which addresses potential impacts and mitigative steps (rather than 6.1.1, which you had suggested, but which refers instead to Existing Environment).

By way of general response to your several other requests (e.g. frequency of water quality analyses, use of hormones or growth enhancements, use of bulk chemicals for water treatment, prior notification of use of approved or unapproved chemicals or drugs, five-yearly review by DAR), we believe that there is already an extensive regulatory framework for these issues under existing laws administered by various Federal agencies (USDA, EPA, FDA) and State agencies (DLNR, CWB-DOH), that addresses these concerns. Please rest assured that we will not use any unapproved substances, or illegal treatments of our fish. If there is ever an inadvertent violation of such a law, we will accept remedy demanded by State or Federal law, within reason, and not waiving our constitutional rights to a fair trial and to appeal. If existing laws provide for termination of the lease for such a violation (whether deliberate or inadvertent), then that punishment could well be imposed upon us. However, we believe that automatic termination of the lease for such a violation is perhaps prohibitively severe.

Please be assured that the requirements for transparency and independence in the environmental monitoring that we have agreed to will ensure that KBWF takes a proactive approach to mitigation of any potential environmental perturbation. Local oversight of our monitoring will mean that if nutrient levels in our farm effluent begin to approach allowable limits, then KBWF will have a very strong incentive to change farm management to reduce these effluent concentrations. This might include reducing the feed levels on those days or at those times when currents are slow or non-existent, reducing fish densities in the cages by cull harvesting or by lowered stocking densities, or even possibly changing the alignment of the cages to improve the flow of water and dilution factors through the cages.

In conclusion, I would like to thank you for the considerate, co-operative tone of our discussions over the last few months, as we have addressed together our proposal and your positions in a constructive manner. We believe that this bodes well for the future development of open ocean fish farming in Kona, and for the community's acceptance of this promising new industry.

Aloha, sincerely,

Neil Anthony Sims
Vice-President / Research Director

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John Piña Craven
4921 Waa Street
Honolulu HI 96821

May 27, 2003

MEMOTANDUM

From: John P. Craven: Private Citizen

To: DLNR CUDA Permit Hearing of May 27, 2003

Subject: Violation of Hawaii Ocean waters

1. It is a bitter bitter irony that this hearing to grant a permit for the destruction of Hawaii's class AA ocean waters should take place at NELH. The very first question that should be asked is if there is an economic viable economic environmentally sustainable alternative to this monstrous collection of "marine pig farms" which can productive as soon or sooner than is here proposed. The answer is yes. NELH is already producing a complete spectrum of marine protein utilizing deep ocean water monitored by an environmental assessment program that has been in place for more than twenty years,
2. Unitil 1990 I occupied a number of State positions involved with the Administration of Hawaii's ocean resources. I was Marine Affairs Co-Ordinator of the State, and in that capacity I was President of NELH a State Corporation for the development of Deep Ocean Wateras a world resource. I was Dean of Marine Programs at the University of Hawaii with responsibility for the Sea Grant Program and from time to time Acting head of the Department of Ocean Engineering. I was Director of the Law the Sea Institute an International organization dedicated to develop a legal regime for the oceans. In 1990 I was stripped of all my State positions by Executive Orders of the Governor of the State and the Dean of the University of Hawaii Law School and the Law of the Sea Institute was transferred to the University of Miami. The NELH Corporation was dissolved and replaced by an Authority whose mission was divorced from the wise development of the Hawaii ocean resource. In its totality the entire Marine Management structure of the State was dissolved at the Executive level and responsibilities for major decisions such as we confront today are relegated to well meaning but ignorant employees of the Bureaucracy, All of Hawaii's qualified ocean managers (with the exception of the military) have died (Doak Cox, John Shupe) or have retired (Jack Davidson) or have been summarily fired (Tom Daniel). Until a complete and thorough environmentall impact statement has been prepared for this project there is no basis on which the public can depend to evaluate this CUDA. There is simply no qualified civil servant in this state who has the experience or knowledge to make such an evaluation.

3. Moreover there has been no consideration of the Hawaiian Society and culture. The Kumulipo makes it clear that every land based operation has its counterpart in the sea. In this instance the land based counterpart of this cage culture farm is the pig farm. Our Nation is a nation of pork. Our consumption of pork can not be met by hunting for pigs in the wild. Pig farms generate large amounts of waste, they require detailed monitoring to prevent the transmittal of disease to the human population or to the environment. The use of chemicals is strictly monitored or restricted. Even so pig farms in the United States are a major source of environemtal hazard. If this operation is successful the Kumulipo tells us we will be surrounded by a sea of oceanic pig farms.

4. We are just beginning to learn that fish farms are also major hazards to the health of humans and to the environment. Until recently I was of the opinion that this was not so. But Rita Colwell the Director of the National Science Foundation has conclusively proved that the carapace of crustacea can harbor viruses within nitrogen cages such as kaiten and kaitenate. When devoured by carnivores these viruses can be disseminated throughout the ocean. She has traced the movement of cholera around the world through this mechanism. But algal toxins can also be disseminated. Kahala is a particularly vulnerable species for such toxins. And of course it is increasingly difficult to farm virus free shrimp particularly if they are fed brine shrimp or other crustacea derived from the shallow water environment. When will we realize that the natural environment of surface waters is a cesspool whose product will always be contaminated.

5. But my bitterest complaint relates to the treatment of NELH by the State of Hawaii. The world need for marine protein will not be resolved until the total volume of marine protein produced in environmentally sustainable farms is greater than the total annual world consumption of fish obtained by fishing from the wild. NELH is to my knowledge the only incubator in the world for such farms. The tenants of this facility are being suffocated by the past and present administrations (it is not a matter of politics). And the embryo in the incubator will soon be dead.

6. As I look at our modern world and its attempt to preserve its affluence wth oil, drugs, and destruction of the environment and as I contemplate the bankruptcy of the NELH tenants I can only recall the words of Shakespeare.

   Oh judgement thou art fled to brutish beasts and men have lost their reason. My heart is in the coffin there with NELHA and I must pause til it return to me.

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

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John Craven 1b.doc
June 18, 2003

Dr John Craven
C.H.C.
4921 Waa St
Honolulu, HI 96821

Aloha, Dr Carven,

Thank you for your oral testimony, which was presented at our May 27th public hearing, a written copy of which was forwarded to us by the State Land Division. We would like to respond here to your concerns regarding our proposed open ocean fish farm project in point-wise fashion, following the numeration in your letter:

1. We are very familiar with the alternative that you propose for land-based, instead of open ocean aquaculture. As you are aware, Dr Sarver and I have worked at NELHA for a collective total of 25 years. During this time, we have led or partnered in a number of innovative research programs using the unique deep sea water available at Keahole Point. We have examined the commercial feasibility for land-based culture of pearls, opihi, namako (sea cucumber), various marine ornamental invertebrates, aquarium fish and food fish. None of these have proven commercially viable in land-based systems. We still intend to use our NELHA facility for hatchery production to stock our offshore fish cages, and we still hope to grow some fish on land, such as aquarium fish (flame angels) and deep water snappers (ehu and onaga). However, small-scale, land-based facilities can only be economical for high-priced, niche-market species, and will go no way towards solving the world's food fish supply problems. At the public hearing you lauded the vision of Ocean Farms of Hawaii's founder, George Lockwood, and his land-based salmon farming venture at NELHA. However, these four 4-acre ponds were rendered uneconomical by the growing seacage industry around the world, and the subsequent flood of cheap, farmed salmon on the market. In the 10 years since salmon growing was halted in these ponds, no-one has yet found a viable alternative species for which to use these ponds as fish farms. In just the last week, one of the two other fish farms at NELHA has declared insolvency, and has halted operations. This was a company that produced moi and kahala, yet they were unable to make it work with the high capital and operating costs involved in land production.

2. We believe that the process for review and extensive public input outlined under Chapter 190D, HRS, is an excellent basis for evaluating this, or any other CDU Application. It does not require any one particular ocean manager or expert to make this decision for the state. We have spent two

years consulting with our local community, and with a range of scientists and administrators from academia, and state and federal governments. None have, as yet, provided any sound basis for requesting a full EIS, and there has been no solid evidence of any significant impact that might arise from our proposed operation. Furthermore, we believe that Hawaiian fish farming should be developed by local scientists and industry, not by offshore investors or multinationals. If we ask local aspirant to this fledgling industry to first conduct a full EIS, we are adding huge unnecessary start-up costs. They will then be forced to seek external financing. Offshore investors or large, multi-national conglomerates would then be left in control of Kona's fish farming, rather than those of us who live here.

3. The comparison between an open ocean fish farm and a pig farm is not valid. A better analogy to a pig farm is a land-based fish farm, which holds fish in tanks at very high densities, with high water flow rates, reliance on oxygen supplementation and heavy solids loading in the effluent. We are presently rearing kahala at our NELHA facility under these very same conditions, and the economics of this are marginal, at best. An open ocean fish farm holds fish at very low densities, and relies on natural flows of water. It is therefore perhaps more analogous to hand-fed cattle raised in a pasture.

4. We know of no validated scientific record of human pathogenic viruses being transmitted by farmed fish. Certainly, as top-end predators, kahala caught in the wild do accumulate high levels of ciguatoxins, and therefore present a serious public health risk in Hawaii. However, farmed kahala will avoid these problems, as they will be fed with pellet feeds, and will not have access at any stage to the coral reef food chain.

5. Black Pearls, Inc. has been a tenant at NELHA for over 10 years. There is no other place in the world where we could have accomplished that which we have accomplished in this time. We are grateful to the opportunity that NELHA has provided us, and other aquaculture companies. We would like to reserve our comments on NELHA Board policies, as this is not an appropriate forum to air these concerns.

6. Antony's speech at Caesar's funeral also contains other lines that might be aptly paraphrased :

I speak not to disprove what John Craven spoke,
But here I am to speak what I do know.
You all did love fish farming once,
Not without cause ....

Thank you, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

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May 24, 2003

Honorable Governor Linda Lingle
Executive Chambers
State Capitol
Honolulu, Hawai'i 96813

Re: open-netcage aquaculture

Dear Governor Lingle:

I write to you out of concern that Hawai'i seems poised to repeat the mistakes of my native province of British Columbia (BC), Canada in the development of open-netcage aquaculture. The proposed Kona Blue Water Farms near Unualoha Point has important similarities to the salmon farms of BC, Norway, Scotland, West Ireland and Chile.

Kona Blue Water Farms (KBWF) proposes to grow-out hatchery mahimahi and kahala (amberjack) in six floating netcages covering an area of about nine acres, located about 2000' feet from shore in water about 150'–200' deep. The operators, Neil Sims and Dale Sarver of Kona, hope to eventually also raise opakapaka, ehu, and hapu'upu'u at the proposed facility.

My response to KBWF's draft Environmental Assessment and the resulting comments from interested parties is that the greatest danger has been completely overlooked. What is killing the open-netcage industry in BC and elsewhere—dragging the wild fishery down with it—is the interaction between netcage fish and the natural diseases of wild fish.

The first part of the disease problem can be understood as follows. Wild fish exist in a dynamic balance with countless diseases and parasites. In the wild when a fish becomes infected it becomes a "slow-swimmer" that is soon eaten by predators. This is nature's method of disease control. Now consider farm fish in an open-netcage: wild fish swim by netcages exposing the farm fish to parasites and infections, and as the farm fish have no predators, most of the fish in the netcage eventually become ill. Farmers then medicate their farm fish to keep them alive, mixing antibiotics and toxic chemical therapeutants with the feed. Governments can be counted on to fund research on these diseases—we scientists love to find cures for disease—but nature has an inexhaustible variety of diseases and parasites.

The second part of the disease problem is more subtle. In order to stop wild fish from eating their own young, nature selects for adult wild fish that physically separate themselves from their young through some form of migration. By keeping adult wild fish in the same area all year round, netcages provide a reservoir of disease and parasites, exposing juvenile wild fish to diseases that they do not naturally encounter. Juvenile wild fish have immature immune systems and low body weight, increasing their susceptibility. They die. It's a problem that is difficult for scientists to study because wild fish don't swim into our laboratories to die. They die unseen, eaten by predators.

Farm fish don't always get disease from adult wild fish, and adult farm fish don't always give the disease back to juvenile wild fish, but that's the way to bet. It is not an oversimplification to say that you can have farm fish or wild fish but you can't have both. At least, not with open netcages.

Leaving aside the wild fish, disease is a difficult problem for the netcage industry because disease often doesn't manifest itself until the local industry reaches a certain size—then disease hits catastrophically, wiping out a huge investment in equipment, stock, and feed. Surprise! Surprise! Governments then bail out the industry with subsidies.

Is there an answer to the disease problem? Scientists who have studied the question believe that land based aquaculture (sometimes referred to as closed-bag) is the only answer. With land based aquaculture one can condition intake water to remove disease and parasites. One can also condition output water to protect wild fish. Netcage operators are perpetually in denial about the disease problem because closed-bag operations are more expensive in the short run.

If Hawai'i blesses the development of open-netcage aquaculture, here is what you can expect: The industry will begin with small facilities, like the proposed KBWF, operated by optimistic locals, like Neil Sims and Dale Sarver. Most of them will go bankrupt. Storms will tear their cages loose. Disease will kill their stock. Inevitably the industry will consolidate into the hands of large multinational corporations (like Stolt of Norway and Nutreco of Holland) that are able to lay-off risk in one area by owning farms in many widely separated parts of the globe. These corporations will employ just enough local people that it will be politically impossible to send them away or reform them. They will insist that they need to expand their operations for the efficiencies of scale necessary to compete on world markets. Hawai'i's coasts will become an industrial park, and there will be no hope at all for the recovery of Hawai'i's wild fisheries. Politicians who supported the netcage industry will continue to support it because they will hate to admit they were wrong. Hawai'i will then be in the same trap as BC is now.

A wild, juvenile chinook salmon mortally infested with sea lice after migration past open-netcage salmon farms in BC. Scientists who study the interaction of fish farms with wild fish informally refer to the farms as "pathogen culture facilities." Photo courtesy Alexandra Morton, Raincoast Research.

A suggestion: Before Hawai'i follows BC down the open-netcage road, we should send a few key legislators on a tour of BC, Norway, Scotland and Western Ireland. Our delegation should be instructed to avoid everyone with an administrative loyalty to the open-netcage industry, visiting instead with knowledgeable local residents and university scientists who study wild fish. In BC, they should visit Alexandra Morton at Echo Bay, and Dr. David Suzuki in Vancouver. They should visit the land based facility at Cedar, near Nanaimo. In Ireland they should visit Paddy Gargan and Oliver Tully. In Scotland, Alan Berry and Bruce Sandison. The costs of making such a trip are much less than the costs of not making it.

Also, the proposed KBWF farm needs a full Environmental Impact Statement in which the proposers demonstrate an understanding of the problems that have plagued open net-cages elsewhere. The draft Environmental Assessment is so remarkably innocent that it reminds me of documents written 25 years ago.

Sincerely,

Neil Frazer
Professor

Cc: Dawn Hegger, DLNR
Public

Kona Blue Water Farms

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May 29th, 2003
KBWF/HU Neil Frazer 1

Professor Neil Frazer
UH Manoa, Geology and Geophysics
Honolulu, HI, 96822

Aloha, Professor Frazer,

Thank you for letter of May 24th, 2003, which was forwarded to us by the State Land Division. We would like to respond here to your concerns regarding our proposed open ocean fish farm project.

We are naturally very concerned with the potential for diseases occurring in our farmed fish, and with any potential interaction between our fish and wild fish. There may indeed be valid concerns about such interactions between farmed and wild salmon. However, much of the information that is available on the web, from such organizations as the David Suzuki Foundation, or the "Farmed and Dangerous" campaign, is not supported by scientific studies. To our knowledge, there has never been a demonstrated case of a farmed fish transferring diseases to wild stocks – it is always vice versa. Certainly, fish held in high densities in shallow water areas with poor circulation are more susceptible to diseases. This is precisely the rationale for moving out into open ocean fish farming, where the fish are held at lower stocking densities, well clear of the substrate, in good current flow of clean, oceanic water.

In the case of kahala, the prime species that we intend to culture, these fish are usually not eaten when captured in the wild in Hawaii because of two disease problems: parasitic worms and ciguatera. According to researchers from the Oceanic Institute, the parasitic worms that permeate the flesh of wild kahala are ingested by the fish when they are larvae. The fish are not vulnerable to these parasites when they are older. As we will be rearing all of our farm stock in the hatchery, we will be able to avoid this infestation.

Furthermore, wild kahala in Hawaii are known to present a high risk of ciguatera poisoning. The ciguatera toxins are produced by an epiphytic dinoflagellate, and become concentrated up the food chain. When kahala prey on smaller fish or crustaceans carrying these toxins, they retain the toxins in their flesh. Again, farmed kahala will be able to avoid accumulating ciguatera, as they will be separated from the coral reef-associated food chain. So our farmed fish will be healthier than those in the ocean.

You state in your letter that "Scientists who have studied the question believe that land based aquaculture .... is the only answer." We are scientists who have not only "studied" the question, but are actually testing it in a big way, and we certainly do not agree with these academic assertions. I know of no scientist who would make such an assertion, without a long string of caveats. My business partner and I are very familiar with the alternative that you propose: land-based aquaculture. We are both scientists with a cumulative total of nearly 50 years experience in fisheries and aquaculture in Hawaii and the developing world. We have worked at NELHA for a collective total of 25 years. During this time, we have led or partnered in a number of innovative research programs using the unique deep-sea water available at Keahole Point. We have examined the commercial feasibility for land-based culture of pearls, opihi, namako (sea cucumber), various marine ornamental invertebrates, aquarium fish and food fish. None of these have proven commercially viable in land-based systems. In just the last week, one of the two other fish farms at NELHA has declared insolvency, and has halted operations. This was a company that produced moi and kahala, yet they were unable to make it work with the high capital and operating costs involved in land-based production. In addition, most of us in Hawaii remember the spectacular failure of the only land-based salmon farm in the State, right here at NELHA.

We still intend to use our NELHA facility for hatchery production to stock our offshore fish cages, and we still hope to grow some fish on land, such as aquarium fish (flame angels) and deep water snappers (ehu and onaga). However, experience has shown that small-scale, land-based facilities can only be economical for high-priced, niche-market species, and will go no way towards solving the world's food fish supply problems.

We have recently modified our proposal to accommodate some of the concerns that have been shared with us over the course of our draft EA review process. One of the most significant changes we are proposing is to make all of our six main cages of the submersible design, rather than a mixed array of surface and submersible cages. These cages will be completely enclosed in mesh; we will not have the large 'open net-cages' that seem to dismay you. The cages will be submerged beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. This will also hopefully alleviate your concerns – and nullify your assertion – that inevitably "storms will tear (our) cages loose".

An EIS is unnecessary, as there is no credible evidence of any significant environmental impact from our proposed project. To insist on an EIS would be to ignore the research and development and ongoing monitoring that has taken place at the existing fish farm site off Ewa Beach, in Oahu. This monitoring data, summarized and presented by Professor Emeritus Chuck Helsely in Hawaii Fishing News' March issue, provided detailed information on the lack of any significant environmental impact from these cages. Indeed, most of the time they could not even detect any of the fish farm effluent! Another commercial project in Puerto Rico, monitored by the University of Miami and University of Puerto Rico, with the same cages and a similar fish, shows the same results – no significant impact. The data from this study is in press at this time.

Your prediction for the future of open ocean fish farming in Hawaii is bleak, but is based on the presumption that large multi-national corporations will take control of the industry. Your demand for an EIS may accomplish this faster than any natural attrition of local companies. An EIS would be an onerous requirement on a small Kona company that is trying to develop a locally-owned venture. If you are to insist on EIS's for all open ocean fish farming, then you will most surely exclude local companies from participation – they will simply not be able to afford the time or the money to compile a complete EIS. Instead, entry into the industry will be restricted to those who can afford it - the very same multinationals and offshore investor groups that you complain about dominating fish farming in B.C.

It is only in British Columbia and Alaska that there is any real vocal opposition to fish farming. Most of this opposition is fueled by local salmon fishermen, who have found that they cannot compete with the greater efficiencies of fish farms. Throughout the remainder of the world, the cage fish farming industry produces over 1.5 million tons annually. If any real problems existed, peer-reviewed journals would abound in scientific studies detailing the negative impacts.

Professor Frazer, this is not salmon farming, these are not frigid waters, and we are not siting our farm in a protected cove or shallow inlet with poor circulation. We are proposing to grow a native Hawaiian fish in submerged cages in waters over 200 ft deep, with a veritable river of a current streaming through the area. To impugn the viability of our proposal based on selective choices of a few bad examples in a huge industry is grossly unfair. It is like denigrating Parker Ranch's cattle farming because of a poor track record in the hog industry in South Carolina.

Furthermore, communities don't just gain jobs from fish farms, they gain a sustainable industry with the standard, many-fold multiplier for the local economy. Rather than just taking from the ocean, they learn to grow their seafood. By adopting fish farming, Hawaii would accept some responsibility for what we consume, rather than constantly relying on foodfish imports that are usually based on unsustainable wild stock fisheries.

We believe that local companies can do this well, and we believe that, with adequate monitoring, they should be given the opportunity to try.

Again, thank you for your comments, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

Harry Fergerstrom
13-1339 Leilani Ave.
Pahoa, Hawaii 96778
808 965-6184
warhawaii@hotmail. Com

REGARDING OFF SHORE FISH FARMING ALONG THE KONA- KOHALA COAST

I am before you to express the Hawaiian cultural knowledge that I believe conflicts with this proposal to allow off shore fish farming along the coast of Kona up to Kohala.

The area in question is the traditional migration path for the Kohola (whale) or the Humpback Whale. Along this trail is also the home of the Naia (Porpoise). The Kohola (Whale) will continue this path to Kawaihae where Puu Kohola Heiau (the Temple on the Mound of the Whale)is located. It is in these coastal waters that the will birth their next generation.

The Kohola in the Hawaiian Culture holds a significant role. They are considered the record keepers of the Migrations. A tooth from a Kohola fashioned into a Palaoa was reserved for only the highest of rank.

I have shared this idea as well as the draft EIS with several groups including the Kupuna Councils. They all agree that this venture needs a lot more study as to the possible distraction of the Kohola from their migration paths as well as the paths of the porpoise.

There is also a lot of talk about using such a concept for the possible farming of local reef fish that has seen great depletion over the years. Fish like aholehole, umu, kole, Uhu, etc, would be a better choice of fish for farms located so close to the shore.

We find that the proposed projects raises another issue all together. That is that the area in question is part of the Ceded Lands inventory, that is held as a public trust. Further that the area proposed is top fishing grounds both for big game as well as for deep water divers.

We feel that there need to be a cultural impact statement prepared and presented to the community.

At this time we would ask that questions like how to evaluate those revenues derived off of ceded lands, the impact it will have on customary diving rights, potential of attracting unwanted numbers of preying fish like the shark, barracuda, and the impact it may have on coastal fish and shell fish.

How will those fish farming areas impact those Hawaiian Rights reaffirmed in the recent PASH decision.

Our suggestion is you may wish to consider a trial pen or pehaps two and evaluate its impact on a small area and take that documented information to the public for their approval.

May I remind you that the Hawaiian waters are a Federally recognized Sanctuary for the Humpback Whale.

We understand the world need for the production of protein and the many benefits fish farms can have for the community as the first to do such were the Hawaiian People.

We question the need for the fish farming if that fish farm is not farming for the people of Hawaii.

Dated this day: May 27th, 2003

Hank Fergerstrom,
Na Koa O Puu Kohola Heiau
Na Koa Lohe O Ke Akua

Kona Blue Water Farms

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May 29th, 2003
KBWF/Hank Fergerstrom 1

Harry Fergerstrom
13-1339 Leilani Ave
Pahoa, HI 96778

Aloha, Hank,

Thank you for taking the time and trouble to attend our public hearing, and provide the oral testimony that you did. Please also extend our thanks to your na kupuna in Hilo for their mana'o. I am in receipt of your letter May 27th, which you read at the hearing, and I would like to address some of the concerns that you express there.

We recognize that you and your kupuna have specific concerns about the kohola, the naia, and the exclusivity that we are requesting in the area around the cages. We have addressed most of these issues in our draft EA, but we are happy to provide more information here.

From all of our surveys, interviews and observations, we have concluded that there is no customary or traditional diving or big game fishing in the proposed lease area. Sharks and barracudas may be attracted to the cages, but if they are aggregated there, then we presume that they will not be in other, more populated areas. We think that this would then be a net benefit for our ocean users.

Also, while reef fish may seem to be a "better choice ... for farms located so close to shore", there is presently not a well-established market for most of these species. Our primary target fish – kahala – are found on the deeper slopes beyond the reef, where our farm will actually be located. Kahala would therefore seem to be an appropriate species to culture here. We also hope that our company's cutting edge hatchery research would one day allow us to either farm larger reef species, such as uhu, omilu or ulua, or to rear them to juvenile sizes and then release them, as so many freshwater fish hatcheries do on the mainland.

Certainly, I think we all hope that the issues of the Ceded Lands inventory could be quickly and amicably resolved, but this would be beyond the scope of this Environmental Assessment, and of our correspondence. We believe that the provision of 20% of all lease revenues to OHA, as trustee for Hawaiian native peoples, is adequate protection for these concerns. The repercussions of the PASH decision are negligible on our proposal, as there are no customary or traditional uses of this area. We have consulted with the kupuna from the area who know the locations of the opelu ko'a, and they affirm that the cages are not located in these areas. There are no other traditional fisheries in this area.

We think that your suggestion to start with a small trial is an excellent idea. However, it is simply not economically viable to run a farm with just "a trial pen or perhaps two". If we are wanting to conduct a realistic trial at a commercial scale, we need a consistent supply of product, and we need to therefore be harvesting one cage every two months. As it takes twelve months to grow the fish to the target size, we need six cages. This is the number of cages that we have requested - no more. We are, then, the smallest possible commercially-viable project – a perfect experiment.

As it is not commercially viable to run one or two cages as a trial, someone would have to pay for the work to be done if we were to do this. In fact, someone already has done this, with Federal SeaGrant research funds. The HOARP project off Ewa Beach was exactly that – a single, small test cage. Our project plans are based on the success of this project, and the fact that they detected no significant environmental impacts from this operation – including no negative impacts on whales or dolphins.

All of the available scientific data suggests that a fixed, moored structure will not impede movements of humpback whales or of dolphins. Still, we are continuing our discussions with State and Federal marine mammal experts, including the Hawaii Islands Humpback Whale National Marine Sanctuary staff, to work towards establishing a sound monitoring program to assess any potential future interactions. We hope this monitoring will provide invaluable scientific data from a fixed ocean observation point, to better understand marine mammal patterns of movement. This would be the first time, to our knowledge, that such data would be available.

Therefore, please be assured that we are giving our fullest possible consideration to ways to address your concerns. Even though we may have had differences over the project that we are proposing, we very much appreciate the aloha spirit, the love of the oceans, and the careful consideration that lies beneath your testimony.

Again, thanks, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

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June 18, 2003
KBWF/Hank Fergerstrom 2

Harry Fergerstrom
13-1339 Leilani Ave
Pahoa, HI 96778

Aloha, Hank,

Further to my letter to you of May 29th, Dale and I have given further thought to our offshore fish farm project. We are now proposing several changes to our original project design and location, to accommodate some of the concerns that have been shared with us over the course of our draft EA review process.

One of the most significant changes we are proposing is to make all of our six main cages of the submersible Sea Station™ kind, rather than a mixed array of surface and submersible cages. These cages will be submerged beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages (less than 50 ft diameter), which will be used for nursery rearing and for harvesting of fish from the submersible cages. We are therefore no longer so concerned about exclusive use of the lease area surrounding the cages. Consequently, we are now only asking for the lease area to be designated as no anchoring, no SCUBA-diving, no swimming, and slow low-wake speed by boats, rather than exclusive use.

Furthermore, to provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha, we are now proposing to move our project a further 600 ft, directly to the west. This now puts our project in water between 200 ft and 220 ft deep. To accommodate this greater depth, we will now need some wider area to spread out our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres). This depth places the proposed project even further away from areas of public use, and so the chance of the public even encountering our cages is very low.

Knowing that you are particularly concerned with the potential for negative interaction between our project and humpback whales, we wanted to also inform you that we have been consulting with experts from the Hawaii Islands Humpback Whale National Marine Sanctuary to find ways of further reducing the chances of such impacts. These experts have suggested that our best approach is to keep to a minimum the number of mooring lines that we use in our cage design. We have taken this request to the project engineers that are working with us, and we hope to include an improved mooring design in the final Environmental Assessment.

We hope that this will go some way towards further ameliorating your concerns about our proposed activities. We look forward to continuing to work with you and the rest of the community to address any other concerns as our project moves forward. Our ultimate hope is that Hawaii can look to this precedent as a model for careful expansion of this sustainable, environmentally-friendly industry.

Again, thanks, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

"Kapu" signs with caution to keep families and or anyone out to gather or fish away from the ocean, their life's refrigerator from which they caught their food and gathered food for their family.

It would be a disastrous disaster for the people of Hawaii of any race.

In short Mr. Young, Hawaii's surrounding waters must be open to Hawaii's Ohana — all the families, sports fishermen, professional fishermen, fishing clubs, fishing derbies, divers, cross net throwers, opelu, kahala, aku, tuna fishermen, deep sea long line fishermen and world wide visitors who love Hawaii's fishing grounds.

Hawaii's ocean surrounding our home islands are choice because they are open for all to enjoy — Not to be boundaried off and become KAPU TO ALL OTHERS!

Me ke aloha pumehana,
Kalawaia Kimona Kaakahele Ahuna

"Cory"
<mh@interpac.net>
05/26/03 07:00 AM

To: <dawn.t.hegger@hawaii.gov>
cc:
Subject: NO to Kona Blue Water Farms

Dear Ms. Hegger,

Please do not approve a permit for Kona Blue Water Farms.

It takes five pounds of feed, made from caught fish, to produce one pound of farmed fish. How long can we do that?

Blue Water assumes that fish droppings will be cleaned out daily by constant currents. But currents are variable in speed and direction. Their EA does not have data on the ocean currents in the area.

Disease spreads easily in close-packed fish farms, so many antibiotics and medicines are dumped into the ocean. Even so, diseases can spread to wild fish.

Blue Water is to be located in a major Kona resting place for spinner dolphins.

We don't need fish farms. We need rebuild our wild fisheries.

Sincerely,
Cory Harden

Kona Blue Water Farms
Kona, Hawai'i
A Division of Black Pearls, Inc.
P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

KBWF/Kalawai'a Ahuna 1.doc
June 17, 2003

Kalawai'a Ahuna
171 King Ave
Hilo, HI 96720

Aloha, Ms Ahuna,

Thank you for your written letter (undated), which was read by Hank Fergerstrom as oral testimony at our public hearing on May 27th, 2003, regarding our open ocean fish farm proposal. As we understand it, you primarily object to our request for exclusive use of the central 9 acre lease area, and for restricted use of the surrounding 72 acre lease area which accommodates the moorings. Your letter states that "such deep water farming will surely bring 'Kapu, No Fishing, No Trespassing' signs and/or laws over, near or in the waters..." and you feel that "there are more than enough 'Kapu' signs on land ...".

We would like you to please understand that we have been working with the community in Kona now for over two years, discussing our offshore fish farm proposal, and obtaining input from kupuna from the area, fishermen, shoreline conservation groups and other environmental interests. The testimony by you, Frank, and one or two others at our public hearing was only the second time that we have heard strongly principled objections to our request for exclusive use of the lease area as we proposed in our draft Environmental Assessment.

We very much want this project to be acceptable to the broader community here in Kona, so that it can become a model for further sustainable development. Therefore, we are now proposing several changes to our original project proposal, to accommodate some of the concerns that the public have shared with us over the course of our draft EA review process.

Of most significance to your concerns is our intention to change our cages from a mixed array of surface and submersible cages, to all six main cages being of the submersible kind. These will be submerged beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. This therefore makes us less concerned about the need for exclusive use of the area surrounding the cages.

Consequently, we are now only asking for the entire lease area to be no anchoring, no SCUBA-diving or swimming, and slow low-wake speed by boats. Any anchors would probably get tangled in our mooring lines, and any SCUBA-diving or swimming incurs a prohibitive liability risk, if accidents were to occur. Therefore, while there may be signs that say "Please do not anchor" or "Please, no SCUBA diving or swimming", and "Please, low-wake speed", there will not be any 'Kapu' 'No Fishing', or No Trespassing" signs around our lease.

We will also still request that we be given permission to use two small surface cages, which will be used for nursery rearing and for harvesting of fish from the submersible cages. However, for these small cages we will not request any exclusivity beyond the cages themselves.

We want to be explicit about our reasons for doing this – we are trusting that Kona's fishermen and divers will respect the fish cages, and that we will not encounter any pilfering, vandalism, or reckless endangerment of property, health or safety. If we do encounter any such problems, we may need to reconsider the level of exclusivity. In such a situation, we would need to go back to the Land Board for redefinition of our lease exclusivity status, and we will probably need to consult further with the community. We believe, however, that this will not be necessary.

Furthermore, to provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha, we are now proposing to move our project a further 600 ft, directly to the west. This now puts our project in water between 200 ft and 220 ft deep. To accommodate this greater depth, we will now need some wider area to spread out our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres). This depth places the proposed project even further away from areas of public use, and so the chance of the public encountering our cages is even further reduced.

We trust that you find these changes acceptable, and that they alleviate many of your concerns. Thank you again for your concern and your input.

Aloha, sincerely,

Neil Anthony Sims
Vice-President / Research Director

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

Cory Harden 1 doc
June 8, 2003

Cory Harden
<mh@interpac.net>

Aloha, Cory,

We would like to respond here to your email to Ms Dawn Hegger, concerning our proposed open ocean fish farm project in Kona.

Fish feed conversion efficiencies are usually calculated on the basis of dried pellet feed. Kahala that we have cultured in our land-based facility yield one pound of fish to every one pound of dried pellet feed. Yes, fish meal is a component of this feed, but it is usually small, oily sardines, herrings and anchovies that are used in fish feed, not larger food fish. Aquaculture research is also focusing on alternative sources of oils, to reduce the reliance on fish meal.

We have compiled more recent data on water currents at the proposed farm site. Also, my partner in KBWF and I have both worked at Keahole Point for over 12 years, and we have watched the currents almost every day. The currents are usually very strong – between ¼ knot and 1 knot. The direction of the current does vary in an unpredictable manner, but this does not effect our anticipated minimal effect on water quality.

We currently hold kahala in land-based tanks at around six times the density at which they will be held in the offshore cages. We have not had to use antibiotics at any stage of grow-out of these fish, so there is less likelihood that we would have to do so in the open ocean cages. To our knowledge, there has never been a demonstrated case of a farmed fish transferring diseases to wild stocks – it is always vice versa. Certainly, fish held in high densities in shallow water areas with poor circulation are more susceptible to diseases. This is precisely the rationale for moving out into open ocean fish farming, where the fish are held at lower stocking densities, well clear of the substrate, in good current flow of clean, oceanic water.

As we demonstrated in our draft Environmental Assessment, we are not proposing to locate our site in the resting area for the dolphins. Our cages will be at least 3,000 feet away from the dolphin resting area. Dr Ostman-Lind, a local dolphin expert, has stated that the dolphins only enter into the proposed lease area when there is a particularly large group (around 600 dolphins) in the Bay, and then smaller groups begin "milling about". These may intrude on the SE-most corner of our proposed lease area, but

there are no cages in this corner. Under the present planned configuration of moorings, there are not even any anchors or moorings in this corner of the lease.

We are also now proposing to move our cages even further offshore, to a site between 200 – 220 ft deep. Dolphins only rest in waters less than 150 ft deep, so this would further avoid any potential risk for interaction between our project and the dolphins.

We, too, believe that we need to rebuild our wild fisheries, but this will not provide the answer to the growing demand for fish protein in the world. We really do need fish farms, but we also need them to be sited appropriately, and carefully monitored. We believe that our proposed project meets these criteria.

Thank you, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

Email from Dawn Hegger to Neil Sims, 4/24/03

Aloha Neil,

A Mr. Jan Ostman-Lind (a UH professor in Kona) called. He noted the proposed site is near a spinner dolphin resting area and requested that the appropriate environmental studies be prepared prior to approval of the project.

Can you please respond to him. Although, he did not leave a number or address with me.

If we can not contact him, or write to him, maybe you can address a general letter to DLNR regarding the above statement and send it to me at DLNR.

Mahalo,

Dawn Hegger

Email reply from Neil Sims to Dawn Hegger, 4/24/03

Aloha, Dawn,

Yes, we know Jan from earlier discussions about the dolphins. He did his Ph.D. here, studying the behavior of the dolphins resting at this site.

Because there were some concerns expressed about the potential interaction between our proposed project and the dolphins, we convened a public meeting to address the issues in some depth (on 5/17/02). Jan attended this meeting, along with several other interested parties with some experience with marine mammals, or some interest in the bay. Randy Cates also came over of his own volition. Randy has worked with dolphins at KMACS since he was 12 years old.

We felt that these discussions were very productive. I made a draft transcript of this meeting, and afterwards circulated this draft to all the attendees to ensure that I had fully and accurately reflected their views. Jan asked for me to make a couple of small changes to things that he had said, but was otherwise happy with this transcript. With the attendees' permission, I then posted this transcript on our web site, alongside the draft EA (at www.blackpearlsinc.com).

Jan is on my email list, which I use to announce any progress (or otherwise) with our EA process. We have always urged our email contact group to please direct any questions or concerns to us. As we had not heard any more from Jan, we presumed that he was satisfied with our EA as it stood. If you think that it is appropriate, I can go back to Jan and ask him what kind of environmental studies he would like to see, but he has never been specific about what he wanted done. We cannot imagine how more studies of the dolphins in the bay would allow us to better predict the potential interaction with our proposed farm. Randy's cage experience seems to offer the most definitive answer.

Please review this transcript, Dawn (copy attached) and let me know what else you would have us do.

Thanks, and aloha,

NAS

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

Jan Ostman-Lind 1.doc
April 29, 2003

Dr Jan Ostman-Lind, Ph.D.
Kula Naia, Waimea, Hawaii

Aloha, Jan,

I have not yet received a reply to my phone message of last week (4/24//03), so thought it best to follow up with a written reply.

Please find attached copies of some email correspondence between myself and Ms Dawn Hegger, of the Lands Division of DLNR. Dawn is our administrative contact for our CDUA application, and she is responsible for receiving public input on our draft Environmental Assessment for our offshore fish farm lease application.

As Dawn indicates, your phone comments to the DLNR Chairman's office were directed to her attention, and she has asked for a response from us. I have replied to Dawn, as set out below, indicating the extent of our contacts with you, and your participation in the meeting last year where we reviewed the potential for interactions between our proposed project and the dolphins in Makako Bay. I also forwarded Dawn an email transcript of that meeting (and enclose here for her a hard copy, with her cc).

Please let me re-emphasize our interest in obtaining maximum community involvement, and our openness to any comments or suggestions that you, or others in the Kona community, may have on our project. This is the underlying reason why we have put our draft EA on our website, and it is why we have circulated the transcripts of some of our public meetings, such as last year's dolphin meeting. We would be very grateful if you could direct questions or concerns directly to us, or copy us on any correspondence that you may direct elsewhere relating to our project.

It would appear that you still do have some concerns about the potential for impact on the dolphins in Makako Bay. If you could please specifically describe for us what you would like to see undertaken in the way of "appropriate environmental studies", then we could evaluate your suggestions, and perhaps incorporate them into our final EA.

As detailed in our draft EA, we will already be conducting extensive water quality monitoring under an NPDES permit, issued by State DOH Clean Water Branch under Federal EPA oversight, as well as monitoring of adjacent fish and benthic communities under DLNR Division of Aquatic Resources guidelines. Additionally, it is our understanding that USFWS will require reporting of any interaction with endangered species, and NMFS will require reporting of any interaction with marine mammals.

We believe that this will provide ample capacity for determining if there is any interaction between our project and the dolphins in Makako Bay. If there is indeed any such interaction, then this monitoring will allow us to evaluate its extent, and determine the best mitigative measures.

We look forward to hearing your thoughts in this matter.

Aloha,

Neil Anthony Sims
Vice-President / Research Director

c.c. Dawn Hegger, DLNR Lands Division, 1151 Punchbowl St, Rm 220, Honolulu, HI 96813

Aloha,

For those of you that received my first version of this message I apologize for sending such a large file. I attached the PDF of the Draft EA that I am responding to in this letter. I thought that it would be useful for everyone to be able to read the document. But, it is a very large file. So, I am re-sending my letter without the large attachment. If you would like to read the Draft EA you can find it at the following website: http://www.blackpearlsinc.com/3_4.shtml

I am very concerned about a proposed fish farm by Kona Blue Water Farms (a division of Black Pearls Inc.) that is requesting permits to put a series of fish pens covering 81 acres in Makako Bay, which is just off of the Kona airport and NELHA. This is also the southern boundary of the Hawaiian Islands Humpback Whale National Marine Sanctuary. I hope that you will take the time to read this letter and consider contacting both the Dept. of Land and Natural Resources and National Marine Fisheries Service, Protected Species Division or anyone else you may know who might have an impact on the decision making process. The current indications are that this project may be permitted without having any EIS required or further study of potential impacts.
Thank you for your time,

Jan (Ostman-Lind)

Peter Young
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

April 22, 2003

Dear Peter Young

I am writing in response to the "Environmental Assessment for an Offshore Open Ocean Fish Farm Project off Unualoha Point, Kona, Hawaii" prepared by Kona Blue Water Farms, a division of Black Pearls, Inc.

As a background to my statement, I would like to mention that I studied the spinner dolphin population off the Kona Coast for my dissertation research between may 1989 and February 1993. I received my Ph.D. for this work at University of California Santa Cruz, in June 1994 (Östman 1994). I returned to the island in 1997, and I am currently continuing my work on the spinner dolphin population off the Kona Coast. Partial funding for this recent research project is a contract with National Marine Fisheries Service to study the human impacts on spinner dolphins and to determine if there has been any significant change in the spinner dolphin population size for the Kona Coast.

The proposed location for the project is in the middle of my main study area, spanning the coastline from Honokohau Harbor and North to Mano point, just north of Kona Village. This area is also part of the Hawaiian Islands Humpback Whale National Marine Sanctuary. During my research I followed 131 schools of spinner dolphins in this area. Most of the schools were followed for about 3 hours, either in the morning or in the afternoon, although several schools were followed all day, for up to 13 hours.

Kona Blue Water Farms is proposing to locate their fish farm in one of the most critical resting areas for spinner dolphins on the Big Island. Not only is it a critical resting area but it accommodates the largest average school sizes of any of the critical resting bays on this island. That is, a high percentage of the spinner dolphin population uses this bay than any other. The average school size of dolphins resting in Makako Bay is 103 animals (range: 17 – 300). This is over three times larger than the average school size (33) found in Kealakekua Bay which is one of the other critical resting areas for this population. It was the chosen resting area for 72 of the 131 schools (55%) followed in the main study area. On average, the spinner schools come into Makako Bay to rest during the middle of the day, from about 11 AM to 1 PM, however, they may be milling in the bay as early as 08:11 and as late as 13:50. Contrary to what the Kona Blue Water Farms states, the spinner dolphins do not migrate through this area. They are a resident population of animals that uses this bay as a resting area. They do not migrate.

In their draft EA, Kona Blue Water Farms claims that their fish pens will be located in an area of the bay that the dolphins do not use to rest. This is erroneous, because of the large school sizes that often rest in the bay they frequently break up into 2-5 subgroups of up to 60 dolphins each. These subgroups mill independently and spread out over most of the area of Makako Bay. The effect of this subdivision is that these schools require a large area to rest. The location of the proposed 81-acre facility right on the edge of this critical resting habitat is likely to crowd these large resting schools and disrupt the dolphins' rest. The area utilized by the spinner dolphins while resting in Makako Bay, especially for the largest schools, is much bigger than indicated on the Draft EA.

The Draft EA determination states that "a finding of no significant impact (FONSI) is anticipated". I disagree with this statement. On the contrary, the proposed project is likely to have significant environmental impact by affecting an environmentally sensitive area, and by disturbing the spinner schools resting in the bay and/or affecting the behavior of theses school in and around this critical resting area (point (24) in the Determination on page 9 of the Draft EA; issue 5 in the table on page x and item (11) on page xii of the Executive Summary).

I participated in a meeting held by Kona Blue Water Farms, on 5/17/02 where I expressed my concerns proposing that they locate the fish farm at another location, or a mile or more offshore. I also reviewed two drafts of the Draft EA. However, my comments are misrepresented in the Draft EA, which makes it appear as if I concur with the proposed location of the fish farm, when nothing could be further from the truth. In addition, my suggestion to move the fish pens farther offshore was brushed off as impossible, since the current technology would not allow for these pens to be located in deeper waters. This assertion was rebuffed during the hearing for the proposed Ahi Nui farm off the Kohala Coast, when the marine engineering expert brought in by the Ahi Nui staff stated that the current technology exists to locate this type of operation farther offshore in much deeper waters.

The proposed farm will be attended by a two to three person crew, in a 45-foot or smaller vessel for "an average of 6 hours per day" and will have a security network associated with it that may include "active sonar and other tracking devices". In other words, there will be a fair amount of human activity and noise generated from this operation on a daily basis, in the near vicinity of the largest resting school of spinner dolphins on the Big Island. I feel that this is indeed the basis for real concern.

Because of the disruption of the spinner dolphins' resting area and because of the potentially negative impacts of the human activity and noise generation, this proposed facility should be review by the National Marine Sanctuary, the Marine Mammal Commission and National Marine Fisheries Services, Division of Protected Resources. It is clear that there is a strong potential for harassment of at least one marine mammal species protected under the MMPA. In addition, there may be impacts as governed by the Endangered Species Act, given that during the winter months, Humpback whales are frequently utilizing this area as well.

These concern alone should be enough to warrant an Environmental Impact Study to be conducted and not just a Draft Environmental Assessment. There are several other pressing concerns that should also be more fully addressed. This include the impact of high levels of organic and nutrient pollution (unused feed & fish feces) likely to come from this operation. Not only are these class AA/A pristine waters but there are a number of reef areas within a short distance of the proposed fish pens. Although there is a strong current in this region given the total volume of waste that will be produced in such close proximity to the shoreline (2000 feet) there is a strong possibility that these nutrient poor waters will be highly impacted by the influx of nitrates, nitrites and phosphates. This in turn could have a negative economic impact on the

dive and marine ecotourism industries because some of the prime diving sites are located just inshore of the proposed fish pens. This area has dive sites that are located in sandy areas because garden eels and manta rays are found in these areas.

To quote some of the reviewers of the EA for a similar project off the Kohala Coast, prepared by Ahi Nui (http://www.kamakani.org/ahinui.html#anchor536094), my overall impression of the Draft EA is that it is "a tool of justification for the project rather than a discovery and study of actual impacts".

I feel strongly that a comprehensive environmental impact study (EIS) is needed to more fully disclose any potential environmental issues that may not be readily apparent at this time. Kona Blue water Farms should also be required to look into the possibility of locating the pens a mile or more offshore, where it will have less of an impact both on the resting spinner dolphins and the near shore ecosystems.

Sincerely Yours,

Jan Östman-Lind, Ph.D.

Aloha, Jan,

I am in receipt of an email that you have circulated to a group of people regarding our open ocean fish farm application off Unualoha Point, in Kona. It appears that you have either not received my email of April 29th, 2003 (a copy is attached herewith, but it had not bounced back to me, so I presumed it you had received it), or that you have chosen not to respond directly to us.

We are disappointed if you have chosen the latter path. As I have indicated to you in several previous conversations, we have taken great pains over the last two years to reach out and engage the broader Kona community in education and discussion about our offshore fish farm proposal. It is a new concept, and it is worthy of full and frank consideration. We believe that offshore fish farming offers tremendous promise for building a more diverse economy in Hawaii, and for reducing the ongoing depletion of our ocean's resources, but we wish to address the various issues in an open, constructive manner. We would have greatly preferred it if you had been able to direct your questions and concerns to us, rather than ignoring our standing invitation, and taking a contrary approach.

We recognize that with this new technology, there will be concerns and questions that need to be addressed. Where these issues may be valid - such as where you point out your concerns with our proposed use of active sonar equipment - we are willing to find some ameliorating common ground (please see the more detailed discussion below). However, we also need to dispel some of the mis-information and fear-mongering that might be inadvertently circulated, or otherwise disseminated.

In the vein of trying to address your concerns constructively, I would like to respond to the major issues that you raise in your email, and to also clarify a number of misrepresentations therein. For clarity, I will do this in pointwise fashion, with quotes from your email highlighted in blue font :

1. " ... a series of fish pens covering 81 acres in Makako Bay ..." . No, Jan. We are requesting a lease over 81 acres offshore from Unualoha Point, north of Makako Bay. The proposed fish pens will only occupy the central 9 acre area. The rest of the 72 acres of the lease will only be used for the underwater moorings to secure the pens.

2. "Kona Blue Water Farms is proposing to locate their fish farm in one of the most critical resting areas for spinner dolphins on the Big Island." No, Jan. As you are well aware, the fish farm cages will be some 3,000 feet away from the normal resting area of the dolphins. The only potential overlap will be where any "milling" dolphins reach the south-easternmost corner of the lease area. The draft EA clearly states "*Under the current working plans for the net cage design, however, this corner of the lease would not contain any anchors and mooring lines (Figure 3, and Plate 1); in any event, there would be no net pens or other substantive farm structures in this corner of the lease.*"

3. "Contrary to what the Kona Blue Water Farms states, the spinner dolphins do not migrate through this area. They are a resident population of animals that uses this bay as a resting area on a regular basis. They do not migrate." We have relied on the best available scientific evidence in our EA – in this case, the comprehensive studies by Norris and his colleagues which have been published in peer-reviewed journals. In our draft EA, we quoted extensively from Norris and Dohl, 1980. An excerpt (from page 28) is provided below. If you have further scientific information that differs from this study, then we would certainly be interested in reviewing it, and perhaps including it in our final EA.

Our intention here is only to provide the best possible assessment of the environmental setting, and the potential impacts of our proposed project.

From draft Environmental Assessment, p. 28: "*The dolphins that are found north of Keahole are part of "the largest school ... on the lee side of Hawaii" (Norris and Dohl, 1980, p. 827). The school ranges from Honokohau Harbor to Kiholo Bay, and may occur as a single school at times, or "fragmented into three or four smaller schools, separated by a few kilometers of coastline" (ibid). "The dolphins do not seem to occupy any of the small coves consistently, but to congregate over the rather extensive area of shallow water, moving back and forth." (ibid). "The dolphin populations ... are not composed of discrete schools of modest size, but instead of highly fluid groups that may range considerable distances and may be associated in very variable combinations of individual animals" (ibid, p. 822)."*

... and later, also on p 28 ...

"There is a "fluidity in school structure and variability of school movement" (Norris and Dohl, 1980, p. 828). "Dolphin schools are not always in these rest localities, and the number of animals using a given cove may vary widely from day to day (ibid). Norris and Dohl (1980, p.830) "reject(ed) the idea of a given cove having a definable resident school", with individual animals moving from Keahole Point school as far south as Kamilo Point. School size also often varies, with one individual dolphin associated with schools ranging from 6 to 150 animals (ibid)."

4. "These subgroups mill independently and spread out over most of the area of Makako Bay. The effect of this subdivision, is that these schools require a large area to rest. The location of the proposed 81-acre facility right on the edge of this critical resting habitat is likely to crowd these large resting schools and disrupt the dolphins' rest." See point 2., above. There is only minimal overlap between the "milling about" areas and the proposed lease area. The mooring lines and anchors will not be in this overlapping corner. In any case, all our moorings will be stationary. All of the available evidence suggests that stationary moorings present no significant obstacle or impediment to dolphin resting (see draft EA excerpt. below). Of more concern, I think, is the presence of boats and divers intruding directly into the resting schools of dolphins.

From draft Environmental Assessment, p. 37: *Norris, et al., (1994, pp 51 – 52) expressed concern that the direct encroachment of yacht moorings may "displace the dolphins from their habitual resting areas" in Kealakekua Bay. The proximity of the moored yachts on more than half of the available sandy area in Napo'opo'o, however, did not appear to disrupt the resting of the dolphins on the remainder of the shallow bay. The dolphins in Kealakekua Bay reacted to foreign objects "in much the same way as we have come to expect from fish schools" (Norris and Dohl, 1980, p 841; i.e. a school approaching an obstruction moves around it, on either side, and reforms once they are past the obstruction).*

5. "My comments are misrepresented in the Draft EA, which makes it appear as if I concur with the proposed location of the fish farm, when nothing could be further from the truth."

We apologize if you feel that we have misrepresented your views, but we believe that we cited you accurately and honestly. We have repeatedly asked for your further comments on this draft EA. When we first posted an earlier version of the EA draft on our web page, we sent a notice out to all those

interested parties that we had engaged through community meetings – including yourself. We received no comments from you to clarify the statements that we attributed to you.

The two areas where we did cite you as a personal communication are :

In the caption for Figure 5 (i.e. "*The migration by spinner dolphins (Stenella longirostris) through the area suggests that the farm will not interfere in any significant manner with the animals' movements. Dolphins may move into the SE corner of the lease area during resting (Jan Ostman-Lind, pers. comm.), but will not encounter mooring lines, anchors, or net cages under the present farm mooring design.*", and again,

On page 37 (i.e. *Jan Ostman-Lind (pers. comm.) indicated that resting schools sometimes move out into deeper water, and may at times intrude on the SE-most corner of the proposed lease area, in 50 m depth. Under the current working plans for the net cage design, however, this corner of the lease would not contain any anchors and mooring lines (Figure 3, and Plate 1); in any event, there would be no net pens or other substantive farm structures in this corner of the lease.* "

Please let us know how you would like us to revise these references in the final Environmental Assessment, and we would be happy to do so.

6. "In addition, my suggestion to move the fish pens farther offshore was brushed off as impossible, since the current technology would not allow for these pens to be located in deeper waters."

We did not say that it would be impossible to locate cages farther offshore. It probably is theoretically possible, but it certainly would be much more expensive, very impractical, much more difficult to manage, and nearly impossible to maintain any security over the site. The fact that the Ahi Nui Tuna Farming company has indicated that they will conduct an EIS to examine relocating their tuna farm to waters over 100 fathoms (600 feet) deep does not mean that it is now practical or reasonable to do so. There are huge increments in costs for such a change. The cage designs would have to be different and much more robust. Greater-sized anchors and heavier mooring lines would be necessary, and larger boats would be required to service the farm in the rougher waters. Further offshore locations would also reduce access days to the farm because of the greater weather exposure.

Also, as the water gets deeper, the lease area grows geometrically larger. For every 100 ft deeper, the anchor lines need to spread out at least a further 300 ft in each direction. E.g. if we were in 300 ft deep water, we would need to have a lease of 144 acres; if it was in 400 ft, the anchor spread would cover 225 acres, and so on. Actually, as you go further offshore, you would also need to increase your anchor scope from 1:3 to maybe 1:5, because it's deeper, and you would also be more exposed to the Waikoloa winds. A 1:5 scope would mean that a farm in 400 ft deep water would need a lease area to accommodate the anchor spread of 530 acres .... Now that is starting to sound like a significant impact! Equally, or more importantly, is the additional risk and difficulty in running a project exposed to much rougher conditions and deep water. It is possible to have divers inspect moorings at 150-200 feet, although it is dangerous. Any deeper than that is extremely risky, requiring very specialized professionals. We are not ready to risk people's lives like that.

Furthermore, your insistence on conducting an EIS and pushing fish farming into deeper water will exclude local involvement in this industry. Open ocean fish farming in Kona will then be the exclusive

domain of mainland investment companies and international agribusinesses. We believe that local Kona companies - and local Kona fishermen - should be able to emulate our efforts, and get involved in developing open ocean fish farming. Very few local ventures could sustain the costs of an EIS. Virtually no local ventures could afford the capital costs for locating a farm out in waters over 600 feet deep. To insist on these two criteria as prerequisites for any fish farm in Kona is therefore to exclude local participation in this promising industry. Mainland or foreign-owned operations will also demand bigger economies of scale, to provide higher returns ... and so the farms will have to be significantly larger.

Our farm, as proposed, is small (only 6 cages, of 80 ft diameter), and it is locally owned (our company has been at NELHA now for nearly 11 years). My business partner and I both surf, fish, and dive along this stretch of coastline. We are accountable to our community, in a way that a large, foreign-owned venture never could be. What style of offshore fish farming would you like to encourage in Kona, Jan?

7. "There will be a fair amount of human activity and noise generated from this operation on a daily basis, in the near vicinity of the largest resting school of spinner dolphins on the Big Island."

Again, we think that there should be far greater concern focused on the presence of commercial dive boats, snorkelers and SCUBA divers who actively pursue the dolphins while they are resting. Some people go out to Makako Bay with the express purpose of diving with the dolphins.

By contrast, we envisage that our work boat would arrive at the site early in the morning - around 7 - 8 am. This is well before the transit of the dolphins past the farm site into the Bay. The main activities during the day would be feeding of fish. On two or three days a week we would undertake grading and harvesting as well. All of these activities would take place inside of the cages, and therefore would offer little chance of disturbing the dolphins.

You may be correct in supposing that the use of active sonar would be a cause for concern, but our understanding is that the impacts of sonar depend on the power of the transducer. We only intend to use echo-sounders of the same power as are used on the average fishing boat. The sonar would only be activated if there was evidence of an intrusion into the cage area. This would be used almost exclusively at night, when the cage is left unmanned. The dolphins are not found around the Makako Bay site or near the fish farm site at night.

During the day, the farm would usually be manned, or we can maintain adequate security from shore, or by using radar. We would be happy to discuss with NMFS or other responsible agencies the security measures that we would propose to use, prior to their installation, to minimize any negative impacts on the dolphins or other marine mammals.

8. "It is clear that there is a strong potential for harassment of at least one marine mammal species protected under the MMPA."

I think that this might perhaps be an overstatement, Jan. It is certainly unfounded, and its inflammatory tone is not helpful to well-intentioned considerations. There is no evidence of any potential for harassment. Harassment involves active pursuit of schools, such as occurs with some of the dive operations or whale-watch folk. A self-contained, stationary farm operation cannot constitute

harassment. There is not even any evidence for potential negative impact on the dolphins, based on all of the available evidence at hand. Perhaps we should let the NMFS officials make an objective assessment of this evidence, and draw their own conclusions. I am happy to do so.

9. "This includes the impact of high levels of organic and nutrient pollution (unused feed & fish feces) likely to come from this operation."

This statement does not reflect the available evidence as presented in the draft EA. All of the data from the Ewa Beach fish farm cage indicates that the nutrient levels downstream of the fish cages are usually undetectable, even right at the very edge of the cage (see Professor Emeritus Chuck Helsely's article in Hawaii Fishing News, March, 2003 – there is a copy of this article on our web site). The beauty of farming fish in sites such as this, in deep water in the tropics, is that firstly, there are strong long-shore currents to dilute any effluents, and secondly, at these high ambient temperatures, the natural breakdown of any nutrients occurs very quickly. This situation is therefore vastly different to a salmon farm stuck in the back of a fjord in Norway, which has almost no current, and where the water temperature is close to freezing.

10. "Although there is a strong current in this region given the total volume of waste that will be produced in such close proximity to the shoreline (2000 feet) there is a strong possibility that these nutrient poor waters will be highly impacted by the influx of nitrates, nitrites and phosphates."

This does not reflect the reality of the water movements at our proposed site: all of the currents past Keahole are long-shore. Currents do not run from the cage farm inshore onto the dive sites. Under a north-setting current, the nearest down-current reef is near Mahaiula, some three or more miles away. Under a south-setting current, the nearest down-current reef is at Keahole Point, one mile away.

We are very, very concerned that there be no negative impacts from this operation. We are both marine biologists who live and work here in Kona. Our hatchery relies on the cleanliness of the surface waters at NELHA. All of our work to date – and our future livelihoods – depends on us running an ecologically sustainable, minimal-impact operation.

We fully expect to - indeed, we embrace the idea of having to - conduct comprehensive environmental monitoring of our fish farm site. Federal and State law mandates that we obtain and maintain an NPDES permit from the EPA and State Department of Health Clean Water Branch. If we exceed the allowable limits under this permit, we either have to instigate immediate mitigation measures - such as reducing feeding rates or reducing the fish densities - or we are shut down. They pull our permit and we're out of business. We would expect the same standards to be imposed on any other fish farm operation that might be set up in Kona, and we expect the monitoring and compliance information to be made publicly available.

11. "A comprehensive environmental impact study (EIS) is needed to more fully disclose any potential environmental issues that may not be readily apparent at this time."

Jan, this draft Environmental Assessment represents the culmination of a two-year process of research, writing, discussions and meetings. We have consulted extensively with kupuna, shoreline conservation groups, and community interests, as well as State agencies, Federal experts and the local County. We

have circulated earlier drafts of our EA to interested parties, and we posted it on the web over 6 months ago, to ensure that we obtained maximum exposure and full and complete input from the public. There has not been any suggestion of any other "potential environmental issues". It is highly unlikely that an EIS would uncover anything else that is not already "readily apparent".

12. "To quote some of the reviewers of the EA for a similar project off the Kohala Coast prepared by Ahi Nui, (http://www.kamakani.org/ahinui.html#anchor536094) my overall impression of the Draft EA is that it is "a tool of justification for the project rather than a discovery and study of actual impacts"."

Jan, I think that it is inappropriate for you to attempt to taint our proposal by association. We believe that our draft EA is a comprehensive, detailed and honest assessment of the likely impacts – or lack thereof – resulting from our offshore fish farm proposal. We fully expect to be actively involved in ongoing monitoring, and that this further data will affirm our EA's conclusions. If there are any impacts that unexpectedly become apparent during this monitoring process, we will, of course, respond rapidly to mitigate and reduce the extent of the impacts. There is a well-established process for this monitoring and compliance oversight.

Again, if you would like to help further the Environmental Assessment review process in a constructive way, then please respond directly to us. We would welcome any information obtained from reliable sources that might challenge that which we have already written. We would also appreciate hearing any other questions or concerns that might need to be addressed.

Thank you, and aloha,

NAS

Reply from Jan Ostman-Lind to NAS's email ... Jan's comments underlines ..

We initially talked about your proposed fish farm over the telephone about a year and a half ago and I participated in your 5/17/02 meeting. I told you on both occasions that the proposed location for your facility was in a very sensitive area, where large schools of spinner dolphins rest during the day on a regular basis. I also sent back revisions on the first draft you circulated. After receiving the second draft, it became clear that you were still focusing on Makako Bay as the chosen location. I felt that I was wasting what little time I had available.

We are disappointed ... We would have greatly preferred it if you had been able to direct your questions and concerns to us, rather than ignoring our standing invitation, and taking a contrary approach.

As I mentioned above, I stated my concerns from the outset, but they fell on deaf ears. I still feel that Makako bay would be a very bad location for a fish farm, for reasons stated in the earlier letter. You have not seriously considered any other location, so all I see is an attempt at convincing people that nothing bad will happen and continue with your current plans. There is NO apparent effort at considering another location. I see no evidence of movement towards another location. So the only avenue left for me was to bring this issue to the attention of as many people as possible, and make my case to them.

We recognize that ... we also need to dispel some of the mis-information and fear-mongering that might be inadvertently circulated, or otherwise disseminated.

There is no attempt at fear mongering on my behalf. When it comes to new technologies I believe that the Precautionary Principle and its tenets should be adheared too. The 4 tenets are (with my emphasis):

€ People HAVE A DUTY to take anticipatory steps to prevent harm. If you have REASONABLE SUSPICION that something bad might happen, you have AN OBLIGATION to try to stop it.

€ The BURDEN OF PROOF of carelessness of a new technology, process, activity, or chemical LIES WITH THE PROPONENTS, not with the general public.

€ Before using a new technology, process, or chemical, or starting a new activity, people have an obligation to examine a FULL RANGE of alternatives, including the alternative of not using it.

€ Decisions applying the precautionary principle must be open, informed, and democratic, and must include the affected parties.

In my view, tenet 2 and 3 have not been addressed adequately.

2. "Kona Blue Water Farms is proposing to locate their fish farm in one of the most

critical resting areas for spinner dolphins on the Big Island." No, Jan. As you are well aware, the fish farm cages will be some 3,000 feet away from the normal resting area of the dolphins. ...
By my calculations, using Figure 5 in the Draft EA, the closest corner of the fish pens (in the central 9 acre area) will be less than 2,000 feet from the spinner dolphin resting area indicated in that Figure. However, the dolphins may use a much larger area than indicated while resting, especially the larger schools. The drawing that I made on that figure during the 5/17/02 meeting indicated a much larger area used by resting dolphins, and as I said at that time, the dolphins may exceed even the area that I indicated when the larger schools are in the bay.

3. "Contrary to what the Kona Blue Water Farms states, the spinner dolphins do not migrate through this area. They are a resident population of animals that uses this bay as a resting area on a regular basis. They do not migrate." We have relied on the best available scientific evidence in our EA ...
The quoted study, Norris and Dohl (1980) was done in the early to mid 1970's. The observations were pioneering at the time, but it has since been followed by two other studies by Dr. Ken Norris and his students, the first done between 1979 and 1980 and a few weeks in 1981 (Norris 1991 ,Norris et al. 1994), the second done by my wife and I between 1989 and 1992 (Driscoll 1995, Ostman 1994). Both the 1970's study and the 1979-81 study covered a large range of research topics, including research on the captive animals in Sea Life Park (Norris et. al. 1994) The quoted observations north of Honokohau harbor were made during aerial surveys, when each school was observed for several minutes, rather than several hours. These survey covered the entire state of Hawaii including the NW Hawaiian Islands.

As I mentioned in my letter, I spent between 3 and 13 hours with 133 spinner dolphin schools in the area between Honokohau and Mano Point (just north of Kona Village). My wife and I have spent far more time with the spinner dolphins in this area than any other researcher. Our research was focused on their social organization, social behavior and acoustics. Previous research efforts were all centered around Kealakekua Bay, ours was centered around Makako Bay.

It is also worth pointing out that none of these studies, or any other that I am aware of, have focused on the possible impact of a fish farm located in Makako Bay.

4. "...the proposed 81-acre facility ... is likely to crowd these large resting schools and disrupt the dolphins' rest."
From draft Environmental Assessment, p. 37: *The proximity of the moored yachts on more than half of the available sandy area in Napo'opo'o, however, did not appear to disrupt the resting of the dolphins on the remainder of the shallow bay.* There area several differences between the two locations. A quick calculation using chart # 19320 (Island of Hawaii) suggest that Kealakekua bay has approximately 3 times the surface area of Makako Bay while the resting schools in Makako Bay, on average (103) are 3 times larger than the resting schools in Kealakekua Bay (33), but could be up to 9 times larger (estimated to up to 300) at times. This last number represents almost 15% of the estimated Big Island spinner dolphin population if you use the population estimate (2334) from Ostman 1994, or over 30% if using the previous population estimate (960) from Norris et al. (1994).

You will also have a lot of activity around the pens for about 6 hours per day.

I would also like to point out that I knew Ken (Dr. Norris) very well, he was both my and my wife's advisor, as well as, a good friend. He was a naturalist, conservationist and activist and he helped write the Marine Mammal Protection Act of 1972. I know that he would have been adamantly opposed to locating a fish farm in the near vicinity of this critical resting area. To him the mer possibility of a negative impact on such a large proportion of the Big Islands estimated spinner dolphin population would have been enough to oppose such an opperation.

5. " ..the Draft EA, which makes it appear as if I concur ...."

We apologize .. We have repeatedly asked for your further comments on this draft EA. See my comments above for why I stopped.

Here I am misquoted and misrepresented.
€ The dolphins are NOT migrating through the area, they are residents, using the coastline year around on a frequent, almost daily basis.
€ I did NOT suggest that the farm would not interfere in any significant manner with the animals' movements. I rather suggested that they might be crowded by the facility and that their movement patterns along the coastline might be altered.
€ I did NOT say that the dolphins would not encounter mooring lines, anchors, or net cages. However, during the 5/17/02 meeting, I drew in a conservative area on one of your figures indicating where the dolphin schools may move while milling around the bay during their resting period, while suggesting that the larger schools may cover an even larger area. My drawing covered a much larger area than the hatched area indicated in Figure 5 of the Draft EA.

Here is a suggested rewrite of the above section:

Spinner dolphins (*Stenella longirostris*) are resident along the coastline and utilize Makako Bay as a resting area during the day on a regular and frequent basis. The proximity of the farm is likely to cause the dolphins to change their behavior during their resting period, including the location of their milling behavior, the movements of subgroups of the larger schools, and may disrupt or even shorten the duration of the resting period. It is further likely to crowd dolphin schools as they move through the area and cause them to change their routes of movement. The dolphins are likely to encounter mooring lines and anchors, and even the net cages during their movements and the cages will be located in an area the dolphins traverse during their afternoon zigzag movements.

On page 37 (i.e. *Jan Ostman-Lind (pers. comm.) indicated that resting schools sometimes move out into deeper water,*

Again a misrepresentation of what I said. See my comments above.

6. "In addition, my suggestion to move the fish pens farther offshore was brushed off as impossible..."

... The fact that the Ahi Nui Tuna Farming company has indicated that they will conduct an EIS to examine relocating their tuna farm to waters over 100 fathoms (600 feet) deep does not mean that it is now practical or reasonable to do so. ... Maybe Kona, with its steep drop-off close to shore, is not a suitable location for an offshore fish farm. I suggested to you both in our initial phone conversation about a year and half ago and during the 5/17/02 meeting that FROM THE PERSPECTIVE OF THE SPINNER DOLPHINS the only location close to shore that would seem suitable as a location for a fish farm along the Kona side of the island would be from Kiholo Bay to South of Puako. The rest of the coastline is frequented by spinner dolphins on a regular and frequent basis. However, that is not to say that there may not be other concerns in that area.

Furthermore, your insistence on conducting an EIS and pushing fish farming into deeper water will exclude local involvement in this industry. ...
To take your argument to its logical conclusion would be to argue that it would be better to have a local business run an operation that could damage the environment, rather than having a mainland business do it in a more environmentally friendly way. I do not think that you mean that. On the other hand, there are local, well-established businesses that may be negatively affected by your proposed operation, such as dive and eco-tour operators.

I again refer to the Precautionary Principle. You are proposing to start a new type of venture, with new technology and new activities, in the Kona area, one of the most diverse in the World when it comes to marine mammals. Furthermore, it is an area with class AA/A pristine waters. There is a huge amount at stake here, with a lot to lose. It is on your shoulders to prove that there will be no negative effects of this operation.

Our farm, as proposed, is small (only 6 cages, of 80 ft diameter), and it is locally owned ...
Kona Blue Water Farms, as state in the Draft EA is "a division of Black Pearl, Inc.", an Australian operation, by my understanding. Again, maybe Kona, with its steep drop-off close to shore, pristine waters, and abundant marine mammal communities is not a suitable location for an offshore fish farm. Makako Bay certainly is not.

7. "There will be a fair amount of human activity and noise generated ...

... should be far greater concern focused on the presence of commercial dive boats, snorkelers and SCUBA divers who actively pursue the dolphins ..

This is indeed a concern, and I am currently working with the local Dive and tour operators on this issue. Pete Hendricks (now the Deputy Managing Director for Hawaii County, Office of the Mayor) and I taught a 6-week evening course about marine protected species and the ocean environment attended by 16 captains, naturalists, and other interested parties. However, this does not diminish the problem posed by the fish farm. On the contrary, in the current situation in Makako Bay, a Fish Farm could be the "straw that broke the camels back" so to speak, causing the dolphins to utilize the bay significantly less than what they have been doing.

... our work boat would arrive at the site early in the morning ... before the transit of the dolphins past the farm site into the Bay. ...

I was mainly concerned with the disturbance factor of an echo-sounder, not of any physical effects of the sound. There are some indications (recordings of unidentified dolphin sounds at night from Makako Bay) that other dolphin species, such as Pantropical spotted dolphins (*Stenella attenuata*) may use this bay to rest at night (Shannon Brownlee, Personal communication; she was part of the 1979-81 team Norris et al, 1994). However, as far as I am aware, no one has covered Makako Bay at night to monitor for such a possibility. Another reason for an EIS.

8. "..there is a strong potential for harassment ...."
There is no evidence of any potential for harassment.

The Fish Farm could cause Level B Harassment. According to the Marina Mammal Protection Act Level B Harassment is defined as: "any act of pursuit, torment, or annoyance which -- ....

...- has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption or behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. "
(http://www.nmfs.noaa.gov/prot_res/laws/MMPA/MMPA.html)

I will end my comments here, since my main input is as a scientists who have studied Hawaiian spinner dolphins since the late 1980's. I raised the issues below as additional concerns, but I will leave it to others to respond to the comments below.

Aloha,

Ian

REFERENCES

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Driscoll, A. (1995) The Whistles of Hawaiian spinner dolphins (*Stenella longirostris*). University of California Santa Cruz. Master's thesis.

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

Jan Ostman-Lind 3.doc
May 29, 2003

Aloha, Jan,

I am in receipt of an email from you, dated May 19th, 2003, that was a response to my email, which itself was responding to your earlier message of May 6th, same, entitled "Concerns about fish farm proposed for Kona".

We want to ensure that we address all relevant comments on our draft Environmental Assessment (EA), and include copies of all written submissions that we receive into our final EA. However, your email consisted of comments inserted amongst the points in my earlier message, and this makes it more difficult to present in an easily readable and printable format.

We are happy to include these comments in the final EA, but we would greatly prefer it if you could please present them as a single discreet letter. If you would prefer, I could also just excerpt your comments, and include those as a separate document. Thank you in anticipation.

Thank you also for your attendance at our public hearing on Tuesday night. We do genuinely appreciate hearing all points of view on our proposed project, so that we can ensure that we will not be causing any significant environmental impact. We are sorry that you view our proposed location at Unualoha Point as completely incompatible with the presence of the dolphins in Makako Bay. All of the available evidence, as we presented in our draft EA, suggests that the presence of the cages will have no significant impact on dolphin movements or resting.

Still, we fully expect that our lease terms and conditions will specify that we must comply with various NMFS requirements for an ongoing marine mammal monitoring program, to assess any potential interactions between our fish farm and the humpback whales or other marine mammals. Beyond this, however, we would like to consider our potential farm site to be a scientific asset, and not just a neutral impact on the environment. Our farm will be manned almost every day, and it represents an ideal location from which to gather invaluable scientific data from a fixed ocean observation point. This will hopefully allow us to better understand variations in marine mammal patterns of movement.

We are therefore continuing with discussions with State and Federal marine mammal experts, including the Hawaii Islands Humpback Whale National Marine Sanctuary staff, to hopefully establish the most scientifically sound monitoring program that could feasibly be implemented by our farm staff, without greatly interfering with their daily work duties. This would be the first time, to our knowledge, that such data would be collected in an ongoing, comprehensive manner.

We would like to propose that we also include as part of this work, a detailed monitoring program of the spinner dolphins in the area. Because of your obvious interest and expertise in the area of smaller cetacean behavior, we would like to invite you to assist us in designing this monitoring program. This would not only monitor the dolphins, but also the human elements in the area. Our staff could be making observations on a daily or twice-daily basis of the location and numbers of dolphins within sight of the farm, the presence of boats or divers in close proximity to the resting schools, and other germane information.

We hope that you will recognize the great potential value of this data, and help us in ensuring that it is collected and analyzed in the most meaningful, valid manner feasible.

Thank you in anticipation of your response.

Aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

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Jan Ostman-Lind 4.doc
June 24, 2003

Aloha, Jan,

Further to my letter to you of May 29th, I wish to inform you of several modifications that we are making to our proposed open ocean fish farm project, to accommodate some of the concerns that have been shared with us over the course of our draft EA review process.

In order provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha Point, we are now proposing to move our project a further 600 ft, directly to the west (offshore). This change now places the project well clear of the dolphin resting area. We are 2,600 ft from the shoreline, or almost half a mile offshore. We are now sited in water between 200 ft and 220 ft deep, which is far beyond the 50 m depth limit to resting dolphin schools. There is now no potential for any overlap between our new lease area and the resting dolphins, even when (as you have indicated occurs with particularly large schools of resting dolphins in Makako Bay) they break up into sub-groups that mill about independently. You had said that these subgroups would occasionally intrude into the SE-most corner of our originally-proposed lease area; this will now not occur.

Furthermore, in discussions with David Mattila and Jeffrey Walters from the Hawaii Islands Humpback Whale National Marine Sanctuary Scientific Advisory Committee, they indicated that an appropriate mitigative measure for whales and other marine mammals would be to keep to a minimum the number of mooring lines that we use in our cage design. We are taking this request to the project engineers at Net Systems, Inc. (manufacturers of the Sea Station™), and we hope to include an improved mooring design in the final Environmental Assessment. Please be assured that the actual layout of these moorings will again still not intrude into the SE-most corner of the lease, so there is further additional cushioning distance between the resting dolphins and the stationary moorings of at least 600 ft.

Another significant change that we are proposing is to make all of our six main cages submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages, which will be used for nursery rearing and for harvesting of fish from the submersible cages.

We would like you to recognize that costs that these changes will bring to our operations, and acknowledge that we are trying to find a workable compromise for your concerns, and for other issues. This deeper site will increase the risk to any diving activity on the farm, and limit our ability to monitor impacts on the benthos, or to regularly inspect mooring lines and anchors. To accommodate this greater depth, we will now need some wider area to spread our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres). There are also greater proportional costs for our moorings, and greater exposure to weather.

Still, we believe that this change results in a better project proposal. We appreciate the input that you have provided to our project planning process, and we hope that these changes will go some way towards further ameliorating your concerns about our proposed activities.

Aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

Sign-up Sheet record of Testifiers at Public Hearing, May 27,2003

Name	Affiliation	Phone/email
Virginia Enos	Cates International, Inc	262 0267
Jan Ostman-Lind	Concerned citizen	883 1178
John R. Cates	Cates International, Inc	479 7104
John P. Craven	Private citizen	386 9370
Noreen Parks	Private citizen	nmparks@nasw.org
Doug Robbins	Private citizen	322 2146
Michael Wilder	Private citizen	962 9747
Syd Kraul	Private citizen	325 1761
David Holzman	Sierra Club	327 9315
Curtis Tyler	County Council District 8	327 3666
Annie Knight		322 9555
David Knight		322 9555
Hank Fergerstrom	Na Koa o Pu'u Kohola Heiau	965 6184
Keoni Chong		982 7298
Maria Haws	University of Hawaii Hilo	933 0707
Shane Rohan	Citizen	
Russ Roy Williams	Marketing talk	
Terry	Jack's Diving Locker	
Bill Walsh	DLNR	

Following pages are (a) sheet of calculations submitted at the public hearing by Jan Ostman-Lind, and (b) hand-written notes submitted by Hank Fergerstrom to project proponents at the public hearing.

Jay Ostenman Lind

1 nm	6076.1	feet
1.27 nm	7716.7	feet
138 mm		

scale
56 ft/mm

Figure 5 Measurements

Scale of Map				Distance	
Distance Unualoha Pt. – Keahole Pt. (1 NM = 6,000 feet)				SE Corner of 9 acre central area to Indicated Dolphin Resting Area	
138 mm	1.27 NM	7716.6 feet	1852m	35	mm
56	ft/mm			**1957**	**Feet**
				597	meters

300 Proportion

Population Estimates		
Ostman	2334	0.13
Norris	960	0.31

BULLETIN FLORIDA COOPERT SERV.
PROFESSOR ANDREW M. LAZUR POULT POL

WFA-36 DEPT OF FISHERIES & AQUATIC SCIENCES UNIV OF FLORIDA

Keoni Chow 5/21/03 recieved.

FISH CAGE

FORI FISH

INCREASE DISEASE SUSEPTIBILITY DUE TO CROWDED

SUBMERGED LAWS (CODED) GIVE LAND EXCLUSIVE USE OF EEZ

MINIMUM 1 MILE OFF SHORE AS NOT TO INTERFEAR WITH KOLOHIKI RIGHT OF AREA

ACCESS TO AREA BY MAKAAINANA TO MARINE MIGRATION PART OF NAIA KOLOLA BOTTOM FISH CRABS LOBS

WATER QUALITY

NITROGENOUS WASTE

ALGAE BLOOM HIGH BACTERIA COUNT

TURBIDITY DUE TO EFFLUENT-RAW SEWAGE

? TOTAL CAGE BIOMASS 5% OF BODY WT/DAY 10-2% AT MARKET SIZE CIRCULATION

USE OF AERATORS OR WATER PUMPS

FLOATING FEED TO SINKING FEED

MEDICATED FEED

FISH ARE SENSATIVE TO NOISE & HUMAN ACTIVITY

DISTURBANCES CAUSE REDUCED FEEDING RESPONSE AND INCREASED STRESS

FORIEGN FISH

WHERE WILL STOCKING FINGERLINGS COME FROM FORIGEN FISH

ALL CAGES ARE FIXED OR MOVABLE

PANGASINAN FISH CAGES ORDERED DISMANTLED

POSTED: 5:10 AM (MANILA TIMES) APR 16 2002

BY YOLANDA FUERTES INQUIRER NEWS SERV

MASSIVE FISH KILL HIGH HYDROGEN SULFIDE GAS IN BOLINAO

UNEATEN FISH FEED PROVIDED AMINO ACIDS FOR THE ANAEROBIC BACTERIA IN SEA BOTTOM TO PRODUCE H_2S EXCESS FEED, DEAD PLANKTONS AND FISH WAST KUKAE COMBINED TO MAKE SUITABLE BREEDING GROUND FOR BACTERIA

APPENDIX X : DRAFT RESOLUTION SUBMITTED TO THE U.S. SENATE BY SENATOR AKAKA, to strengthen and promote the national policy on aquaculture.

108TH CONGRESS
1ST SESSION

S. RES. _____

IN THE SENATE OF THE UNITED STATES

Mr. AKAKA submitted the following resolution; which was referred to the Committee on _____

RESOLUTION

To express the sense of the Senate that the Federal Government should actively pursue a unified approach to strengthen and promote the national policy on aquaculture.

Whereas the Food and Agriculture Organization of the United Nations determined that aquaculture is the fastest growing food sector that provides animal protein for citizens of the world;

Whereas global aquacultural production (including the production of aquatic plants) has increased at an average rate of 9.2 percent per year since 1970, compared with only 1.4 percent for capture fisheries and 2.8 percent for terrestrial-farmed meat production systems;

Whereas freshwater aquacultural production increased from 15,900,000 metric tons in 1996 to 22,600,000 metric

tons in 2001, marine aquacultural production increased from 10,800,000 metric tons in 1996 to 15,200,000 metric tons in 2001, and total aquacultural production increased from 26,700,000 metric tons in 1996 to 37,800,000 metric tons in 2001;

Whereas economic modeling predicts that global annual consumption of fish and shellfish per person will increase over time, from about 16 kilograms today to between 19 and 21 kilograms in 2030, due to increased health consciousness and the stronger demand for seafood products;

Whereas the United States imports more than 60 percent of its seafood products, resulting in an annual seafood trade deficit in excess of $7,000,000,000; and

Whereas section 7109 of the Farm Security and Rural Investment Act of 2002 (Public Law 107–171; 116 Stat. 436) reauthorized the National Aquaculture Act of 1980 (16 U.S.C. 2801 et seq.) until 2007, but did not adequately address emerging national issues such as offshore aquaculture development, water quality concerns, invasive species impacts, and a coordinated siting, permitting, and licensing process: Now, therefore, be it

Resolved, That the Senate calls on the Federal Government to actively pursue a unified approach to strengthen and promote the national policy on aquaculture, including as priorities—

(1) ensuring the sustainable development of production where aquaculture is economically viable, environmentally feasible, and culturally acceptable;

(2) analyzing the supply and demand for domestic and exported aquacultural products to enable the United States to compete in the global marketplace;

(3) increasing the availability of new technical and scientific information that supports aquaculture development;

(4) with regard to marine aquaculture, providing encouragement and identification of marine zones favorable to aquaculture that take into consideration desired environmental conditions and potential use conflicts; and

(5) establishing a goal of a 5-fold increase in United States aquacultural production by 2025.

May 12, 2003 (4:48 p.m.)

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

(2) analyzing the supply and demand for domestic and exported aquacultural products to enable the United States to compete in the global marketplace;

(3) increasing the availability of new technical and scientific information that supports aquaculture development;

(4) with regard to marine aquaculture, providing encouragement and identification of marine zones favorable to aquaculture that take into consideration desired environmental conditions and potential use conflicts; and

(5) establishing a goal of a 5-fold increase in United States aquacultural production by 2025.

May 12, 2003 (4:48 p.m.)

2003-07-23-HA-FEA

FINAL

(KONA BLUE WATER) ENVIRONMENTAL ASSESSMENT

FOR

AN OFFSHORE OPEN OCEAN FISH FARM PROJECT

OFF UNUALOHA POINT, KONA, HAWAII

PREPARED FOR :

Land Division,
Department of Land and Natural Resources

PREPARED BY :

Kona Blue Water Farms
(a division of Black Pearls, Inc.)
P.O. Box 525, Holualoa, HI 96725

Dated : June 25, 2003

NOTICE OF ADDENDA

All alternations or additions to text of the original Draft Environmental Assessment are flagged within the text of this document using *italic font, and background shading.*

This Final Environmental Assessment incorporates several significant changes to the original plan, as presented in the Draft Environmental Assessment. KBWF now proposes the following :

1. To make all of the six main grow-out cages submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages (less than 50 ft diameter), which will be used for nursery rearing and for harvesting of fish from the submersible cages.

2. To request only that our lease area to be designated as no anchoring, no SCUBA-diving, no swimming, and slow low-wake speed by boats, rather than for exclusive use. KBWF trusts that Kona's fishermen and divers will respect the fish cages and the fish as private property. If problems of pilfering, vandalism, or reckless endangerment of property, health or safety are encountered, KBWF may need to go back to the Land Board for redefinition of our lease exclusivity status. The company believes, however, that this will not be necessary.

3. To move our project a further 600 ft, directly to the west (offshore). This now puts our project in water between 200 ft and 220 ft deep, around 2,600 ft from the shoreline.

4. To increase the lease area to be expanded to around 90 acres (from 81 acres).

A separate Management Plan has also been prepared as part of this CDUA Application. This Management Plan provides more specific descriptions of the farm structures, and more detailed information on the proposed farm deployment and operations. In the interests of providing the best available information to the public for review of this proposal, a copy of this Management Plan has been appended to this Final Environmental Assessment. Please refer to Appendix VI.

This Appendix VI should be referred to when considering Section 4. Project Description, particularly subsection 4.1 Technical and Operational Characteristics.

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List of Acronyms and Abbreviations

ACOE	- Army Corps of Engineers
ADP	- Aquaculture Development Program, a division of DOA
BPI	- Black Pearls, Inc.
CDUA	- Conservation District Use Application
CII	- Cates International, Inc.
DAR	- Division of Aquatic Resources, a division of DLNR
DBOR	– Division of Boating and Ocean Recreation, a division of DLNR
DLNR	- Department of Land and Natural Resources
DOA	- State of Hawaii Department of Agriculture
DOH	- State of Hawaii Department of Health
EA	- Environmental Assessment
EPA	- Environmental Protection Authority
FAA	- Federal Aviation Authority
FAD	- Fish Aggregating Device
FONSI	– Finding of No Significant Impact
HIHWNMS	- Hawaiian Islands Humpback Whale National Marine Sanctuary
HOARP	– Hawaii Offshore Aquaculture Research Project
HRS	- Hawaii Revised Statutes
KBWF	- Kona Blue Water Farms, a division of BPI
KIA	- Kona International Airport
MHI	– Main Hawaiian Islands
NPDES	- National Pollutant Discharge Elimination System
NELHA	– Natural Energy Laboratory of Hawaii Authority
NMFS	- National Marine Fisheries Service, a division of NOAA
PAO	- Pacific Area Office, an office within NMFS
NOAA	- National Oceanographic and Atmospheric Agency
NWHI	– Northwest Hawaiian Islands
OHA	- Office of Hawaiian Affairs
OSWM	- Office of Solid Waste Management, a division of DOH
OTEC	– Ocean Thermal Energy Conversion
CWB	- Clean Water Branch, a division of the State Department of Health
UH	– University of Hawaii
UHSG	- University of Hawaii Sea Grant Program
WHAP	- West Hawaii Aquarium Project
ZOM	- Zone of Mixing

EXECUTIVE SUMMARY

Kona Blue Water Farms (KBWF; a division of Black Pearls, Inc.) is applying for an ocean lease over a portion of the offshore waters adjacent to the Natural Energy Laboratory of Hawaii Authority and the Keahole-Kona International Airport under Chapter 190 D, Hawaii Revised Statutes (HRS), as amended, to establish and operate an open ocean fish farm. This Environmental Assessment (EA) assesses the present environment and current human activities in the proposed fish farm area. It reviews alternative actions, and recommends the project proceed because of the relatively minor impacts of the project, and the economic and environmental benefits to be gained.

The EA assesses the potential impacts of the fish farm, and describes means for reducing or mitigating these impacts. Given the depth of water, the bare sand substrate beneath the farm, the high rate of water exchange through the area, and the distance to any nearby reef areas, the farm will result in little detriment to water quality or benthic ecosystems.

A lease is requested over an area of *90 acres* (around *600 yds x 667 yds*), to accommodate an array of submersible fish cages, and the mooring and anchor array. *All of the fish pens will be submersible, and will normally be below the water surface. Two smaller surface cages may still be needed for nursery culture, or to expedite harvesting from the submersible cages. The location of the proposed farm has been moved 600 ft to offshore, to provide further assurances of no significant impacts on water quality, coral reefs, or dolphin resting activity. The water depth in this area is between 200 and 220 ft. The proposed lease area has been increased slightly (from 81 acres), to accommodate the increase scope needed in the mooring lines at this depth.*

The issuance of a lease for an offshore deep water farm will have little impact on public activities in the area. The depth of water is well beyond the limits of normal recreational diving. Almost all present diving and reef-fishing activities are confined to the reef shelf, almost 2,000 feet inshore from the cages at the center of the lease area. Most present offshore fishing activity is centered along the 100 fathom drop-off, along the south-western edge of the shelf, almost 1 nautical mile to the south-west of the cages. There is no significant bottom relief in the area, and most of the substrate is medium to coarse sand.

The public will be permitted to fish and traverse throughout the entire lease area; no exclusivity is requested outside of the cage perimeters. However, for safety and liability reasons, anchoring, SCUBA-diving, snorkeling or swimming by the public will be precluded in the lease area.

The fish farm will cultivate a range of local Hawaiian species, including kahala (*Seriola dumerili*), mahimahi (*Coryphaena hippurus*), and possibly opakapaka (*Pristipomoides filamentosus*), ehu (*Etelis carbunculus*), onaga (*E. coruscans*), hapu'upu'u (*Epinephelus quernus*), and giant grouper (*E. lanceolatus*). Many of these species have been severely overfished in the past, and their stocks are in need of rehabilitation. Culture of these species offers the only viable alternative to continuing declines in wild populations and reduced landings

by the fishery, as well as providing alternative employment opportunities for commercial fishermen.

A table is presented below summarizing the salient issues for open ocean fish farming in Hawaii, based on public comments from KBWF's meetings with the community, and responses to other fish farming proposals in Hawaii. The determination for each issue, and relevant page in this document, is also presented in this listing of preliminary consultation concerns.

ISSUE OR CONCERN RAISED BY PUBLIC	ANALYSIS, DETERMINATION, MONITORING AND MITIGATION	PAGE NO.
Deterioration of water quality downcurrent of farm	Strong currents in open ocean provides rapid dilution. Data from Oahu cages show barely measurable impacts 30 m from cage. Ongoing monitoring is required under Federal law.	34
Accumulation of fish feces under cage, or on nearby reefs and beaches	Fish feces are mostly liquid. The small proportion of particulates and will be dispersed by the currents, and will not accumulate or float on the water surface. The depth of water diminishes impact of settled solids on benthos. Ongoing monitoring is required.	34
Accumulation of excess feed under cage	Careful farm management will reduce excess feed losses. Coarse sand substrate and benthic detritivores will assimilate inputs. Data from Oahu cage study indicates minimal impact.	37
Offshore farm will negatively impact wild fish stocks	Only native species will be cultured in KBWF's offshore cages. All farm fish will be hatchery-reared, not wild-caught. Hatchery broodstock will be rotated to maintain genetic diversity.	38
Dolphins will be disturbed by cages or entangled in mesh	Lease area is outside of daily path of spinner dolphin movement and resting. Entanglement can only occur in large, loose-mesh nets or slack lines. All KBWF cage mesh will be small and taut; all anchor lines will be kept taut.	38
Sharks will be attracted to cage, leading to attacks on people and dolphins	Sharks may be attracted to farm by either food availability or aggregative effects. If the former applies, then sharks will presumably be well-fed, and less likely than at present to attack dolphins or people. If the latter, then the farm may reduce shark population in nearby areas, also reducing likelihood of attacks.	40
Fish farm conflicts with fishing activity	Lease area depth *(200 - 220')* is shoreward of ono trolling lanes, yet too deep for reef fishing or spear fishing. No fishing for Kona crab and laenihi (nabeta) because of strong currents. No 'opelu ko'a are located in proposed farm lease area.	43, 44
Fish farm conflicts with other recreation	No apparent recreational use of this area. Dive boats and other vessels may occasionally transit through site, but this passage will not be significantly impeded.	43
Supply of farmed fish will reduce prices paid to local fishermen	Demand for fish far outstrips supply. Hawaii bottomfish stocks already overfished. Most mahimahi or bottomfish consumed in Hawaii is imported from overseas. Farmed fish will create new markets by promoting product quality and consistency of supply.	18

A finding of no significant impact (FONSI) is anticipated. Findings to support this determination based on established "Significance Criteria" (Chapter 200, HAR) are :

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.
No. The offshore area contains no resources that would be significantly affected. The only potential cultural impact – possibly changing behavior of 'opelu around the traditional ko'as – is not significant, and is not irrevocable.

(2) Curtails the range of beneficial uses of the environment.
No. There is little existing recreational or subsistence use of the proposed lease area.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines.
No. The project is one of the first tests of the amended ocean leasing law (Chapter 190 D HRS), which was specifically crafted to allow a sustainable ocean-based commercial aquaculture industry to develop in the State. The proposed project is consistent with the environmental policies established under Chapter 344 HRS.

(4) Substantially affects the economic or social welfare of the community or state.
No. There will be economic benefits from increased employment and consistent supply of high quality fish to restaurants and the public.

(5) Substantially affects public health.
No. Increases in the availability of fresh fish will likely have some positive impact on public health.

(6) Involves substantial secondary impacts such as population changes or effects on public facilities.
No substantial secondary impacts will be involved.

(7) Involves a substantial degradation of environmental quality.
No. There will be no degradation of environmental quality associated with the project. There will be negligible impacts on water quality and benthic fauna.

(8) Cumulatively has a considerable effect on the environment or involves a commitment for larger actions.
No. Implementation of the proposed project will not cause any significant cumulative effects, and does not involve any commitment for larger actions. The project is described in its entirety in the document.

(9) Substantially affects a rare, threatened or endangered species or its habitat.
No. The proposed project will not cause any substantial detriment to a rare, threatened or endangered species or its habitat. Humpback whales and monk seals may all transit through

the farm area, but the cages will not represent a significant barrier to movement of marine mammals, and there is *negligible* risk of entanglement in the taut-line mesh and mooring system.

(10) Detrimentally affects air or water quality or ambient noise levels.

No. Any noise generated will be insignificant compared with the nearby airport.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area.

The open ocean site is over *200 feet (45m) deep*, with strong currents and coarse sand substrate. The farm will not impede movement or otherwise disturb the spinner dolphins that rest in the shallow waters of nearby Makako Bay. The nearest coral reef downcurrent from the farm is either Keahole Point (1 mile away under a S-setting current) or the reef at Mahaiula Bay (3 miles downstream under a N-setting current).

(12) Substantially affects scenic viewplanes or vistas.

No. The project will utilize submerged pens whenever possible, as these will provide better security, safety, and reduced wear on gear. *Two small surface net pens (less than 50 ft in diameter) will be needed for early nursery culture, and for facilitating harvest from the submersible cages,* but these will not be a significant impact on the viewplane, given the existing land use of the Kona International Airport and the ponds at the Natural Energy Laboratory of Hawaii Authority.

(13) Requires substantial energy consumption.

No. There will be insubstantial amounts of energy used to power the boats and equipment.

1. CONSULTATIONS AND STATUS OF PERMITS

This section outlines the regulatory issues and coordination associated with Kona Blue Water Farms' proposed open ocean fish farm project in the Unualoha Point area of the Kona Coast. Regulatory issues include permits and concurrence with a number of Federal, State and County regulations. Consultation has included scoping meetings with a range of state and federal agencies, and the public. Kona Blue Water Farms will also use innovative application of the internet, through the Black Pearls, Inc. web site (www.blackpearlsinc.com) to further the information sharing process throughout the public review period of the project proposal.

1.1 PERMITS AND APPROVALS

Permitting procedures follow Chapter 190 D, HRS, as amended, and other relevant laws.

1.1.1 Federal

a. U.S. Department of the Army Permit

The Rivers and Harbors Act, Section 10, requires that a Department of the Army (DA) permit be issued for any activity that obstructs or alters navigable waters of the U.S. This project will require the deployment of cages and permanent moorings for the cages and boats. As such, a Section 10 authorization will be required as part of the DA permit application.

The U.S. Army Corps of Engineers (ACOE) is responsible for administering and granting DA permits. The criteria for issuance of a DA permit are similar to those for issuance of an EA. At the discretion of the ACOE, the DA permit can be processed and issued concurrently with other permits.

1.1.2 State

a. Conservation District Use Application

Chapter 183C HRS and HAR 13-5 pertain to obtaining permits for any use of lands in the Conservation District. The Conservation District Use Application (CDUA) process is managed by the Land Division of DLNR. A CDUA permit is required before a lease can be considered by the BLNR.

b. National Pollutant Discharge Elimination System Permit

The State Department of Health Clean Water Branch (DOH-CWB) will require a National Pollutant Discharge Elimination System (NPDES) Permit and Zone of Mixing Permit (ZOM) under the Federal Clean Water Act, Section 402, HAR 11-55. This applies specifically to

discharges of point sources of pollutants into surface waters of the U.S. All aquaculture projects – including offshore cage culture – are considered point-sources.

c. DOH Solid Waste Permit

The farm intends to sell all fish whole, and solid waste disposal will therefore be the responsibility of the wholesaler or purchaser. If fish are cleaned, the DOH Office of Solid Waste Management (OSWM) may require regulation of the disposal of waste fish material from the harvested product. Solid waste regulations are detailed in HAR 11-58.1. Permit applications, where necessary, will occur after the EA process is completed.

d. Special Management Areas and Shoreline Setback

Use of the area is not subject to County Special Management Area (SMA) permit requirements. *A letter from Chris Yuen, Planning Director for Hawaii County, confirms this (appended).*

e. Aquaculture License

An Aquaculture License is required for commercial culture of a State regulated species under Chapter 187A-3.5 HRS and Sections 13-74-43 and 13-74-44 HAR. The DLNR Division of Aquatic Resources and DOA ADP are the co-ordinating agencies. While fishing for the high-value bottomfish species is regulated by the State, the fish themselves are not protected. Therefore, an Aquaculture License will probably not be required at this time.

1.2 AGENCIES, CITIZEN GROUPS AND INDIVIDUALS CONSULTED

1.2.1 Meetings and community consultations

(a) Review of the Draft Environmental Assessment

As required under the CDUA Permit process, opportunity was provided for Federal and State departmental review of the draft Environmental Assessment. Comments received by the DLNR Lands Division, and responses by KBWF to these comments, are appended (Appendix IX).

Opportunity was also provided for public input on the draft Environmental Assessment by written comments submitted to the Lands Division or to KBWF, and by oral testimony delivered at a public hearing held at the NELHA conference room in Kona, on May 27th, 2003. Comment letters or written testimony submitted at the public hearing are also appended, together with KBWF responses to these comments.

In addition, KBWF has undertaken an extensive outreach program through their website (www.blackpearlsinc.com) by including a full pdf version of the draft Environmental Assessment for review by the public from the web.

(b) Compilation of the Draft Environmental Assessment

The State Aquaculture Development Program (ADP: under the Department of Agriculture) has acted as liaison and principal contact for KBWF during review of the legislation, consideration of the project concept, initial meetings and drafting of the EA. KBWF and ADP have had regular contact on numerous issues and questions over the last five years, and these contacts are therefore not itemized below.

A series of meetings were held during the development of the project proposal process, with ADP acting in a facilitatory role. A meeting was held with officials from ADP, NMFS, ACOE, Coast Guard, Department of Health (DOH), DLNR-DBOR, and DLNR Land Division on July 12th, 2001. Subsequent follow-up meetings were held with DLNR Aquatic Resources officials on 2/8/01.

KBWF provided a press release on August 3rd, 2001, to various Hawaiian media outlets. West Hawaii Today published a front page article, that specifically requested for interested parties to contact KBWF for more information.

A series of informational meetings were held during the development of the EA, to provide for community consultation. A meeting was held with the Keahole Point Tenant's Association (KPTA) on 7/6/01, to outline the project proposal. A formal presentation was made to the West Hawaii Fisheries Management Council on 9/19/01. A public meeting was held at the Big Island Game Fishing Club, on 10/3/01.

After submission of the draft Environmental Assessment, and during the public review period, presentations were also made to Hawaii County Committee on Human Services and Economic Development (2/19/03), and the NELHA Board (1/21/03 and 2/18/03)). Further discussions were also held with the KPTA on 2/7/03, and a presentation was made to the Sierra Club, Moku Loa Chapter, on 2/7/03. We subsequently met several times with a representative of the Sierra Club.

A community informational meeting was held at the NELHA conference room on 4/10/02, with over 60 invited participants. A series of subsequent invited meetings were held to address specific concerns that had been raised at this larger meeting. A follow-up "Core Group Meeting" was held to discuss specific community concerns on 4/23/02. A meeting was held with kupuna, cultural representatives and other interested fisheries advocates on 5/21/02. Abridged transcripts from these community meetings are available at BPI's website (www.blackpearlsinc.com). *Two meetings were also held with community members in the adjacent Kala'oa area (the Greater Kala'oa Community Development Association, 3/6/03), and the Palisades Estates Subdivision (Palisades Estates Subdivision Homeowners Association (5/14/03).*

KBWF officials met with Naomi Macintosh and Liz Russell from the Hawaiian Islands Humpback Whale National Marine Sanctuary on 10/19/01 to discuss the project. A KBWF representative (NAS) subsequently made a formal presentation to the Humpback Whale Sanctuary Scientific Advisory Committee on 12/12/01. *KBWF principals (NAS and DJS) also participated in a conference phone call with David Mattila and Jeffrey Walters, of the Hawaii Islands Humpback Whale National Marine Sanctuary Scientific Advisory Committe on 6/2/03.* KBWF has also discussed potential marine mammal-fish farm interactions by phone with a number of NOAA/NMFS authorities, including Greg Silber, Gene Nitta, and Tom Swenarton. A meeting was held at NELHA conference room on 5/17/02, with individuals with particular interest in the marine mammal issues. An abridged transcript from this meeting is also available at BPI's website (www.blackpearlsinc.com).

KBWF met with Nancy Murphy, State Boating and Ocean Recreation, Hawaii District Manager, on 3/19/02, and again on 3/27/02, to discuss the logistical requirements for loading feed and unloading fish in Honokohau, and for boat storage.

KBWF met with the Office of Hawaiian Affairs Lands Committee on 9/26/02, and provided a description of the project, and an overview of areas of community concern. *Subsequently, KBWF principals met with OHA's Kona office manager, Ruby MacDonald (4/22/03).* KBWF also met with Department of Health Clean Water Branch officials on 9/26/02 to discuss the requirements of a NPDES permit, and the application process.

In the interests of better understanding and addressing the community's concerns about offshore fish farming, KBWF also attended a community informational meeting on 8/13/02 for the Ahi Nui Tuna Farming Company's proposal for an offshore tuna farm north of Kawaihae Harbor, and a subsequent public hearing on Ahi Nui's proposal on 10/7/02. Further, KBWF also attended a UH SeaGrant-sponsored ReefTalk by Prof. Charles Helsely and Randy Cates, at Waimea, on 10/8/02.

KBWF has presented detailed descriptions of the project to various individuals, community groups and native Hawaiian organizations, with extensive question and answer sessions. Project outlines were presented to :

- Curtis Tyler III, North Kona County Councilmember (meeting on 6/5/01, with follow-up phone conversations on 1/11/02 and 5/6/02),
- *Representative Cindi Evans (visited KBWF hatchery on 4/7/03 to discuss project)*
- Edith Kanaka'ole Foundation (Kekuhi Kanahele-Frias, phone conversation 1/5/02, follow-up mailing of project information package 1/9/02),
- Queen Lili'uokalani Children's Center (Michael Ikeda, phone call, 1/5/02, follow-up mailing of project information package 1/9/02),
- Office of Hawaiian Affairs (Colin Kippen, 12/19/01 – email, follow-up mailing and phone call on 12/22/01; Ruby McDonald, meeting 10/10/01 and follow-up phone calls and mailings; and Donald Cataluna, chairman of the OHA Lands Committee, letter 4/30/02, and follow-up phone calls)
- Kona Rotary Club (presentation to a club luncheon on October 25th, 2001)

- Kona-Kohala Chamber of Commerce (presentation on 5/15/02, with letter of support from Ron Aronson, President, 6/4/02 – Appendix 5)
- Royal Order of Kamehameha (informational package mailed to Mahealani Pai, Kaka o Lelo, 5/14/02, and informational meeting on May 28th, 2002)
- Kona Reefers Dive Club (presentation to club meeting on 4/19/2002)

Letters and informational packages were also mailed to political representatives from the affected district.

Table 1 presents a listing of agencies and organizations consulted during development of the project concept and the EA.

TABLE 1 : AGENCIES AND ORGANIZATIONS CONSULTED

Agencies and Organizations Consulted	Date
Federal Agencies	
National Marine Fisheries Service	7/12/01
Army Corps of Engineers	7/12/01
Coast Guard	7/12/01
Hawaiian Islands Humpback Whale National Marine Sanctuary	10/19/01, 12/12/01
State Agencies	
DLNR, Aquatic Resources	8/2/01
DLNR, Land Division	7/12/01
DLNR, Boating and Ocean Recreation	7/12/01, 3/19/02, 3/27/02
DOH	7/12/01, 9/26/02
OHA	9/26/02
City and County Agencies	
None applicable	
Community and Native Hawaiian Groups	
Royal Order of Kamehameha	5/28/01
Keahole Point Tenants' Association	7/6/01
West Hawaii Fisheries Management Council	9/19/01
Kona Reefers Dive Club	4/19/02
Public meeting with fishing interests at Big Island Game Fishing Clubhouse	1/3/01
Public meeting with cultural and shoreline conservation interests at NELHA	4/10/01*
Special Core Group meeting to review cultural and community interactions and potential benefits	4/23/01*
Marine mammal group	5/17/01*
Kekaha kupuna to review cultural interaction	5/21/01*
Kona Rotary Club	10/25/01
Kona-Kohala Chamber of Commerce	5/15/02

* = Abridged transcripts from these meetings are available at BPI's website (www.blackpearlsinc.com).

1.2.2 Environmental Assessment and ongoing consultation via BPI's web-site

Throughout the consultative process, KBWF has compiled a mailing list (emails and other contact information) of individuals and groups to facilitate an ongoing exchange of information. To further encourage open sharing of the results of this Environmental Assessment, and to continue to foster the consultative process with the public, Black Pearls, Inc. *made a copy of this document available through their web site (www.blackpearlsinc.com in a section under "Commercial Projects" and a subsection under "Kona Blue Water Farms"). This also included* notes and transcripts from various public meetings held during project consideration and formulation of this EA. *This represents, to our knowledge, the first time that project proponents in Hawaii have made a complete draft Environmental Assessment available through the web.*

2. DETERMINATION

The proposed fish farm project in the open ocean area offshore from Unualoha Point, in Kona, will not have any significant effects in the context of Chapter 343 HRS and HAR 11-200-12. Therefore a finding of no significant impact (FONSI) is anticipated.

A brief summary of findings to support this determination follows (Table 2). Chapter 200, HAR, establish "Significance Criteria" to be used as a basis for identifying whether significant environmental impacts will occur. These criteria are addressed in more detail below.

TABLE 2 : SIGNIFICANCE CRITERIA, FINDINGS AND ANTICIPATED DETERMINATION FOR EACH CRITERION

Significance Criteria	Does Project meet Criterion?
1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.	No
2. Curtails the range of beneficial uses of the environment.	No
3. Conflicts with the State's long-term environmental policies or goals and guidelines.	No
4. Substantially affects the economic or social welfare of the community or state.	No
5. Substantially affects public health.	No
6. Involves substantial secondary impacts such as population changes or effects on public facilities.	No
7. Involves a substantial degradation of environmental quality.	No
8. Is individually limited, but cumulatively has a considerable effect on the environment or involves a commitment for larger actions.	No
9. Substantially affects a rare, threatened or endangered species or its habitat.	No
10. Detrimentally affects air or water quality or ambient noise levels.	No
11. Affects or is likely to suffer damage by being located in an environmentally sensitive area.	No
12. Substantially affects scenic viewplanes or vistas.	No
13. Requires substantial energy consumption	No

Significant environmental impacts are deemed to occur if any of the following hold true :

(14) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

There will not be an irrevocable commitment to loss or destruction of any natural or cultural resource. The offshore area contains no resources that would be significantly affected. The only potential cultural impact – possibly changing behavior of 'opelu around the traditional ko'as – is not significant, and is not irrevocable.

(15) Curtails the range of beneficial uses of the environment.

Surveys indicate that the proposed action will not curtail the range of beneficial uses of the environment (see Appendices I, II, III and IV). There is little existing recreational or subsistence use of the proposed lease area.

(16) Conflicts with the State's long-term environmental policies or goals and guidelines.

The project is one of the first tests of the amended ocean leasing law (Chapter 190 D HRS), which was specifically crafted to allow a sustainable ocean-based commercial aquaculture industry to develop in the State. The proposed project is consistent with the environmental policies established under Chapter 344 HRS.

(17) *Substantially affects the economic or social welfare of the community or state.*

The project will not substantially affect the economic or social welfare of the community or State. Private investment will be used to finance the project. There will be economic benefits from increased employment and consistent supply of high quality fish to restaurants and the public.

(18) Substantially affects public health.

The project will not substantially affect public health. Increases in the availability of fresh fish will likely have some positive impact on public health.

(19) Involves substantial secondary impacts such as population changes or effects on public facilities.

No substantial secondary impacts will be involved.

(20) Involves a substantial degradation of environmental quality.

There will be no degradation of environmental quality associated with the project. There will be negligible impacts on water quality and benthic fauna.

(21) Cumulatively has a considerable effect on the environment or involves a commitment for larger actions.

Implementation of the proposed project will not cause any significant cumulative effects, and does not involve any commitment for larger actions. The project is described in its entirety in the document.

(22) Substantially affects a rare, threatened or endangered species or its habitat.

The proposed project will not cause any substantial detriment to a rare, threatened or endangered species or its habitat. Humpback whales and monk seals may all transit through

the farm area, but the cages will not represent a significant barrier to movement of marine mammals, and there is *negligible* risk of entanglement in the taut-line mooring system.

(23) Detrimentally affects air or water quality or ambient noise levels.

None of the emissions from the farm vessels or equipment are anticipated to have a substantial effect on air or water quality. Any noise generated by the project, even during construction phase, will be insignificant compared with the noise from the adjacent Kona International Airport.

(24) Affects or is likely to suffer damage by being located in an environmentally sensitive area.

The open ocean site is over *200 feet (60m)* deep, with strong currents and coarse sand substrate. The farm will not impede movement or otherwise disturb the spinner dolphins that rest in the shallow waters of nearby Makako Bay. The nearest coral reef downcurrent from the farm is either Keahole Point (1 mile away under a S-setting current) or the reef at Mahaiula Bay (3 miles downstream under a N-setting current).

(25) Substantially affects scenic viewplanes or vistas.

The project will utilize only submerged grow-out pens, as these provide better security, safety, and reduced wear on gear. Only two small surface net pens (less than 50 ft diameter) will be needed for nursery growout some stages or for harvesting. These surface net pens will not be a significant impact on the viewplane, given the existing land use of the Kona International Airport and the ponds at the Natural Energy Laboratory of Hawaii Authority.

(26) Requires substantial energy consumption.

There will be insubstantial amounts of energy used to power the boats and equipment.

3. THE RATIONALE FOR OPEN OCEAN FISH FARMING

3.1 THE ECONOMIC OPPORTUNITY

3.1.1 U.S. seafood imports and aquaculture production

The seafood component of the U.S. trade deficit currently runs at over US$7 billion annually, and is increasing at around 12% p.a. (Seafood Market Analyst, 2001). While the demand for seafood increases, capture fisheries around the world are collapsing from overfishing. In the U.S., closures or buyback schemes to reduce effort have effectively shut down once-productive fisheries for Atlantic tunas and swordfish, the groundfish of Georges Bank and other Northeast fisheries, Pacific Coast anchovies and albacore, and recently snapper fisheries along the whole Pacific coast. Other environmental concerns for endangered species or marine mammals have seen closures or limitations placed on fisheries for shrimp in the Gulf of Mexico, purse seining for tuna in the Pacific, and most recently longlining for tuna in Hawaii and the U.S. Pacific. U.S. domestic fisheries production is currently sustained by massive harvests of pollock in the Bering Sea – a former trash fish that is now used as a surimi component. For the first time ever, in 1999, the U.S. imported more seafood than was caught by U.S. fishermen domestically.

Aquaculture offers the only viable solution to the growing demand for sustainable, healthy sources of seafood for human consumption. Fish farming reduces exploitative pressure on already-depleted wild stocks, supports the growth of coastal and rural industries. and yields a product that is low in fat, and high in protein. Worldwide, aquaculture has grown at an average annual rate of almost 10% since 1984 compared with 3% for livestock meat and 1.6% for capture fisheries production. The annual contribution of aquaculture to total aquatic production increased from 16% to 26% in six years (1990 - 1996). Finfish aquaculture worldwide is estimated to be worth $4 billion annually. The total value of U.S. fish production from aquaculture is nearly $600 million, yet almost all of this production is from freshwater (catfish) or anadromous (freshwater spawning) species, such as salmon (Table 3).

TABLE 3 : FINFISH PRODUCTION IN THE U.S.A.: 1985 AND 1996
Value, in millions of dollars

	1985	1996
Baitfish	$51.3	$70.3
Catfish	$138.9	$365.0
Salmon	$5.5	$61.0
Striped bass	NA	$20.3
Tilapia	NA	$23.9
Trout	$55.2	$57.0
Total	**$250.8**	**$597.4**

Advancement of marine fish culture worldwide has, up to now, been limited by grow-out technology that has kept most fish farm operations confined to inshore, protected areas. In inshore coastal waters, fish farms face greater competition for space with other ocean user-groups, water exchange rates are limited, and pollution and other environmental impacts are more keenly felt. Inshore fish farm proposals often encounter legal and policy hurdles, vociferous opposition, and stringent monitoring and reporting requirements.

In the last few years, there have been dramatic advances in the legal and engineering fields, which have opened up the new fish farming frontier of offshore open ocean areas. Moving offshore, into deeper water, with fewer public use conflicts or pollution impacts, has satisfied most of the regulatory and public concerns about this type of fish farming. One of the keys to opening open ocean aquaculture has been the new offshore net pen technology. These new cage designs allow safe, cost-effective, and sustainable farming activities in the exposed offshore environments. Hawaii's first commercial offshore fishcage began operation in May, 2001, culturing the Pacific threadfin (*Polydactylus sexfilis*, or moi) off Ewa Beach, in Oahu. This operation currently harvests around 5,000 lbs per week of moi. There is great potential for expanding this technology into other Hawaiian species.

3.1.2 The Hawaii market

Initially, Kona Blue Water Farms intends to culture *kahala (amberjack, or Seriola rivoliana) and* mahimahi (dorado or dolphinfish, *Coryphaena hippurus*). Kahala are closely related to the much-esteemed Japanese yellow-tail (*S. quinqueradiata*), and offer great potential as an export species. There may also be considerable demand for kahala in Hawaii, but this is yet to be tested on a large scale. Local kahala have parasitic worms in the flesh, and have a reputation for being ciguatoxic. KBWF believes that both of these market impediments will be overcome by using hatchery-reared, farmed fish. KBWF currently holds broodstock of kahala in tanks at KBWF's facility at the Natural Energy Laboratory of Hawaii Authority (NELHA). These fish are now spawning, and several batches of larvae have been successfully reared. Another private company at NELHA has also been rearing kahala (also known by the Japanese name, "kampachi"), with an eye towards providing fingerlings for grow-out in offshore net pens. (More details are available in a front-page article from West Hawaii Today, dated October 2nd, 2002. Refer to www.westhawaiitoday.com, Archives).

The one previous attempt at commercial mahimahi culture in Hawaii was land-based, at NELHA. This venture was able to demonstrate a strong demand for farm-raised product at the high-end 'white cloth' restaurants in the Kona area, but was unable to succeed financially due to the high costs of water pumping and treatment. Net pen culture would not incur these costs.

Mahimahi is one of the most popular table fish in Hawaii, with local catch volumes around 1 million lbs (500 tonnes) per annum. Imports of frozen mahimahi fillets to the U.S. total over 16 million lbs (8,000 tonnes) annually (2001 data, NMFS), at prices varying between $3.00 - $4.40 per kg, contributing a total of $25 million to the U.S. seafood balance-of-trade deficit. Principal

sources of supply are Taiwan, Ecuador and Costa Rica. Total market volume for mahimahi worldwide is over 60 million lbs (30,000 tonnes) per year.

KBWF is also committing considerable research and development resources to developing hatchery culture and grow-out techniques for other native bottomfish species. The company has recently been successful in rearing opakapaka (*Pristipomoides filamentosus*) larvae from eggs to fingerlings at KBWF's facility at NELHA. Over 100 opakapaka fingerlings resulted from this experimental work. Together with two opakapaka fingerlings raised by UH scientists this summer, these represent the first time that deep-water snappers have ever been reared in captivity. (More details are available in a front-page article from West Hawaii Today, dated September 4th, 2002. Refer to www.westhawaiitoday.com, Archives). KBWF hopes to incorporate some of these species into its farming activities as the technology is deevleoped.

Total snapper imports into the U.S. totaled nearly 15 million lbs (7,500 tonnes) in 2001, worth over $50 million. Demand for bottomfish in Hawaii currently far exceeds supply. The commercial catch has dropped dramatically in recent years, however, to less than half, at 740,000 lbs (370 tonnes) in the year 2000. Over the last decade, new fisheries have developed in Tonga and Fiji to supply Hawaii's growing bottomfish demand. In 1996, imported bottomfish accounted for 41% of the Hawaiian market (NOAA Fishery Monitoring Economics Program); several fish traders in Hawaii unofficially estimate that imports have now risen to over 50% of market volume. The growing demand suggests that it is only a matter of time before these foreign fisheries deplete their stocks, as well. Opakapaka from as far as Indonesia are now showing up in Hawaii's supermarkets.

Development of offshore aquaculture techniques for these species could take the pressure off these locally overfished species, and could lead to stock enhancement or other conservation efforts. Substitution of domestically-reared bottomfish for wild-caught imports could also help reduce the seafood component of America's balance of payments deficit. By developing offshore farming for these species, Hawaii could become more self-reliant in its food supply. Hawaiian-grown products, from sustainable fish farm operations would have great market appeal domestically, for local consumption, the visitor industry, and as export products.

3.2 THE ENVIRONMENTAL BENEFITS

The principal environmental benefits to be gained from this project will be in a reduction on commercial fishing pressure on wild fish stocks, and the eventual development of the capacity for reef restocking programs, to supplement recruitment to the reef. Mahimahi and kahala are not good candidates for recruitment supplementation; mahimahi are pelagic, and wild kahala are subject to ciguatera and parasites. However, the eventual goal for this project is to develop hatchery culture, nursery and grow-out techniques for a range of species. The primary targets for KBWF's research are now the deep water snappers and groupers. These would be ideal candidates for reef restocking.

The decreasing catch volume and decreasing average size of fish caught in the bottomfish fishery has caused considerable concern in Hawaii, in the Federal fisheries administration, and among other U.S.-affiliated Pacific Islands countries. By 1996, only 20% of the onaga catch in the main Hawaiian Islands (MHI) had previously spawned; similar declines were evident among other species stocks. These species' biological characteristics make them vulnerable to recruitment over-fishing; NOAA Fisheries staff estimate that an onaga attains maturity at about 4.1 years of age, at a size of 66 cm. With Federal and State data indicating significant overfishing of these stocks, increased regulation became imperative. In June, 1998 new legislation went into effect, established limits on fishing gear, bag limits, registration of bottomfishing craft, and restricted fishing areas (up to 20% of the bottomfish grounds was placed off limits) for the commercial and recreational fishery. It is unknown how these regulations will effect the fish populations, or the total catch, and it will be several years before any conclusions can be made. One thing is for certain: the Hawaiian fishery cannot supply sufficient quantities to meet the growing demand for these fish.

This one fish farm will not, by itself, lead to measurable benefits to Hawaii's bottomfish stocks in the short-term. However, two significant, long-term environmental benefits could be gained from the development of offshore fish farming. Firstly, development of offshore fish farming should, over time, reduce commercial fishing pressure on wild stocks. This should make more of these fish available to recreational fishermen, and should allow an ecological balance to re-establish itself over the fishing grounds. Secondly, increased commercial fish farming will result in greater research funds – both public and private – for rearing of marine fish larvae. More marine fish hatcheries might then become established in the islands, which will provide the infrastructure and the technology to initiate large-scale stock re-establishment or recruitment supplementation programs.

The community in Kona has expressed strong interest in the potential for ecological and public benefit that could be derived from a project such as this. One member of the West Hawaii Fisheries Council specifically asked whether KBWF would undertake a reef restocking program, at the company's expense, as a quid pro quo for obtaining the lease. Restocking programs are the purview of DLNR and DAR. Once the technology for mass production of these fish is available, and if the government agencies want to establish such programs, then KBWF would be very interested in involvement in such collaborative efforts.

Further, the farm will pay a portion its gross revenues to the State, as lease payment. These monies go into the Special Land and Development Fund for planning research and development of the aquaculture industry, which is intended "for aquaculture purposes", and administered by the Land Board. It may be possible to direct some of these funds to projects in Kona for restocking, marine education, or other marine conservation efforts. KBWF has held discussions with the community along these lines, in an effort to obtain a consensus for how such environmental benefits might be best returned to Kona (see below, Section 6.7 (b): Submerged lands issues and the public trust).

3.3 SITE SELECTION

3.3.1 Criteria

This site was selected for its suitability, based on the following primary criteria :

1. The site is in deep-water area, well-mixed oceanic environment that will naturally mitigate environmental impacts and present less exposure to storm or wave damage.

2. There is little or no public use of this area. The farm site lies between the limits of normal recreational SCUBA-diving (around 120 feet) and the normal depths for offshore trolling for ono (wahoo, *Acanthocybium solandri*), in around 250 feet.

3. The site is afforded some measure of protection from both Kona storms and the strong trade winds. The proximity to shore also allows for a shore-based control and security facility, which reduces the need for vessels on site.

4. There is ready access from Honokohau harbor, which provides support facilities such as slips, ramps, fueling, and rentable office space.

5. The site is directly offshore from the Kona International Airport and NELHA, and as such its use for commercial aquaculture is consistent with the adjacent land uses.

3.3.2 Minimal potential conflict with existing user groups

The fact that the site is in deep water, yet shoreward of the normal trolling areas, means that there is almost no traditional or customary use of the area. There are few fish found in sand bottoms at these depths, and large benthic organisms are scarce or absent. In KBWF's extensive discussions with community groups, no objections were voiced regarding the potential for conflict with *verified* existing uses. The only comments on recreational use of the area were several requests by divers for access to dive or spearfish in around the net pens. Although there are no such activities at present, these divers presume that the net pens may aggregate larger fishes, in the same way that a Fish Aggregation Device aggregates pelagic species.

There are no historical sites that would be directly impacted by the farm. Some concerns have been expressed that the net pens may attract 'opelu (*Decapterus macarellus*, or mackerel scad) away from the traditional 'opelu ko'a in the area. All available evidence suggests that these ko'a are not regularly fished or maintained. The most relevant information on the long-term impacts on 'opelu come from the Cates International, Inc., cage farm on Oahu. There, the 'opelu are present sometimes and not others, and do not appear to be either attracted or repelled by the cage (see Section 5.2.6).

4. PROJECT DESCRIPTION

4.1 TECHNICAL AND OPERATIONAL CHARACTERISTICS

4.1.1 Location and extent of the lease area

(Please refer also to Appendix VI : Management Plan, for more details).

Kona Blue Water Farms (a division of Black Pearls, Inc) is proposing to establish a fish farm in the waters adjacent to the Natural Energy Laboratory of Hawaii Authority (NELHA) and the Keahole-Kona International Airport (KIA). The proposed farm site lies south-west of Unualoha Point. *The site that was originally proposed in the draft Environmental Assessment lay a further 600 ft inshore, in waters of 150 – 200 ft deep. However, in response to several expressions of concern from the public, and from experts from Hawaii Islands Humpback Whale National Marine Sanctuary Scientific Advisory Committee (David Mattila and Jeffrey Walters, pers. comm.), we have proposed to move the site 600 ft to the West, into waters between 200 ft and 220 ft deep (Figures 1 and 2). This now puts our project in water around 2,600 ft from the shoreline. This modification is intended as a mitigative measure to further minimize the potential for negative interaction between the project and the humpback whales. It will also provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha Point.*

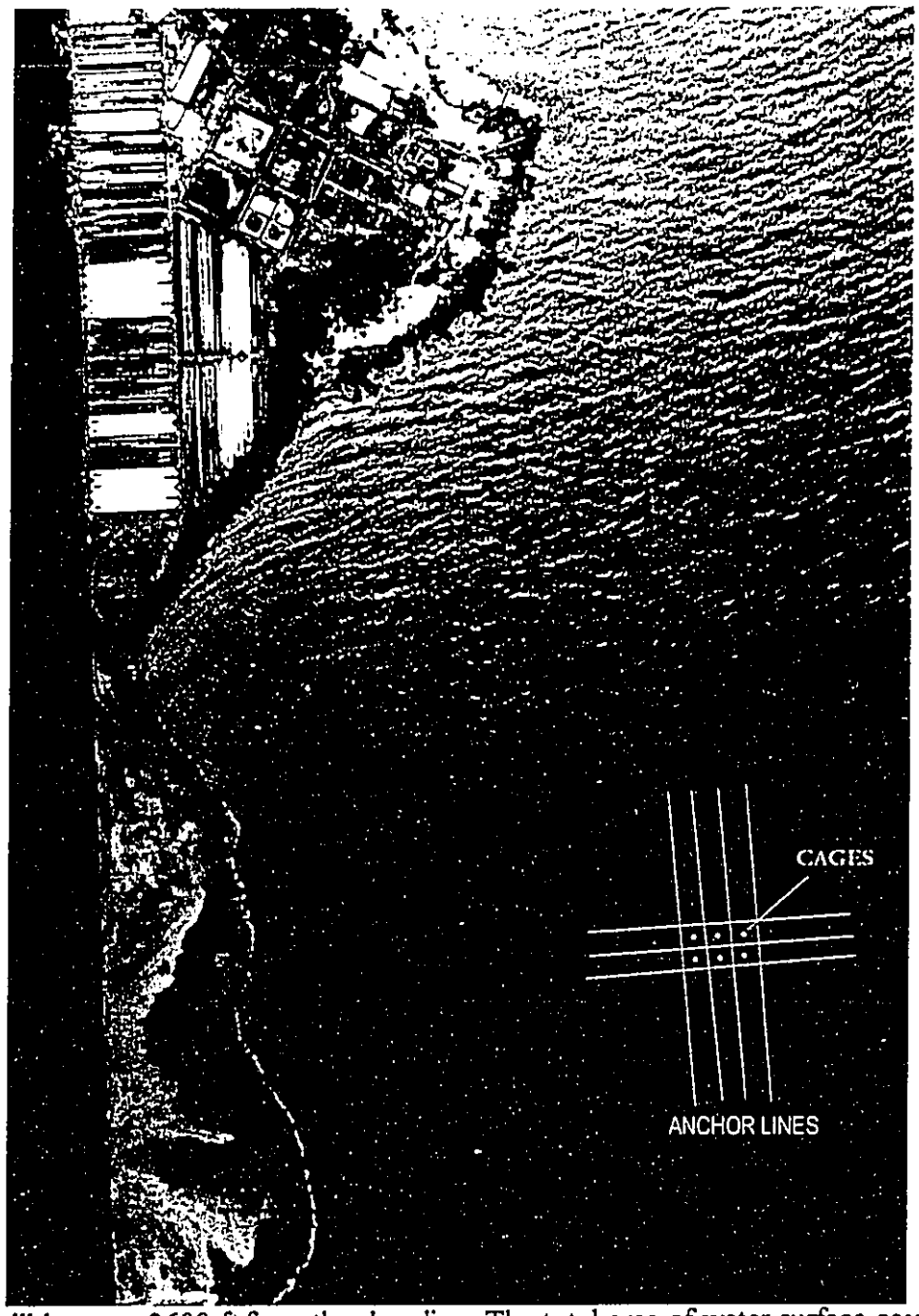
To accommodate this greater depth, we will now need some wider area to spread our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres). Most of this area would contain the anchor lines, which will require a scope of around 4:1 (i.e. 480 to 680 ft in length, if the anchors are attached at a point on the cages 30 ft beneath the surface).

Although an inner, area of around 9 acres was originally proposed as a "central safety buffer area", needing restricted access, modifications in the net cage array now remove this requirement. Consequently, an exclusive lease is no longer sought. For liability and safety reasons, however, no anchoring, SCUBA-diving, swimming or fast transit through the lease area can be permitted.

All six main cages used in the project will be submersible Sea Stations™, rather than a mixed array of three surface and three submersible cages. These Sea Station™ cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. (Figure 3 a). Submersible net pens offer distinct operational and economic advantages, as the potential damage from storm surf or hurricanes is greatly reduced, normal wear-and-tear on the cage and the moorings is minimized by the dampening of the day-to-day wind and wave action at the surface, macroalgal biofouling of the net surface is lower at depth because of the reduced availability of light, and security and aesthetic concerns are alleviated.

Figure 1: Proposed offshore farm lease site.

The proposed farm site lies south-west of Unualoha Point, in waters between *200 – 220* ft deep.



The cages will be over *2600 ft* from the shoreline. The total area of water surface covered by the proposed Farm Lease Area is approximately *36.5 hectares, or 90 acres.* Most of this area would contain the anchor lines (shown below as dotted lines), which require a scope of around 4:1 (480 to 680 ft long, if the anchors are attached at a point on the cages *25-30 ft* beneath the surface).

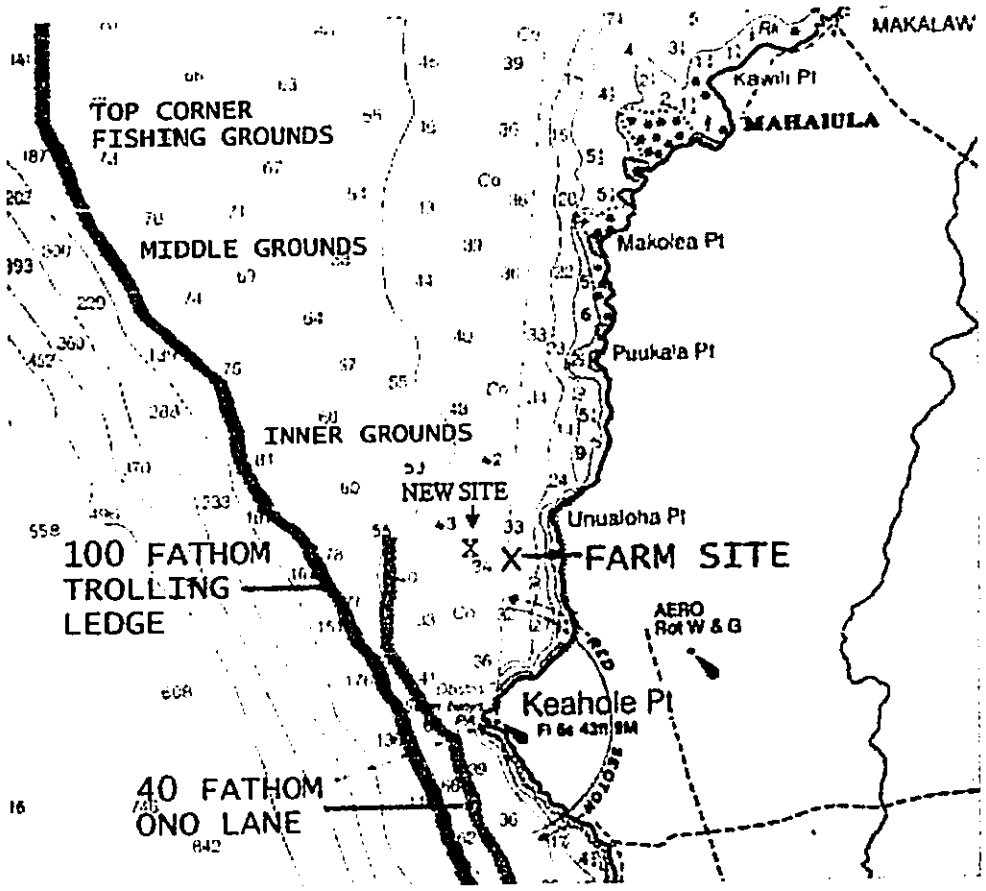


Figure 2: Proposed offshore fish farm site and primary fishing areas

The site is well inside of both the 100 fathom (200 m) trolling ledge along the "grounds" offshore of Keahole Point, and the 40 fathom (80 m) ono lane. Reef fishing and 'opelu ko'a are found well inshore of the proposed site, along the edge of the reef, in waters up to 120 feet deep (40 m). Fishing grounds for 'opelu at night are usually deeper than 40 fathoms (80 m).

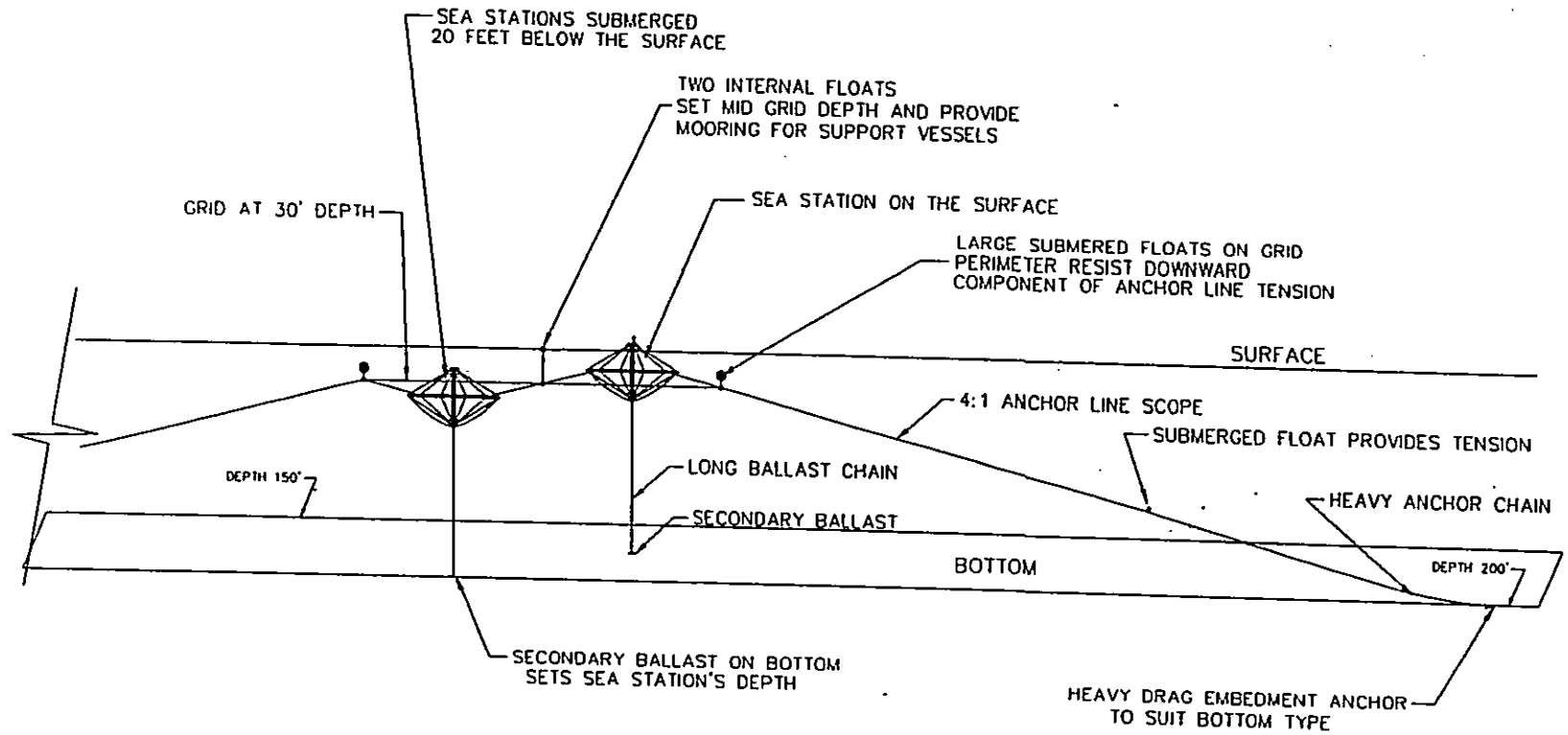
Figure 3: Typical net pen anchoring arrays

Figures 3 (a) (i) (adjacent page), and 3 (a) (ii) (following page) :

Sea Station Submersible cage systems.

The farm will use an array of six submersible cages for all grow-out. Submersible net pens are preferred because of reduced wear-and-tear on equipment, and less stress on the fish. Net pens will be anchored into the soft substrate using anchors and concrete block weights, in an array similar to that shown below. A series of buoys and weights would ensure that the anchor lines are perpetually taut, to avoid entanglement by marine mammals.

REVISION	DATE	COMMENTS



ELEVATION

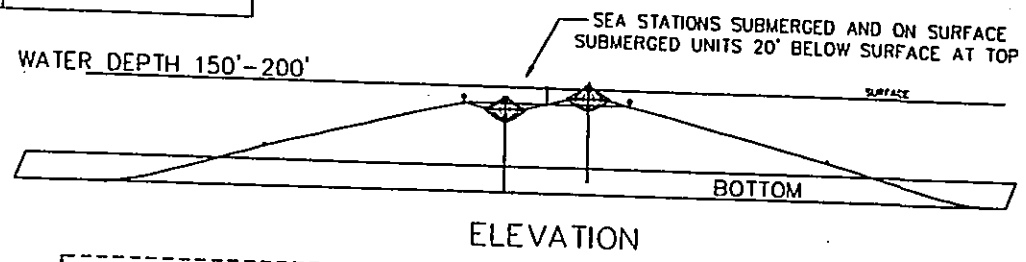
NORTH ⇒

⇐ PREVAILING CURRENT ⇒

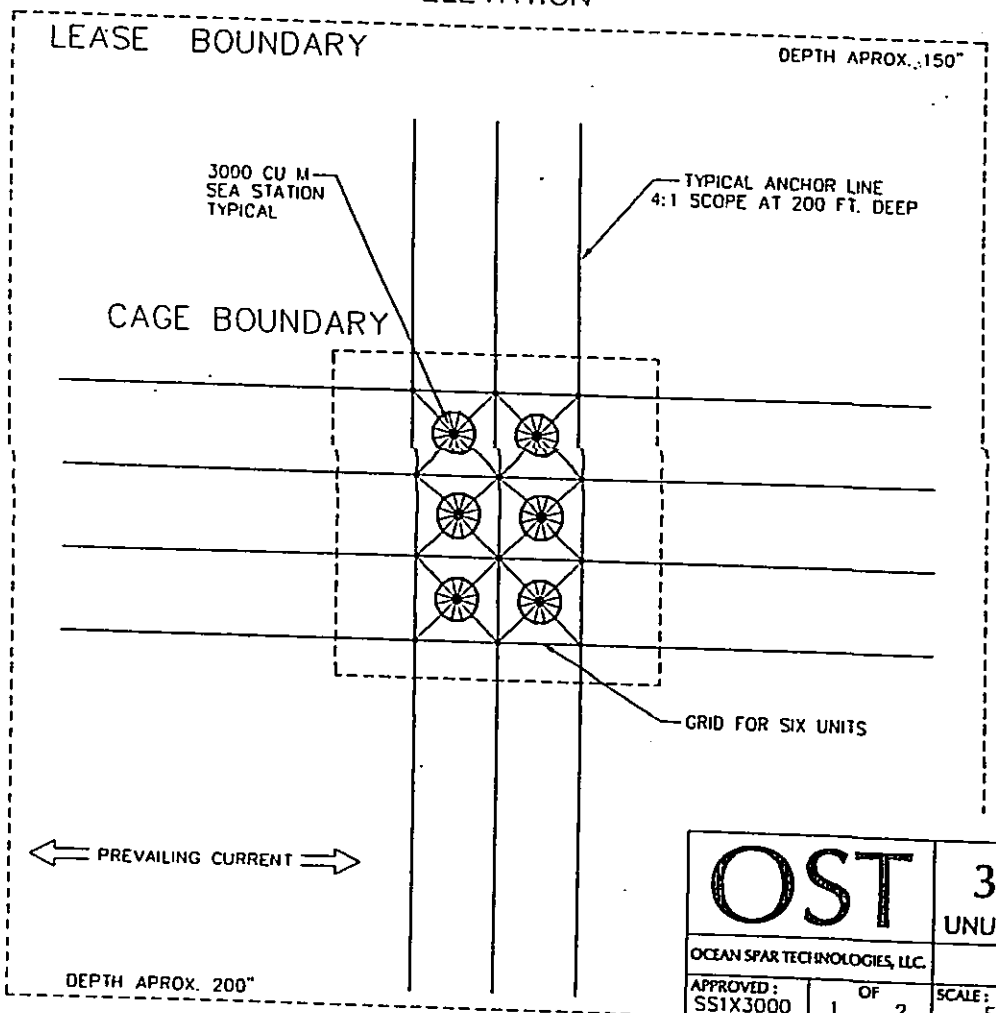
OST	SEA STATION FARM UNUALOHA POINT, NORTH KONA, HAWAII				
OCEAN SPAR TECHNOLOGIES, LLC.	KONA BLUE WATER FARMS				
APPROVED: KONABLUE	OF 2 2	SCALE: FIT	DATE: 10-22-02	DRAWN BY: KTS	DESIGNED BY: KTS

OS1-7906 N.E. DAY ROAD WEST - BAINBRIDGE ISLAND, WA 98110 - USA - PH. 1 (206) 780-3145 FX. 1(206) 780-1243

REVISION	DATE	COMMENTS
2.5	06/97	VOLUME NET



ELEVATION



FARM OVERVIEW

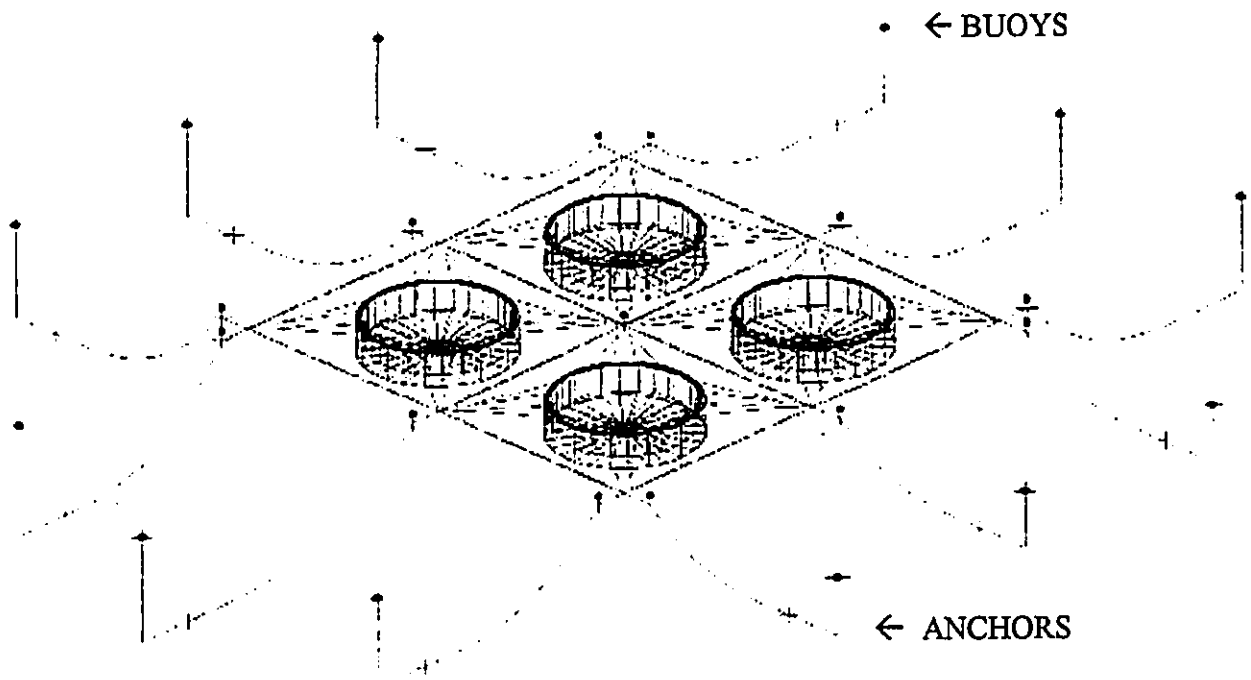
OST	3000 M3 SEA STATION					
OCEAN SPAR TECHNOLOGIES, LLC.	UNUALOHA POINT, NORTH KONA, HAWAII					
	KONA BLUE WATER FARMS					
APPROVED: SS1X3000	OF 1 2	SCALE: FIT	DATE: 10-22-02	DRAWN BY: GFL	DESIGNED BY: GFL	

OSI-7906 N.E. DAY ROAD WEST - BAINBRIDGE ISLAND, WA 98110 - USA - PH. 1 (206) 780-1145 FX. 1(206) 780-1243

Figure 3: Typical net pen anchoring arrays (continued)

Figure 3 (b): Polar Circle floating cage system.

Two small surface cages will be needed for nursery rearing and for harvesting from the submersible cages. These will be less than 50 feet in diameter. This figure shows a typical surface net pen array.



Two small surface cages (less than 50 ft in diameter) will still be needed for nursery rearing and for harvesting of fish from the submersible cages.

The net pens will be anchored into the soft substrate using anchors and/or concrete block weights, in an array similar to that shown in Figure 3. A series of buoys and weights would ensure that the anchor lines are perpetually taut, to ensure that there is no risk of entanglement by marine mammals, and to keep lines away from the surface, where they might become a hazard to navigation. All components of the cage array will be engineered by the cage manufacturers to withstand the worse storm and surf conditions that have been recorded for this site. KBWF and the cage manufacturer also have strong commercial incentives to ensure that these structures will not fail, and will employ a healthy degree of over-engineering.

Any emergent structures on the farm will be marked with Class C navigation lights (amber or yellow flashing, visible up to one nautical mile distant), as required by the Coast Guard (CWO Wayne Wallace, *in litt.*, 10/15/01).

4.1.2. Farm operations

(Please refer also to Appendix VI : Management Plan, for more details).

The farm will be serviced by a tender vessel (around 25 [redacted] ft length), which will serve as the platform to support feeding, harvesting, and grading of the fish, and cleaning of the nets. This vessel will run out of Honokohau Harbor, and will shuttle workers, supplies, and harvested product back and forth between the harbor and the farm site. Heavy work, such as deployment of cages and anchors, will be contracted out to commercial marine construction companies.

The daily activities on the farm will primarily consist of feeding and grading of the fish in the pens. Fish will be harvested into ice-brine mixtures, to quickly and humanely kill the fish with a minimum of damage. Fish will all be transported whole, in brine, to land-based wholesale facilities or appropriately certified kitchens, for sale or other handling prior to shipping. No fish processing will occur at sea during the harvests. Disposal of solid wastes will be the responsibility of the wholesalers or other purchasers of the fish.

The site *may* be monitored continuously by electronic surveillance. The farm security network may include passive submarine hydrophones, active sonar and other tracking devices, and radar for monitoring nearby surface boat traffic. The Federal Aviation Authority and the State Airport Authority in the Department of Transportation will review all security equipment, to ensure that there is no conflict with airport operations.

Support activities will be based out of Honokohau, where property will be leased and improved to accommodate containers for feed storage, a gear storage area, and closed workshop area, restrooms and office. The farm work vessel will be powered by commercially-available outboard or inboard-outboard motors. Boat designs will provide maximum utility combined with good safety. Fuel supplies will be purchased as needed from the commercial fuel dock at Honokohau Marina.

4.2 ECONOMIC CHARACTERISTICS

4.2.1 Economic impacts of project operations

The farming operations will most directly impact the local economy through employment, secondary support industries, and product availability. There will be direct employment of local people to staff the hatchery and grow-out operations, and increased employment for supportive industries. The farm will support other local businesses that will supply the wide variety of materials necessary to build and maintain the operations. In addition, fish supplied by the farm will stimulate economic activity in the restaurant trade, as well as the wholesale and retail fish trade.

Given the fixed costs for hatchery and farm operation, the optimum commercial farm size for a profitable offshore operation is approximately 790,000 lbs (360,000 kg) of mahimahi and/or kahala per year. This represents approximately 80,000 fish of around 10 lbs (4.5 kg) harvested each year. The standing stock at any one time would be around 180,000 lbs (80,000 kg) for mahimahi. Assuming a price per pound for fresh product of $3.50 ($7.70/kg), total turnover for the farm is around $2,770,000 per year. An array of at least 6 net pens will be needed to produce this quantity of fish in continuous production, to satisfy market requirements.

The greatest single operational cost for the farm is the labor. Labor and salaries, including project management and administration (six full-time positions), comprise nearly 25% of recurrent steady state costs (including equipment replacement). Feed is equivalent to 38% of the overall costs. Hatchery operations are calculated separately, and are about 12% of total farm operations. Again, the hatchery costs consist largely of labor (three full-time positions). Actual hatchery production will be contracted out to BPI, an affiliated company based at the Natural Energy Laboratory of Hawaii Authority, at Keahole Point.

4.2.2. Impacts on the market

KBWF is not planning to sell fish in the retail market, but intends to concentrate on the restaurant and wholesale trade. As such, the company will not directly control the retail price of fish. Nevertheless, in discussions with local community groups and fishermen in Kona, for the preparation of this document, two issues were repeatedly raised. Firstly, community interests often expressed the hope that the project would result in a consistent supply of affordable fish to the Kona market. Participants often complained about the high prices for fish, and the lack of year-round availability, and asked if the project could help to rectify this situation. Secondly, fishermen and other community members expressed concern that the project might hurt local commercial fishermen by flooding the market, resulting in a drop in local fish prices. These two concerns are clearly contradictory (and were often expressed by the same respondents, at different times in the course of the same discussion), yet they each still deserve to be addressed.

The first concern is difficult for a private company to singularly address. As a commercial enterprise, KBWF will attempt to market and sell its fish to get the highest possible return. Fresh product always gets the highest prices, and shipping fresh product is very expensive. The best

marketing scenario will always be to sell whatever is possible locally, and to export the excess. The scarcity of fish in Kona has many contributing causes. The greatest public benefit to be gained from this project is probably in creating the commercial incentive for further research and increased infrastructure for hatchery production of marine fish. This would provide capacity for better fisheries management systems and possible reef restocking programs. Further, by meeting some portion of the market demand, the expansion of fish farming may also be able to reduce commercial fishing pressure on already-depleted reef fish resources. These two paths are probably the most direct avenues to increase availability of fish for local consumption.

The issue of competition with local fishermen depends on the season, the species that is being caught, and the markets that the fishermen and the farm are both targeting. The major competitive advantages of fish farming over commercial fishing are consistency of supply and product quality. KBWF is already undertaking rearing trials with kahala. This fish offers great market potential both locally, and in Japan, where "kampachi" is a well-recognized substitute for yellowtail ("hamachi") in the sashimi trade. *As there is no existing market for kahala in Hawaii, the farmed fish will be creating a market, rather than competing with established interests. Wild-caught kahala are usually considered inedible in Hawaii because of two disease problems: parasitic worms and ciguatera. The parasitic worms that permeate the flesh of wild kahala are ingested by the fish when they are larvae. The fish are not vulnerable to these parasites when they are older. As we will be rearing all of our farm stock in the hatchery, we will be able to avoid this infestation. Furthermore, farmed kahala will be able to avoid accumulating ciguatera, as they will be separated from the coral reef-associated food chain.*

For around nine months of the year, mahimahi is in short supply in Kona, and the product from the fish farm would be primarily competing with the imported frozen mahimahi from Ecuador and Taiwan. For around three months of the year, mahimahi is in abundant supply. Particularly when a drifting log or net is found offshore, prices paid to fishermen drop to under $1 per pound. The relatively small volume of fish from the farm will have little overall impact on the market during these short-term gluts.

Farmed mahimahi and wild-caught fish are essentially two different products. Production costs and efficiencies dictate that farmed fish need to be sold at smaller sizes than wild fish. Market studies have shown that small farm-raised mahimahi – up to10 lb (4.5 kg) – are very well received by 'white tablecloth' restaurants in Kona, and KBWF anticipates establishing regular clients in this higher-end niche in Kona, Maui and Oahu. Currently, the existing fish wholesale trade pays very low prices for any wild-caught fish under 13 lbs (5.5 kg). The local fishermen and the farm are therefore targeting two very different markets, and this will tend to further reduce potential competition.

As other species come on line at the KBWF operation, the market impacts will be even less of a concern. Culture of opakapaka or other deep bottom species would have little impact on local fishermen's markets. Deep-water snappers have been heavily overfished (see Section 1.2). Commercial fishing for these species around the main Hawaiian Islands has been increasingly regulated, and is now greatly diminished. The main competition in the market is the existing high level of imports of deep bottom snappers from elsewhere in the Pacific and Southeast Asia. The production of fresh, local farmed product would probably substitute for these imports first, and

would strive to maintain local fish prices at some threshold level. Further, the farm's optimum market for these fish will probably be for export to Japan and China – markets presently untouched by local bottom-fishermen, because they can produce neither the consistency of supply, nor the volumes needed.

4.3 SOCIAL CHARACTERISTICS

The KBWF fish farm could make a significant contribution to local employment, with ten full time positions in the full-scale project (after Year 3). These positions are primarily in farm operations, and provide continuing, stable income in a fisheries-related industry. As such, this project will offer opportunities for alternative employment for fishermen who have been displaced by the increasing regulation of the bottom-fish fishery, offshore long-lining, or by other fisheries faced with increased management pressure or reduced stocks.

Fish farming will also increase the diversity of the economic base in the Big Island, and provide some greater degree of immunity to the fluctuations brought about by the heavy reliance on the visitor industry in the State. Fish farming offers the capacity to strengthen the maritime support industries in rural coastal areas, such as dock facilities and bat maintenance, marine supplies and engineering, and fish wholesalers. This could have broad social and economic implications in Kailua-Kona, particularly in times of economic hardship.

4.3.1 Public use of offshore ocean space

As discussed below (see Section 4.3), surveys indicate that this deep-water area north of Keahole Point is little used, except for transit to or from other reef or fishing areas (Figure 2). Nevertheless, two comments received from the public on the draft Environmental Assessment expressed concern about the restricted access to the central 9 acre area surrounding the cages. The changes that we are now proposing to our cage array mean that it is possible to reevaluate the need for exclusivity. All six of the main grow-out cages will now be submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. Two small surface cages (less than 50 ft diameter) will still be needed for nursery rearing, and for harvesting of fish from the submersible cages. However, the requirement for exclusive use of the lease area surrounding the cages is now considerably reduced. Consequently, we are now only asking for the lease area to be designated as no anchoring, no SCUBA-diving, no swimming, and slow low-wake speed by boats, rather than exclusive use.

In taking this action, KBWF is trusting that Kona's fishermen and divers will respect the fish cages, and that pilfering, vandalism, or reckless endangerment of property, health or safety will not become a problem. If such problems do arise, KBWF may, at some later stage, ask the Land Board to reconsider the level of exclusivity. If such a re-evaluation arises, KBWF understands that further consultations would be needed with the community; however, the company believes that this step will not be necessary.

KBWF believes that the normal movement of boats *within the lease area will not be affected by the presence of the cages.* Surface boats could traverse freely through this area, although buoys would support signage requesting boats maintain some slower speed as a safety precaution. Trolling and bottom-fishing would also be permitted under normal conditions, although on the understanding that the anchor lines are present in this area, and that any fish that might be hooked may become entangled in these lines. Similarly, no anchoring of boats could be permitted within the entire farm site, because of the risk of entanglement of anchors in the mooring array for the net pens. State law decrees that the company must accept all liability for any accidents or injuries that occur within the lease area, *SCUBA-diving and swimming activities could not be permitted around the mooring lines or cages, within the 90 acre area.* Again, however, these waters are deep, and presently not used for such activities; hence this loss of access does not represent a significant impact on the public.

4.3.2 Demonstration of offshore aquaculture in Kona

Amending the ocean leasing law during the 1999 State legislative session caused much comment from State agencies and the public. Legislative committee members and many of those who testified at the hearings recognized that the future for ocean aquaculture in Hawaii required a "user friendly" permit/lease regime, to test the feasibility and impacts of such leases.

Interest in ocean aquaculture is currently rising among policy-makers and private aquaculture entrepreneurs. However, the general public has limited experience with the issues, impacts and benefits from ocean farming in the nearshore or offshore environments. This is especially true in Kona, where the community wants sustainable, socially- and culturally-appropriate use of marine resources. The amended ocean leasing law was specifically crafted to provide a clear mandate from the legislature for the State to assess the impacts of ocean leases on the environment and the public.

There is only one other offshore fish farm currently operating in the state: Cates International, Inc. off Ewa Beach on Oahu. A further application has been filed by Ahi Nui Tuna Farming Company, for a tuna farm, based on wild-caught fish from the sea mounts, to be sited north of Kawaihae Harbor, in Kohala. This project here offers another opportunity to demonstrate the potential benefits that offshore fish farming could bring, particularly when based on hatchery production of other high value fish species, and when sited in an appropriate location for aquaculture.

4.3.3 Research, training and extension opportunities

The KBWF site will also promote aquaculture research and development, will increase the profile of Hawaii as a site for innovative ocean aquaculture, and will open up opportunities for training and extension work, to broaden the benefits from these developments. By increasing the level of offshore aquaculture expertise among Hawaii's workers, this project will support the future growth of this industry in the State. It will also enable Hawaii to leverage a greater role in the expanding Pacific aquaculture industry.

Black Pearls, Inc. has a demonstrated capacity for research, training and extension of innovative aquaculture enterprises. Over the last eight years BPI has received support for training programs from US Department of Agriculture (USDA), National Marine Fisheries Service (NMFS), University of Hawaii Seagrant (UHSG) and Land Grant, in both Hawaii and the Marshall Islands. The company would also welcome involvement from other State, Federal and private agencies to increase its capacity and effectiveness in accomplishing these training and extension goals.

Black Pearls, Inc. has an outstanding research and development track record, being the recipient of over 23 State and Federal research grants and contracts, since the company's formation in 1992. The most recent of these grants, from the Advanced Technology Program, within the Federal Department of Commerce, was specifically targeted towards overcoming the technological impediments to hatchery production of marine finfish. This three-year research grant is examining hatchery production of both ornamental fishes, such as flame angels (*Centropyges loriculus*) and food fishes, such as opakapaka and kahala. KBWF has, in the first year of this research, successfully reared flame angelfish, opakapaka, and golden trevally (*Gnathanodon speciosus*). This is the first time that these fish have been reared by a private company. KBWF has also been able to rear kahala from eggs to juvenile fish. Further developments are expected in these areas, as KBWF's research progresses, and as further focus and resources are brought to bear on these critical issues of hatchery production for reef restocking.

4.4 ENVIRONMNENTAL CHARACTERISTICS

Environmental impacts associated with the project are generally negligible and benign. The proposed project site is just outside of the NELHA research corridor, and offshore from both Cyanotech Corporation's *Spirulina* algae production ponds and the Kona International Airport.

The physical and biological attributes of the existing environment of the proposed farm area are described in detail below (Section 4). The area's topography and oceanography are distinguished by the depth of water; the deep sand substrate; the strong currents through the area; the exposure to high winter surf and strong trade winds; and the adjacent shoreline of a narrow coral bench reef with a steep basalt (lava) cliff. The existing uses of the area are negligible, because of its depth, the paucity of fish, and the barren benthos.

Minor impacts on water quality and the substrate beneath the farm or benthic loading could be expected in the immediate area of the farm. However, given the strong long-shore currents, the deep water and sand substrate, and the incentives for careful management of fish feed, these impacts will be minimal. Increased nutrient loading onto the substrate may result in some greater biological activity there. The soft substrate presently supports only a small number of holothurians and other detrital feeders, Their numbers will likely increase somewhat, as the farm develops. However, evidence from the Ewa Beach farm indicates that there will not be any significant skewing of the benthic community composition. There will also be some increased levels of dissolved organic nitrogen in the immediate vicinity of the cages, but again, the

evidence from the Ewa Beach project is that these inputs will be rapidly diluted and assimilated within the zone of mixing of the farm.

The proposed farm site also lies just inside the southern boundary of the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS). The Sanctuary boundary runs directly west of Keahole Point, and humpbacks are known to frequent the entire Kona coast area in winter. Information from National Marine Fisheries Service, and experience from other fish farming areas, indicate that the farm itself will not interfere with the movement of the humpback whales. Some concerns have been expressed with the potential for entanglement of whales in the mooring lines of the net pens. Examination of entanglement records show that most events occur in slack net mesh (such as drift nets or fish weirs), slack vertical lines (such as crab pot or lobster pot floats), or surface lines (such as long-lining gear). With heavy mooring gear, and taut lines and mesh, the potential for entanglement is considered negligible (Celikkol, 1999; Wursig and Gailey, 2002; see also Section 5.2.2 d, below).

Although other Federally-listed species are known to occur in the area, the farm does not present any potential detrimental impact on these animals. Leatherback and Green Sea Turtles and Monk Seals may occasionally stray into these deep-water areas. As with humpback whales, however, the taut-line mooring system and stiff-mesh net pens will prevent animals from becoming entangled.

Nearby Makako Bay is frequented by large schools of spinner dolphins, on nearly a daily basis. These animals usually follow a daily pattern of movement, from the Makalawena shelf area to the north, along the reef edge to the shallow areas in Makako Bay, where they rest for some time during the middle of the day. The schools then follow an erratic zig-zag pattern in their return back to their deep-water feeding grounds. The farm site will not impede the usual pattern of movement. The potential for the offshore farm to disrupt the normal resting pattern of the dolphins in the shallow waters of the bay is also considered negligible. (refer to Section 5.2.2 c for more detailed analysis of biotic interactions). *This potential for negative interaction has been further lessened by moving the farm an additional 600 feet to the west (offshore), such that there is now no overlap at all between the dolphin resting area and the lease area. As dolphins are known to only rest in waters shallower than 150 ft, the new depth range for the cages of 200 – 220 ft are clearly well beyond these limits.*

5. ALTERNATIVES

5.1 ALTERNATIVES EVALUATED

Several other protected bodies of water in West Hawaii, such as offshore of Kawaihae Harbor and Kealakekua Bay, were also considered as possible fish farm sites, but were determined to be unsuitable because of the heavy recreational use, and because of the public perceptions of appropriate activities in these areas of the ocean.

5.1.1 Kawaihae

During public hearings, some commercial dive operators in the Kailua-Kona area urged KBWF to consider relocating to an area outside of Kawaihae Harbor. KBWF had already examined this alternative early on in the site selection process, and had rejected the area because of the high winds that frequent the area, the distance from the hatchery, and potential conflict with another proposed fish farm. The Ahi Nui Tuna Farming Company grow-out project is already being proposed for an area about 5 miles north of Kawaihae, along the Kohala coast. Furthermore, in public hearings for this tuna operation, several residents from the Kawaihae area urged the tuna farm company to consider relocating to an area more appropriate for aquaculture development, "such as down off OTEC" (Benny Bowman, in public testimony to DLNR representatives, Kealakehe Intermediate School, October 7th, 2002). Other public testimony at the same hearing also pointed out that the very high wind speeds in the Kawaihae area made it unsuitable for fish farming. Bill Paul, a resident of the area, and operator of a weather station, testified that he had recorded wind speeds of up to 85 mph in the area, with winds in excess of 60 mph occurring throughout the year.

5.1.2 Kealakekua Bay area

Kealakekua Bay was also not considered a viable site. While a large section of the bay lies outside of the established Marine Life Conservation District, in a suitable depth range for fish farming, this is not considered a viable proposition because of public interest concerns. There is a strong community protectiveness for the overall aesthetic of the Kealakekua Bay area, and there is vocal opposition to development of the lands adjacent to the bay. While there would probably be no significant environmental detriment from a fish farm operation in this area, it would probably be perceived by most of the public as incompatible with the existing uses of the area. Kealakekua is also further from a functional harbor, and further from the hatchery.

Two other potential sites in the Kailua-Kona area were also considered – the deep-water area south of Kailua Bay, and the waters directly offshore and north of Kaloko Pond, offshore from Kaloko-Honokohau National Historic Park. Kailua Bay is already intensively used by other commercial interests, with cruise ships, submarines, jet-skis, para-sailing and fishing and sunset cruise vessels working from the pier area. Given these activities, and the intensive recreational use of the Bay by fisherfolk, divers and swimmers, the farm operation would probably not be a welcomed addition.

The waters offshore from Kaloko Pond are ideal in terms of depth profile, protection from storm and wind exposure, and proximity to Honokohau Harbor. However, the location would then be offshore from the boundary of the Kaloko-Honokohau National Historic Park. The National Park Service is presently negotiating an operating agreement to provide them with jurisdiction over the State waters adjacent to the Park. Even though Kaloko pond was traditionally used by Hawaiians for fish culture, park staff have indicated that a commercial fish farm would not be considered a compatible use (Sallie Beavers, pers. comm.).

Sites for offshore aquaculture are not common. A good site has to include a combination of characteristics such as good current (ideally ranging from 0.5 - 1.5 knots), water depth (from 100 - 200 ft.), significant distance from shore to eliminate ecological effects, appropriate bottom conditions, shelter to avoid storm conditions and waves, absence of competing uses such as fishing and recreation, and proximity to shore-based support services such as hatcheries and boat harbors. Finding a site that satisfies all these criteria is difficult. The scarcity of commercial harbors in Hawaii also greatly restricts the areas where farms could be located.

5.2 NO ACTION ALTERNATIVE

The option of No Action is not recommended, given the potential economic benefits that could accrue from development of offshore aquaculture in Hawaii, and the long-term environmental benefits that would accrue through development of hatchery techniques for food fish and ornamental fish. To take no action would be an abrogation of responsibility by Hawaii for self-sufficiency and sustainability in food fish resources.

If the option of No Action is taken, this would hinder the development of offshore aquaculture in Hawaii, and probably discourage further research or development efforts in this area. The only alternative, then, would be to continue development of land-based marine fish farming. These activities are very capital intensive, energy intensive, and highly mechanized. They are therefore only suitable for high-value marine fish. They also only offer limited employment and development opportunities to the community. Further reliance on expansion of shore-based fish farms would also require commitment of valuable shoreline property, and may incur problems with disposal of concentrated effluent in fresh-water lenses or in nearshore waters. To confine future marine fish farming in Kona to shore-based activities would also limit the public and private investments into future hatchery and nursery research, which would reduce capabilities and capacities for reef restocking.

6. ENVIRONMENTAL SETTING

The waters offshore from Unualoha Point, within the depth profile for the fish farm (*200 - 220 ft*), are not utilized extensively by the community. These waters do not represent a unique asset, as they are comparable to similar offshore along the Kona coast. Therefore, impacts by the project on the Unualoha Point environment, and the broader Kona marine environment, should be minimal.

6.1 WATER QUALITY

6.1.1 Existing water quality monitoring program

The Water Quality Laboratory at the Natural Energy Laboratory of Hawaii Authority has conducted an extensive water quality monitoring program around Keahole Point, on a quarterly basis since 1989. This program is designed to detect any changes in water quality in the groundwater or on the fringing reef, from Ho'ona Bay to Wawaloli, resulting from the aquaculture activities at NELHA. Appendix 1(a) is a typical quarterly data summary available from this sampling, which provides an indication of the type of monitoring, and the typical parameter values found in the offshore waters around NELHA. As such, these data represent a comprehensive data set – in time and space - that reflects the offshore water quality in the general Keahole-Unualoha area.

The water quality parameters for the proposed offshore farm site are probably most comparable to those found directly offshore of Keahole Point (shown as "Site 3, NELHA Pipelines" in the location diagram in Appendix 1 (a)). These waters are of low turbidity, with negligible levels of particulate organic matter. Turbidity values (in NTUs) along a cross-reef transect at the tip of Keahole Point (Transect Number 3) range from 0.10 at the surface, to 0.14 at the bottom. Similarly, ammonia nitrogen levels along Transect No. 3 range from 0.05 to 0.12 uM (or from 0.70 to 1.68 ug/L).

6.1.2 Currents

General water movement patterns are governed by the currents past Keahole Point (the western-most point of the Big Island of Hawaii). KBWF principals and NELHA staff have observed these currents for more than a decade, and the following summarizes these observations.

Usually the current in this area runs from south to north. Under this strong N-setting current, water is deflected by Keahole Point, and a gyre (circular current) develops to the north of Keahole Point. The strength of this gyre, and the distance from shore to the center of the gyre are governed by the strength and angle of the current. Under very strong N-setting currents, the gyre extends well north of the Unualoha area, and the proposed farm site would be subject to either gently North-setting or a South-setting counter-current. Under moderate to light N-setting currents, the gyre is weaker, and the water moving over the farm moves towards the North. Under all S-setting currents, the water over the Unualoha site area moves unimpeded towards the South. These patterns therefore suggest that the two points of first impact downstream from the

proposed site will be either Keahole Point, over a mile to the south of the site, or the Makalawena shelf area, several miles to the north.

Authoritative current data is only available for the Keahole Point area from a monitoring program conducted by the Look Laboratory of Oceanographic Engineering in 1979, to provide engineering information for deployment of OTEC pipelines for NELHA (Appendix 1 (b)). These results show that extremely strong currents can occur along the shallow, shelf areas of Keahole Point – probably due to the funneling effect as water moves past the point. Location A, in 55 ft of water, experienced a single current incident of 130 cm/second (a little over 2.5 kts), and several recordings of over 100 cm/sec (just under 2 kts; Figure A1, Appendix 1 (b)). Vector averaged currents (Figure A4a) indicate that these currents were South setting (coming out of the North).

Location B, in about 300 ft depth off Keahole, is more relevant to the currents at the proposed farm site (Figure A16 – A22b, Appendix 1 (b)). The current meter at this site was moored between 80 and 100 ft deep – around the depth of the bottom of any submerged net pen at the site. Figure A 21 shows a full month's data for this site, with a predominant northward direction (compass headings between 315 and 45 degrees). Currents here averaged only a little under 50 cm/sec (nearly 1.0 kt), but with one peak of at least 120 cm/sec (2.3 kts).

The intended site is, however, a considerable distance from Keahole Point, and experiences less current speed than those recorded directly off the Point. *A current meter was deployed at the proposed site yielded data over a one month period (Appendix 1(c)). Average current speed was 16 cm/sec (about 0.3 kts), and current headings were either generally to the North (predominantly) or to the South.* KBWF intends to *conduct more detailed current studies* over the coming months, *redeploying* a tethered current meter at the *site as it becomes available*. This information will be used for KBWF's modeling work to refine the engineering specifications for cage moorings and anchors. This current data will also be made publicly available. The important conclusion from the evidence at hand is that there is more than sufficient current in this area to assure adequate flushing of the farm.

6.2 BIOTA

Relevant biota can be divided into three types: terrestrial biota, marine biota, and rare, threatened or endangered species. The effects of the proposed project on rare, threatened or endangered species or their habitats are considered independently, in light of the regulatory requirements of the Migratory Bird Treaty Act and the Endangered Species Act.

6.2.1 Terrestrial biota

The proposed project will not significantly impact any terrestrial biota such as seabird populations. The proposed farm area itself is infrequently used as a foraging area by seabirds. Observations indicate that most seabird activity in the area is confined to the fishing "grounds", which extend to the northwest of Keahole Point.

6.2.2 Marine biota

In general, the deeper waters of the proposed farm site support a highly limited benthic community and fish faunal assemblage. The few marine plants or animals within the proposed lease area are mostly pelagic – either planktonic algae, or free-swimming open-water fishes. These biota are, by definition, non-residents, and would not be permanently impacted by the proposed farming activities. An extensive survey of the sand substrate beneath the lease area has not been possible, because the depth of water imposes limits on the bottom-time for SCUBA diving. Several "bounce" dives in the area, *at depths ranging from 160 – 200 ft*, have not encountered any macrofauna or marine algae. It is likely that the lease area does support some scattered resident fishes such as garden eels (*Gorgasia hawaiiensis*) and laenihi (nabeta, *Xyrichtys* spp) although observations suggest that their populations are low, and no fishing activity has been observed in this immediate area.

SCUBA survey dives at several points along the reef face, south of Unualoha Point, have extended down to the juncture with the sand substrate at the bottom of the reef slope, which occurs at a depth of between 120 ft and 155 ft. At each site surveyed, the sand substrate extended off towards the west uninterrupted, and showed no evidence of benthic macrofauna.

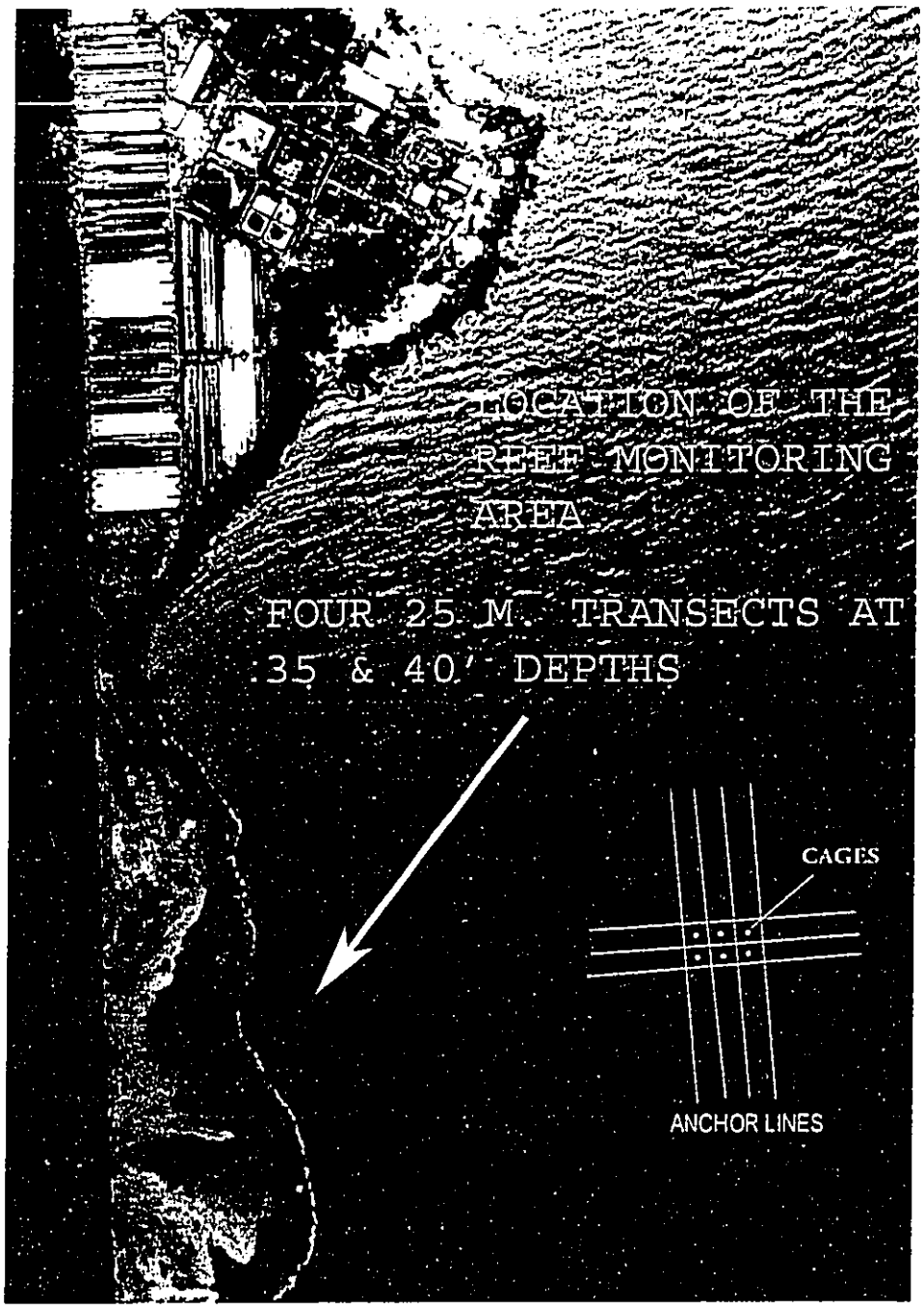
Benthic and Fish surveys

At DAR's request, a comprehensive survey of marine biota was conducted on the reef directly adjacent to the proposed farm lease area, just south of Unualoha Point (Figure 4). An intensive survey was conducted of the benthic biota of the fringing reef crest in this area (Appendix II). This survey used protocols identical to those employed by the DAR West Hawaii Reef Management Task Force Survey, with a series of four transects of 25 m x 2 m, extended parallel to the reef crest, immediately mauka of the seaward edge of the reef. Video footage was made of these transects, and digitized for selection of random points on the video frames. By using these protocols, this survey work adds further information to the DLNR monitoring program, and also allows the entire data set from West Hawaii to be used as the controls for the farm site.

The survey revealed that the site is characteristic of similar areas along the Kona Coast that have steep drop-offs close to shore, and are subject to heavy wave action during storm surf conditions. There was a high coral cover (50% live coral) over a basalt pavement (from the 1301 lava flow). The reef was considered "vibrant and healthy" (WHAP team, Appendix II). Predominant species included *Porites lobata* (29% cover) and *Pocillopora meandrina* (8%).

Fishes were surveyed using visual census techniques over the same transect lines; again employing the same precise methods that have been used by the DAR WHAP survey work. The fishes showed similarly high levels of abundance and diversity to the corals. Plantivores were numerically dominant (70%), as might be expected in an area close to a steep offshore slope. *Chromis vanderbilti* was by far the most dominant species (66% of total abundance). Other damselfish (Pomacentridae), surgeon-fish (Acanthuridae) and wrasses (Labridae) were also present in moderate numbers.

Figure 4: Location of benthic and fish surveys



A comprehensive survey of marine biota was conducted on the reef directly adjacent to the proposed farm lease area, just south of Unualoha Point.

Dolphins

The shoreline areas of Makako Bay and Ho'ona Bay, south of Unualoha Point, are also frequented by spinner dolphins (*Stenella longisrostris*). Because of marine mammal protection concerns (legal, cultural, and public policy issues), the existing status of dolphins in the area and the potential impacts from the farm operation (see Section 5.2.2 c, below) are reviewed here in detail.

The dolphins that are found north of Keahole are part of "the largest school ... on the lee side of Hawaii" (Norris and Dohl, 1980, p. 827). The school ranges from Honokohau Harbor to Kiholo Bay, and may occur as a single school at times, or "fragmented into three or four smaller schools, separated by a few kilometers of coastline" (ibid). "The dolphins do not seem to occupy any of the small coves consistently, but to congregate over the rather extensive area of shallow water, moving back and forth." (ibid). "The dolphin populations .... are not composed of discrete schools of modest size, but instead of highly fluid groups that may range considerable distances and may be associated in very variable combinations of individual animals" (ibid, p. 822).

The spinners' normal diurnal movements carry them from their nocturnal feeding grounds, in deep waters offshore, into a shallow rest area, around the middle of the day, and then back out towards the grounds around the mid-afternoon (Norris, et al, 1994). The dolphins appear to prefer resting areas that are closer to deep offshore feeding grounds, and that offer calm water and good visibility (ibid; Ostman, 1994). Rest areas are generally 50 m or less in depth. (Norris and Dohl, 1980). North of Keahole Point, schools usually gather on the shallow shelf off Mahaiula in mid-morning, presumably after feeding on the 'grounds'. The school then moves along the reef edge, parallel to the shore, south into Makako Bay. Around 11 am, they usually arrive in the shallow (less than 25 m, or 80 feet) sandy area in the most protected part of the Bay, where they may spend the next two to three hours 'resting'. The movement out of the Bay, after the rest period, usually follows a "zig-zag pattern" (Norris, et al, 1994, p. 89), of back and forwards movements as the school moves along the coast, perhaps for several kilometers, before moving out to deeper water.

There is a "fluidity in school structure and variability of school movement" (Norris and Dohl, 1980, p. 828). "Dolphin schools are not always in these rest localities, and the number of animals using a given cove may vary widely from day to day (ibid). Norris and Dohl (1980, p.830) "reject(ed) the idea of a given cove having a definable resident school", with individual animals moving from Keahole Point school as far south as Kamilo Point. School size also often varies, with one individual dolphin associated with schools ranging from 6 to 150 animals (ibid).

The pattern of movement into the rest areas is also highly variable. Norris and Dohl (1980) found "(the) movement toward the coast may be a general one and not necessarily pointed to a precise rest cove" (p 837), with a number of different schools entering Kealakekua Bay at different times and from different directions. This led the researchers to conclude that "the bays and coves used for rest periods may not necessarily be the direct target of daily inshore movement", and that the location of the rest area is selected on an opportunistic basis. There would appear, therefore, to be no obligation on the part of the dolphins to use of a particular rest area, or to adhere to a particular group.

Other dolphin species may be found in and around the project area, but are usually most commonly seen on the 'grounds'. Bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella attenuata*), rough-toothed dolphins (*Steno bredanensis*), and false killer whales (*Pseudorca crassidens*) have all been observed on the 'grounds', or in other offshore waters of the Kona Coast. These species would have considerably less interaction with the project than the spinner dolphins described above.

6.2.3 Rare, threatened or endangered species

Four species of marine animals that occur in Hawaiian waters have been declared threatened or endangered and are under Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) is common in the nearshore waters of the main Hawaiian Islands. The endangered hawksbill turtle (*Eretmochelys imbricata*) is infrequently found in Hawaiian waters. The principal nesting site for the green turtle is in the Northwest Hawaiian Islands, on French Frigate Shoals (Balazs, 1980). No turtles were observed in the area, but it is possible that they occasionally transit through the site.

The Hawaiian Monk Seal (*Monachus schauinslandi*) occurs rarely in the main Hawaiian Islands, but has not been observed in or near the site of the proposed project. The closest recorded occurrence of monk seals was in March, 1995, when several animals hauled out for protracted periods at Mahaiula Bay, in the Kona Coast State Park (about 5 miles north of the project site).

Populations of the endangered humpback whale (*Megaptera novaeangliae*) winter in the Hawaiian Islands, and the project site lies just within the boundaries of the Hawaiian Islands Humpback Whale National Marine Sanctuary. The southern boundary of the sanctuary runs due west of Keahole Point, about 1 mile to the south of the project site. Humpback whales occur frequently over the winter months in the Kona Coast area, and may traverse through the project site.

6.3 RECREATION

A survey of recreational activity in the general area, north of Keahole Point was conducted from August to September, 2001 (Appendix III). The survey covered two months of summer conditions, with low ocean swells and light trades on the Kona side. The first month was over school vacation. The Keahole area is very exposed to heavy North and West ocean swells, which primarily occur over the winter months (November – March). Strong trade winds also are prevalent in winter, and blow generally from the North or Northeast. Recreational use of the Unualoha-to-Keahole area is therefore significantly diminished over winter. The timing of the survey over these two months was considered the best means of ensuring that the data represented a picture of heaviest use of the area, rather than some period of less-intensive use.

KBWF staff conducted the survey by making observations using binoculars from an established vantage point, north of Keahole Point. The survey design covered all 61 days of the two month period, with observations made three times each day.

Of the 150 observations, only one boat was seen within the proposed project site – a boat transiting through the area. There was also limited activity in the general area lying to the offshore of the proposed farm area, with only 16 events recorded (8 boats transiting, 6 trolling, and 2 sailing the offshore waters). Most activity in the general Unualoha area was recreational dive boats and commercial dive tour operations. Diving occurred in the mornings along the reef and shoreline south of Unualoha Point (directly inshore from the proposed farm site), and in Makako Bay itself. There were several instances where close interaction between vessels and spinner dolphins was observed, with divers in the water around the resting school. The diving activity along the shoreline (Unualoha to Ho'ona) is largely from commercial dive operations, catering to tourists, rather than local, non-commercial dive operations. Commercial dive operations also conduct night dives on the reef just north of Makako Bay, with the principal target being the manta rays that frequent the area at night.

6.4 NOISE AND AIR QUALITY

Ambient noise levels are severely impacted by the site's proximity to the Kona International Airport. Air quality varies, depending on the amount of vog in the air. On days of strong trade winds – predominantly over winter - a general northerly wind pattern results in negligible levels of vog. On days of weaker trade winds – generally more frequent over summer – a more southerly air flow brings vog-laden air from Kilauea volcano around and up to Kona on a southerly air stream, created by the adiabatic convection currents along the lee of the island. Usually the air is clear, dry and cooler in the mornings, with offshore winds predominating.

6.5 AESTHETICS

The aesthetic value of the proposed project site must be considered in light of both the intrinsic value of open ocean space, and the nearby shoreline activities. The waters surrounding the area, near Keahole Point and towards the "grounds" to the northwest, are valued by the community for the big game fishing. Shoreline activities include recreational diving and fishing along the nearshore fringing reef. The properties along the adjacent shoreline consist of Kona International Airport, and the residential and commercial aquaculture operations at NELHA.

6.6 CULTURAL RESOURCES AND PRACTICES

The proposed lease area is too deep for free-diving, and for any significant SCUBA diving activity. There are no significant benthic plant or animal populations, and there are virtually no benthic or pelagic fishing activities in this depth range. Kona crabs and nabeta are the only benthic resources that occur on sand bottom at this depth, but informants suggest that the currents are too strong for any significant fishing effort this close to Keahole Point.

The only potentially-impacted cultural resource that was cited during extensive discussions with community and kupuna groups was the 'opelu ko'a ('holes' or schooling places for mackerel scad – *Decapterus macarellus*) that occur in the general region. The locations of these ko'a are considered to be part of the traditional marine lore, and are considered inappropriate for publication, or for sharing outside of the families or community groups who have traditionally fished these ko'a. 'Opelu aggregations usually occur in water around 120 ft deep, close to reef drop-offs, and well shoreward of the farm area.

An important aspect of the 'opelu ko'a tradition is the maintainence of these ko'a by feeding of the school. To keep fish attracted to a ko'a, a fisherman will regularly drop bags of palu - grated vegetable matter - to the school (daily, or every second day). Kupuna from the Kekaha district stated that the 'opelu ko'a along the north of Keahole Point are not currently 'fed' or fished by either commercial or recreational/artisanal fishermen. However, the knowledge of the names and locations of the ko'a is considered of historical significance, and is a tradition that the kupuna would like to see preserved and passed on to future generations (refer to transcript from Kupuna Meeting, on BPI's web site: www.blackpearlsinc.com).

Prior to the 1801 lava flow that inundated the area, Keahole was the site of the largest fish pond in the Hawaiian islands – one so large that a canoe was used to traverse from one side to the other. Fish farming could therefore be considered historically and traditionally appropriate to the area.

6.7 LAND USE AND ENVIRONMENTAL COMPATIBILITY

6.7.1 Current usage

The proposed site presently offers no special environmental or public benefit to the community, beyond the relatively rare instance of use by recreational boats.

6.7.2 Submerged lands issues and the public trust

The proposed farm site constitutes part of the ceded lands trust, since all submerged lands are ceded lands. The 1999 amendments to the Ocean and Submerged Lands Leasing law (Chapter 190D HRS) directly addressed the issue of Office of Hawaiian Affairs' share of the lease revenues, by stipulating that the designated 20% of lease payments should be due to OHA.

6.7.3 Public perceptions of ocean use

The public perceptions of ocean access and ownership in Hawaii are an amalgam of two conflicting cultural traditions. The legal regime has, up to now, been largely based on the ancient western concept of Mares Librum – Freedom of the Seas, or the ocean as a common property resource. The traditional Hawaiian concepts of land-use and ocean-ownership practices were related to the principles of the ahu-pua'a, fishponds, and the konohiki fisheries. This provided for

ownership of ocean resources, and was recognized as a sustainable, efficient means of managing the ocean, and reducing conflicts.

The 1999 amendments to the Ocean and Submerged Lands Leasing law (Chapter 190 D HRS) were the first major step to view the oceans as a resource that could be occupied and sustainably utilized, rather than simply exploited. This represents a sea change in the legislative and community thinking. It could be interpreted to represent a shift in current policies away from the Western Mares Librum ideas towards the more traditional Hawaiian concept. It might also reflect increasing recognition – evident in increased regulation and licensing of fishing activities in the state - that open-access fisheries, and unrestricted access to the ocean does not appear to provide sufficiently for effective management of ocean resources.

7. POTENTIAL IMPACTS AND MITIGATION

7.1 IMPACTS DURING CONSTRUCTION

Primary impacts during farm construction are confined to the areas where permanent structures are to be located – i.e. the anchoring of the mooring lines for the cages. The net pens and submersible cages will be anchored into the soft bottom substrate, and secured by steel Danforth anchors and/or concrete blocks. Anchor lines and anchor blocks will be moved to the site from either Honokohau or Kawaihae harbors, and will be deployed from large boats or barges. The anchors will result in only minimal re-suspension of soft sediments, which will have no measurable impacts on the biota of the area (unless they are within the immediate footprint of the anchor block, which is unlikely, given the scarcity of benthic fauna in the area).

The net pens and submersible cages will be constructed according to manufacturers specifications and instructions, launched in Kawaiihae Harbor, and then towed down to the site – a distance of around 25 nautical miles. Once in position, the cages will be attached to the anchor lines. Cages such as the Net Systems, Inc. "Sea Station™" spar-buoy system have been extensively tested throughout the world, in offshore conditions far worse than those normally experienced here in Hawaii. Sea Station™ cages have been successfully deployed offshore of New Hampshire (where a surface cage has weathered currents of up to 2 kts, and waves of up to 9 m (30 ft high – Richard Langer, pers. comm.), and off Mississippi (where a surface cage, during recent Caribbean hurricanes, withstood waves of 5 m (16 ft) on a 5 second wave period – intense, high energy storm surf – Christopher Bridger, pers. comm..). As well as the Cates International, Inc. cage off Oahu, another commercial farm also uses Sea Station™ cages off Puerto Rico.

There will be a very slight risk of pollution from spills of fuel, oil, or hydraulic fluids from the boats used in deploying the anchors and the cages. However, this risk will be no greater than for any other boat in Kona waters. Standard precautions and Coast Guard regulations for working on the ocean will be adhered to during the towing and deployment operations.

7.2 LONG TERM IMPACTS

7.2.1 Water quality

Results from offshore fish farm trials in Oahu

Stocking of the cages with fish will result in some increase in nutrients and particulate matter in the water column from the fishes' metabolic wastes, feces and any excess feed. The strong currents through the proposed farm area, the depth of water, and the distance to any coral reef areas downstream of the farm (under either a N- or S-setting current) all indicate that there will be negligible impact on water quality in the immediate vicinity of the cage.

The best examples of likely impacts on water quality are drawn from the studies by University of Hawaii Sea Grant and Oceanic Institute of the offshore fish farm research projects off Ewa Beach, in Oahu (HOARP Phases I and II). The subsequent commercial moi project that is in operation there now (Cates International, Inc.) is also being monitored under a Sea Grant research program (HOARP Phase III). The broad conclusions drawn from these studies are that the tremendous dilution factor of the water moving through a deep-water offshore farm greatly reduces the impacts on the water quality downstream of the operation. Thus, while increases in levels of ammonia may be measurable at the edge of the cage, the impacts on important water quality parameters are greatly reduced with distance from the cage, and increased mixing by currents (Appendix 4 a). The HOARP I and II studies found that there was an increase in ammonia levels directly downstream from the cage after the first feeding of the day, but that, in most instances, this was quickly mixed, and absorbed by naturally occurring bacteria and phytoplankton. Values reached ambient levels (comparable with upstream levels) within 30 m downstream from the cage. These HOARP studies also found that total suspended solids (TSS) showed no discernible trends or changes. Any fluctuations that were evident may well have been caused by high surf or strong currents, rather than from any impact of the fish cage.

Moreover, there has been no evidence of any perceptible impacts from further studies on water quality associated with the commercial expansion of the moi cage operation off Ewa Beach - the HOARP III project. In some instances, ammonia, nitrate and nitrite concentrations have been higher upcurrent of the moi cages than they have been downcurrent – implying that the cages are actually absorbing these nutrients (most likely through the macro-algal growth on the cage netting: Randy Cates, pers. comm.).

These results have been confirmed by the environmental monitoring program supporting the cobia (Rachycentron canadum) cages deployed off Puerto Rico. The water quality and other parameters around these Sea Station™ cages have been monitored by the University of Miami and University of Puerto Rico, and results (in press at this time) have again showed no significant impact (Prof. Dan Benetti, pers. comm.).

Fish feces concerns

Despite the data from the HOARP, there are still some misperceptions among the public, evident in recent public meetings and other forums, about the potential impacts on water quality from offshore fish farming. Concerns were often expressed about the potential for fish food or fish feces to "wash up on the beaches". Some comments have equated the fish fecal input from a fish farm to the sewage outfall from a town or small city. However, fish feces is primarily composed of liquid material, and is quickly dispersed. Feces from fish such as mahimahi, snappers and jacks (trevallies) is not composed of discrete stools, is not odiferous, and does not carry bacteria or other microbes that may be potentially pathogenic to humans. Any solids in the fish feces are negatively buoyant, and fall to the bottom, where they are quickly assimilated into the environment by the detritivores (see Section 5.2.2 (c), Marine Benthic Organisms, below).

The organic input of fish feces from farmed pelagic carnivorous fish is also relatively insignificant, compared with wild fish, particularly herbivores. Fish feed is designed by the feed

manufacturers to be readily digested. If material passes through the fish's alimentary canal without being digested it is, essentially, a waste of the farmer's money. Also, carnivorous fish have highly efficient digestive systems; by contrast, herbivores are highly inefficient. Most divers are familiar with the prodigious streams of feces that are frequently emitted by parrotfish (uhu, Family Scaridae) or surgeonfish (palani, maiko, etc, Family Acanthuridae), yet few can recall seeing feces from carnivorous fish. Similarly, most fishermen also recognize the difference in large-intestine volume between such herbivorous fish, and carnivores such as mahimahi, snappers and trevallies.

It is also highly improbable that fish feed will be obvious on the surface of the ocean, or will wash up on nearby beaches. Most fish feeds are designed to sink gradually through the water column, rather than to drift up to the surface. Any feed that falls uneaten through the cage netting will be eaten by the wild fish around the cage. Feed that falls uneaten to the ocean floor below the cage will be quickly consumed by the detritivores. Again, however, any feed that is not eaten by the fish represents a waste of the farmer's money. Prudent farm management practices decree that feed wastage be minimized. This is best accomplished by carefully monitoring the consumption rates of the fish, and only feeding to a point close to satiation.

Simple modeling of organic inputs and dilution rates are also instructive. Presuming a 1 knot current through the farm area, and a production of 360,000 kg of fish per year, the dilution of organic wastes into the ocean is equivalent to 1 lb of fish food into 108 million gallons of water, or 1 lb of food into nearly 165 olympic-sized swimming pools (Appendix IV b: EA Bio Load c).

Monitoring and NPDES Permit requirements

The project will require a National Pollutant Discharge Elimination System (NPDES) Permit. This will consist of approvals and ongoing oversight by the federal Environmental Protection Authority (EPA), with a long-term water quality monitoring program under the supervision of the State Department of Health Clean Water Branch (CWB). This program will be run solely at the farming company's expense, adhering to established protocols and standards, and will be designed to detect any impacts on water quality from the farm. Any breach of these conditions could result in loss of the permit, which would cause the farm to immediately cease operations. Farm management will therefore ensure that stocking densities and feeding strategies keep all water quality parameters within the allowable limits imposed by the permit.

Because of the long-term nature of the impacts on water quality, sampling will begin with a base-line survey in the first year of the lease, and then will consist of follow-up surveys, as the farm grows to full capacity. These surveys will measure a wide range of water quality parameters, such as salinity, temperature, oxygen saturation (% O_2), acidity (pH), phosphates (PO_4), silicates ($Si(OH)_4$), nitrates (NO_3), ammonium (NH_4), total phosphorous (TP), total nitrogen (TN), and water clarity (turbidity)). The full extent and frequency of such sampling will be determined during the NPDES permitting process, by CWB in consultation with EPA. The limitations and monitoring requirements for Zone of Mixing for non-toxic materials for the Ewa Beach project are included here as Appendix 1 (d). KBWF expects that similar standards would govern the NPDES permit and monitoring for KBWF's site if this project proceeds.

By way of comparison between existing and permitted conditions, the Zone of Mixing limitations for turbidity permitted for the Cates International, Inc., moi farm site off Ewa Beach are a geometric mean of only 0.20 NTUs (Appendix 1 (d)). NELHA water quality values for Transect 3 range from 0.10 to 0.14 NTUs (Appendix 1 (a)). Allowable levels under the CII NPDES permit for ammonia nitrogen levels are for a geometric mean of 2.50 ug/L; levels along Transect 3 are already up to 1.68 ug/L. In all likelihood, then, the farm will be permitted to only incrementally impact water quality within the Zone of Mixing, with less than a 50% increase in concentrations allowable.

In discussions with local conservation interests during the public review period of the draft EA,, requests were voiced for KBWF to establish a precedent of increasing the opportunities for local input, transparency and independence of the monitoring program. KBWF recognizes the value of such a precedent, and has agreed to provide the Kona community to have full access to our monitoring results.

Therefore, where possible and practiocal, Kona Blue Water Farms will :

- *Use objective, third party experts to collect the water quality samples for us.*
- *Use local water quality laboratories – such as NELHA Water Quality Lab, or local private laboratories - for conducting the sample analysis.*
- *Place copies of all Federally or State-mandated environmental quality reports at local repositories, such as the DAR office at Honokohau, or the NELHA library, so that local residents can review this data.*
- *Make publicly available at the local repository copies of all the mandated monitoring programs, detailing frequency of sample collections, types and numbers of samples, handling protocols, allowable limits and other guidelines.*
- *Provide reasonable access to Federal, State and County officials for monitoring and oversight purposes.*

KBWF believes that through such local involvement, open ocean aquaculture can be shown to an environmentally friendly industry, which the community in Kona can support.

<u>Further mitigative options</u>

The agreed-upon steps outlined above to improve transparency and independence in the environmental monitoring will have the added benefit of ensuring that KBWF takes a proactive approach to mitigation of any potential environmental perturbation. In particular, local oversight of water quality monitoring will mean that if nutrient levels in the farm effluent begin to approach allowable limits, then KBWF will have a very strong incentive to change farm management to reduce these effluent concentrations before they become problematic. Mitigative steps that the company might take could include reducing the feed levels on those days or at those times when currents are slower, reducing fish densities in the cages by cull harvesting or by lowered stocking densities, or even possibly changing the alignment of the cages to improve the flow of water and dilution factors through the cages.

7.2.2 Biota

a. Flora

There are no terrestrial flora or marine macroflora in the proposed lease area. Few algae are able to grow at these depths, or under these substrate and current regimes. The increased organic loading in the substrate may result in some growth of benthic algae – possibly filamentous green algae – over a limited area underneath and immediately downcurrent of the cages, but this will not be significant.

b. Terrestrial fauna

The project would not impact terrestrial fauna. This area is not considered important for birdlife, and any impacts will be insignificant.

c. Marine biota

Marine Benthic Organisms

There will likely be an increase in the amount of marine benthic fauna both on the cages themselves, on the anchor lines, and on the substrate beneath the cage. Fouling on the cages and the anchor lines would probably include macroalgae, bivalves (several species of mussels and oysters (*Pteria* and *Pinctada* spp), corals (*Pocillopora* and *Porites*), sea urchins (*Echinothrix calamaris*) nudibranchs (*Stylocheilus longicauda*) and sponges. These would all settle out of the plankton, and there would be no measurable impacts on adjacent communities. The presence of these organisms would primarily be a function of the presence of the artificial substrates, rather than any other perturbation to the environment. Grazing and browsing fishes may remove much of this fouling, but occasionally divers would need to scrape occluding fouling from these surfaces. Some of this fouling would fall to the bottom, and become part of the general benthic processes of detritivores and decomposers in the soft substrate.

The main impact on the benthic biota will be the increased detrital loading from the fish feces and uneaten food. Evidence from the cage farm site on Oahu suggests that there will be no major change in the diversity of benthic organisms. While there were periodic increases in abundance of polychaete worms (dorvilleids, of the genus *Ophryotrocha*, and capitellids) underneath the cage, there were also occasional periodic increases in abundance of benthic detrital feeders at the control sites, well removed from the cage area. "The majority of the samples showed no significant difference between the community composition at the (control and the cage) sites." (Ostrowski, et al., 2001, p. 29). The overall pattern of the infaunal community was "patchy" (ibid). There was also a similar number of families of benthic organisms at both sites, indicating that there had been no change in the species richness, due to the presence of the cage.

Any change in the benthic community that may occur will be localized, and will only be temporary. If the fish are removed from a cage, the available evidence suggests that the substrate will quickly revert to the previous state of barren, coarse sand.

Fishes

Fish may be attracted to the site for a number of reasons: the fouling on the cage, the occasional release of small quantities of uneaten food from the cage, and the aggregative nature of objects in open water (as for Fish Aggregation Devices). Based on the evidence from the Ewa Beach cage experiment, the resident fish species around the cage may vary over time. The predominant resident species on the Ewa Beach cage was the scribbled filefish (loulu: *Aluteris scripta*), which on occasion reached in excess of 300 individuals within a 50 m radius of the cage. This year (2002), however, the populations of this fish completely disappeared around the Ewa cage (Randy Cates, pers. comm.). Schools of mackerel scad (opelu: *Decapterus macarellus*) may also be occasionally attracted to the area around the cage, but these did not take up permanent residence. Carnivorous pelagic fish, such as false albacore tuna (kawakawa: *Euthynnus alletteratus*), yellowfin tuna (ahi: *Thunnus alabacares*), and occasionally ono (wahoo: *Acanthocybium solandri*) and amberjack (kahala: *Seriola dumerili*) are also attracted to the area by the baitfish, or by the cages themselves.

Spinner dolphins

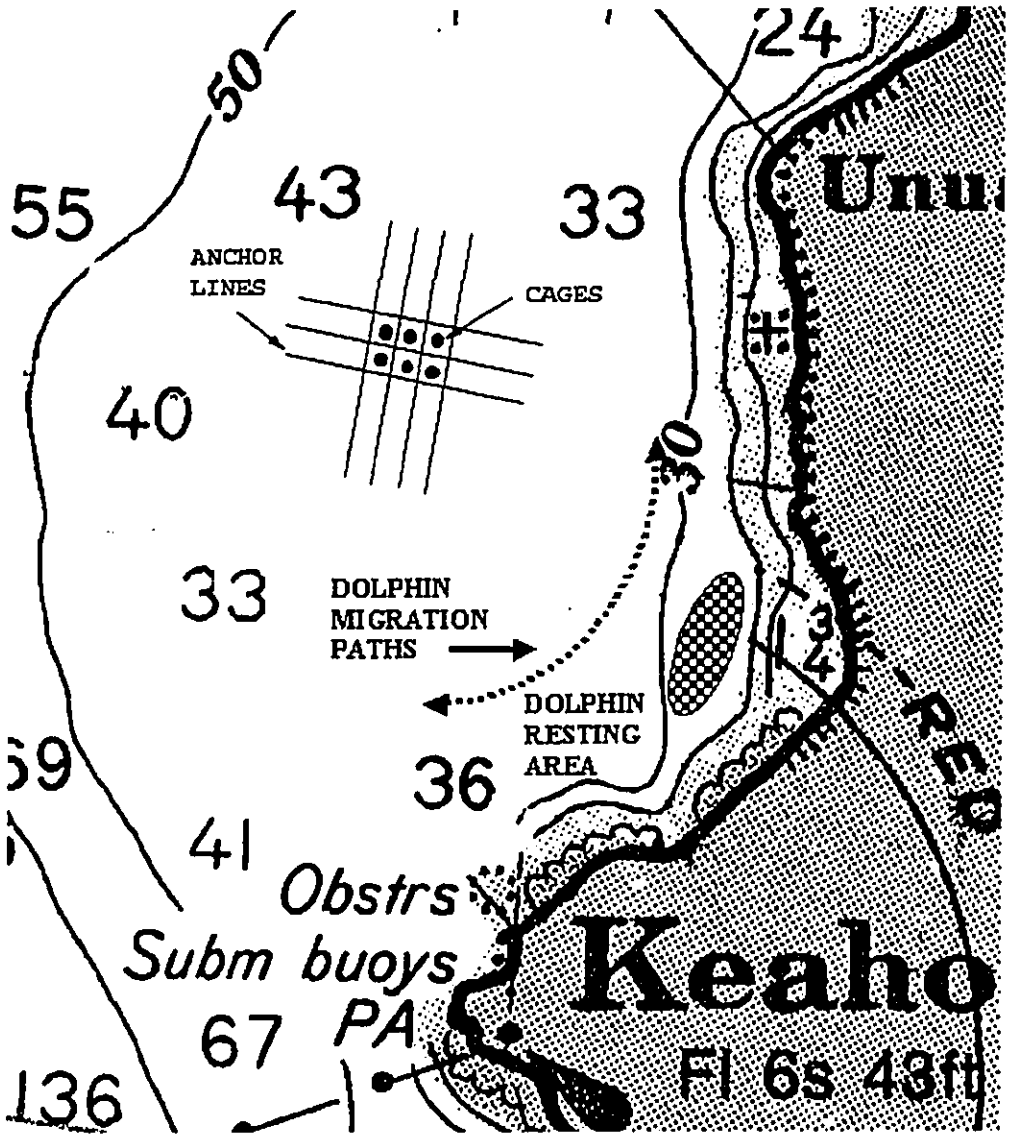
The pattern of migration by spinner dolphins (*Stenella longirostris*) through the area suggests that the project will not interfere in any significant manner with the animals' movements (Figure 5). Spinner dolphins and spotted dolphins (*Stenella attenuata*) have both been observed occasionally around the Ewa Beach cage, feeding on schools of mackerel scad. These dolphins approach the cage without any apparent inhibitions, moving "under, over and around" the cage and mooring lines (Randy Cates, pers. comm.) while chasing the bait, and departing at whim.

The usual ingress of the spinner dolphins into the Makako Bay rest area is from the North, along the reef drop-off, and well away from the proposed farm site. The main rest area in Makako Bay is in waters of less than 25 m (80 feet), and at least *1,500 feet* from the nearest anchors of the farm lease (Figure 5). Resting schools usually remain deep within the bay or cove. Jan Ostman-Lind (pers. comm.) indicated that resting schools sometimes move out into deeper water, and may at times intrude on the SE-most corner of the originally-proposed lease area, in 50 m depth. Under the original working plans for the net cage design, however, this corner of the lease would not have contained any anchors and mooring lines (Figure 3, and Plate 1); in any event, there would be no net pens or other substantive farm structures in this corner of the lease.

The risk for any potential negative interaction has been even further reduced by moving the proposed project site an additional 600 ft offshore (to the west). The cages and moorings are now located in water that is significantly deeper than that where dolphins are known to rest (i.e. the new site is in water 200 – 220 ft deep, whereas dolphins do not rest in waters deeper than 50 m, or 150 ft).

Figure 5: Movements of spinner dolphins

The migration by spinner dolphins (*Stenella longirostris*) through the area suggests that the farm will not interfere in any significant manner with the animals' movements. *As the farm has now been relocated a further 600 ft to the west (offshore), resting dolphins will now no longer have any overlap, even with the unoccupied SE corner of the lease area (Jan Ostman-Lind, pers. comm.). Resting dolphins will not come within 600 ft of mooring lines or anchors, and will be at least 1,200 ft from the net cages under the present farm mooring design.*



Norris, et al., (1994, pp 51 – 52) expressed concern that the direct encroachment of yacht moorings may "displace the dolphins from their habitual resting areas" in Kealakekua Bay. The proximity of the moored yachts on more than half of the available sandy area in Napo'opo'o, however, did not appear to disrupt the resting of the dolphins on the remainder of the shallow bay. The dolphins in Kealakekua Bay reacted to foreign objects "in much the same way as we have come to expect from fish schools" (Norris and Dohl, 1980, p 841; i.e. a school approaching an obstruction moves around it, on either side, and reforms once they are past the obstruction). Also, spinners are able to adapt to new objects "such as a buoy, boat or line ... in a matter of days" (ibid). The presence of the fish farm structures at such a removed distance will therefore represent an insignificant physical impact on the dolphins' diurnal movements and rest patterns.

The main activities at the farm will be feeding and grading of fish (within the net pens), and movement of tender boats. Norris and Dohl, 1980 (p. 842) noted that "once quiescent, resting schools are difficult to disrupt". The most significant impact from human activity on the dolphins in Makako Bay is most likely the snorkeling and diving tour operations in the area. Ostman (1994, p. 62) notes that "dolphins generally are more accepting of boats than (of) swimmers", and so the static structures of the project, far removed from the inner cove rest area, will presumably represent less intrusion, and be more readily accepted by the dolphins than the active, immediate activity of the snorkel and dive tours.

It is also highly unlikely that the relatively small physical structures of the farm will inhibit the movement of the animals to their offshore feeding sites. The zig-zag pattern of departure of spinner dolphins from their rest area (Norris and Dohl, 1980; Norris, et al, 1994), implies that there is no established path of egress, and that they will readily move around objects such as the moorings and fish cages. The dolphins near Keahole Point may move "back and forth for a few kilometers, moving close along the open coast before they angle(d) offshore toward the open sea" (ibid, p 89). While spinner dolphins do show long-term site fidelity (from at least 1978 to 1999, in several cases; Marten and Psarakos, 1999), there is a general irregularity of dolphin movements, both from day-to-day, and over long periods (Norris and Dohl, 1980; Norris, et al, 1994; Ostman, 1994, p 40).

Some concern has been expressed that the dolphins' movements may be restricted, and the dolphins may become "trapped" by the net pens, in much the same manner that spinners are caught within purse seine nets in the Eastern Pacific tuna fishery. However, the net pens are discrete units, mostly contained within the 9 acre area of concentrated activity. At most, the dolphins would have to swim 300 feet in either direction to move around the cages.

Spinner dolphins can also be herded and encircled by float-lines (similar to hukilau fishing methods: Norris and Dohl, 1980; Jan Ostman-Lind, pers. comm.). Traps for spinner dolphins can be constructed using a floating polypropylene line (1/2" – 12 mm - diameter) with 60 ft (19 m) long 'dropper' lines of ¼" rope (6 mm) spaced every 6 feet (1.9 m) apart. These hukilau traps represent a significant visual barrier (and presumably, a significant echolocation barrier), far more than the single lines used for mooring of net pens. Care will be taken in project operations to restrict the extent to which floating lines are kept on the surface, primarily for navigational safety concerns. The mooring lines will also not restrict the animals' movements, as they will be

submerged (rather than floating on the surface), and will not carry streamers or other attachments which may make them more prone to restrict the passage of the dolphins through the area. As has been demonstrated at the Ewa Beach site, the cages and moorings do not present any apparent barrier to the dolphins.

There is also negligible risk of entanglement by spinner dolphins or other marine mammals in the taut moorings or stretched mesh of the cages. A comprehensive search of available records (NMFS Stock Assessments) and a review of interactions between marine mammals and Hawaii's fisheries (Nitta and Henderson, 1993) all confirm that the major entanglement problems for small marine mammals are all entanglement in slack-line fishing gear or extensive, loose, large-mesh nets. Floating gill nets, drift nets, long-lines and slack lines, such as crab pot float lines represent the major entanglement concerns for marine mammals. Other dolphin species are also occasionally injured or hooked while taking bait or fish off fishing lines. Spinner dolphins are known to have become entangled in nets or net fragments (ibid), but the animals are only vulnerable when there is no tension on the mesh. There are recent records of both bottlenose dolphins and common dolphins becoming entangled in the predator nets around tuna cages in South Australia (an average of 3 entanglements per year: Kemper and Gibbs, 2001; Wursig and Gailey, 2002). However, these entanglements were exclusively in the large-mesh predator nets (mostly > 15 cm, or 6 inch mesh) that were set in shallow water, so that the nets hung loosely at low tide. Further, the dolphins were apparently attracted to the cages by the whole pilchards that were fed to the tuna. The fish feed pellets KBWF plans to use in Kona would not have the same attraction to dolphins. However, there is no record from any U.S. aquaculture operation of entanglement of dolphins or other marine mammals in the taut moorings or taut net panels of fish cages.

Sharks

In KBWF's meetings with the public, special interest groups, and various other forums, there have often been concerns expressed about the potential for the proposed farm to act as a Fish Aggregating Device (FAD). Although this offers great potential benefits to fishermen (see, for example, Jim Rizzuto's article in West Hawaii Today on Monday, September 16th, 2002, regarding the FAD benefits of the proposed tuna farm north of Kawaihae Harbor), it is also recognized that the FAD action of a fish farm may attract sharks to the area. While this is of concern to some people, particularly those associated with the tourist trade, some others thought that the presence of sharks in the area would make it more attractive as a dive site.

An increase in resident sandbar sharks (mano: *Carcharhinus plumbeus*) also occurred in the second stage of the Ewa Beach cage trials, though not in the initial series of trials (Ostrowski , et al., 2001). Overall, the evidence from the HOARP experimental cages, and personal observations by Randy Cates (owner and operator of the moi farm offshore of Ewa Beach) suggest that there will be no negative impacts from any aggregating effects of the cage on sharks. Sharks may be aggregated to the cages, but the number of sharks in the overall area will not increase. Indeed, if sharks are drawn to the cage, they will presumably be drawn away from other adjacent areas, thereby reducing the apparent density of sharks. There would therefore be a decreased risk to the public from sharks. Further, if sharks are indeed drawn to the cages because of a greater availability of food (either as excess fish food or because of the greater biomass of other fish

outside the cage) then presumably they would be well-fed, and would not be preying on dolphins or other marine mammals.

There may be some concerns that if sharks are drawn to the cages, it could lead to increased predation on dolphins or other marine mammals in the area. However, the cage will not in any way impact the natural balance between the sharks and their natural prey. The vulnerability of dolphins or other mammals to predation by sharks would remain the same, whether or not the cage is present.

d. Rare, threatened or endangered species

There are two conceivable ways for open ocean fish farming to negatively impact rare, threatened or endangered species: the project may present a significant obstruction to animal movements, or the animals may become entangled in the cages or moorings. However, the relatively small size and specific attributes of the taut moorings and taut mesh cage designs proposed for this project suggest that the risk of such negative impacts is negligible.

Monk seals and sea turtles occur in the area infrequently, and move erratically, with no defined migration through the proposed farm site. The presence of the cages themselves will therefore not represent any restriction of movement on these species. There is negligible risk of entanglement by sea turtles or monk seals, due to the infrequency of their presence in the site area, the heavy, taut mooring lines, and the taut mesh used in the sea cages.

Humpback whales

The area is frequented by humpback whales during the winter, and lies within the boundaries of the Hawaiian Islands Humpback Whale National Marine Sanctuary. The whales move throughout the general area, usually following a longshore track (N-S; *Dale Sarver and Neil Sims, pers. obs.*). There is no evidence to suggest that the mooring lines will inhibit whale movements. There is ample room on the inshore side of the cages for whales to move around them. *The chances for any funneling or bottleneck effect on whale movements past the cages has been further reduced by the proposed relocation of the cages an additional 600 ft offshore (David Mattila and Jeffrey Walters, pers. comm.).* There is unlimited room for the animals to move past the cages on the offshore side.

Some concerns were expressed by HIHWNMS and DLNR/DAR officials about the reduction of whale habitat by the project. The mooring lines do not appear to represent an exclusion from the habitat, any more than an anchor line from a boat. The only real loss of habitat for the whales is therefore the waters within the submerged cage from which they are excluded.

The percentage of habitat loss from the entire Sanctuary is difficult to determine, as the total available habitat in the Sanctuary cannot readily be calculated. However, the percentage of habitat lost from, say, one kilometer of Sanctuary waters can be estimated. Six submersible cages will each occupy a volume of 2,600 m^3, for a total of 15,600 m^3. One kilometer of Sanctuary waters (measured along the coastline), of an average depth of, say, 50 fathoms (around 100 m), and of a width (from coastline to 100 fathoms) in this area of around 5 km

equates to a total volume of 500 million m^3. The loss of habitat from the presence of the cages is therefore 0.0031% of the available habitat in this 1 km of the Sanctuary Coastline. The loss of habitat is equivalent in volume to the loss of habitat from the displacement of a 15,000 tonne vessel.

The risk of entanglement by whales in the mooring lines or net pen mesh warranted further examination. A comprehensive search of available records (NMFS Stock Assessments), a review of interactions between marine mammals and Hawaii's fisheries (Nitta and Henderson, 1993), and details of marine mammal strandings compiled by NMFS Pacific Area Office (NMFS-PAO), all confirm that entanglement problems for whales are all due to slack-line fishing gear or extensive, loose-mesh fishing nets. Of all the marine mammal stranding reports compiled by NMFS/PAO since 1982, only one refers to a "mooring line": a report of a stranding of a dead humpback whale stranded in Kihei which was "tangled in mooring line and other types of rope/line". This description suggests that the materials were not a single mooring line, but were perhaps some fishing rig or net lines.

The NMFS Stock Assessment for the Central North Pacific Stock of humpback whales shows a total of two whale mortalities associated with fishery interactions from 1990 to 1998. One was observed by fishery observers as entangled in a longline in 1991. Another dead whale was entangled in a longline off Maui in 1993. Humpback mortalities were also entangled in a Bering Sea/Aleutian Island groundfish trawl in 1998, in the South-East Alaska salmon purse seine fishery in 1989 and 1994, and in the South-East Alaska drift gill-net fishery in 1996. All other entanglements or interactions (presented in Table 26 b, of NMFS Stock Assessment Report for Year 2000) were associated with fishing gear, except for one in 1996 in Hawaiian waters entangled in "non-fishing gear", where the injuries were considered "not serious", and the animal was released alive.

As with spinner dolphins, the major entanglement concerns for humpbacks and other whales are from floating gill nets, drift nets, long-lines and slack lines, such as crab pot float lines. A comprehensive review of the potential for entanglements by humpbacks or other whales was conducted by U.S. Army Corps of Engineers for the University of New Hampshire Open Ocean Aquaculture Demonstration project (Celikkol, 1999). Almost all entanglements in Newfoundland and the Gulf of Maine were due to fishing gear, such as cod traps, gill nets, weirs and seines. Entanglement mortality was around 0.2 and 0.3 percent of the populations, respectively, for the Gulf of Maine and Newfoundland populations. Entanglement scars were observed on 12.4% of flukes and 6.3% of tails in photographs of humpbacks in the Gulf of Maine area.

Amongst all these observations, there is no record from any U.S. aquaculture operation, of entanglement of humpback whales, or other marine mammals, in the taut moorings or net panels of fish cages. The risks of entanglement in the proposed fish farm project would be even further reduced by the heavy, *highly-tensioned* mooring lines, which would be around 1½" in diameter.

David Mattila and Jeffrey Walters (HIHWNMS representatives, pers. comm.) indicated that the work of Lien in Newfoundland was important to consider when assessing the likely risks of humpback whale entanglement (refer to Clapham, et al., 2002, Report of the intersessional working group on large whale entanglements, presented to the IWC Scientific Committee, which

reported much of Lien's findings). However, these studies still found passive fishing gear - traps and gillnets - to be the major source of entanglement. Although the report states that "fixed or anchored gear of almost any type represents the major entanglement threat", this is for fishing gear that is designed to corral, enmesh or otherwise capture swimming fish. Passive fishing gear is, by its nature, difficult to see. It floats or hangs freely in the water, and is located, shaped or aligned to entrap or funnel animals into netted areas.

By contrast, submersible Sea Station™ cages are designed to keep fish enclosed within the cage. There are no flat walls, funnels or bottlenecks in the cage designs. The cage surface is primarily taut mesh, more akin to a vessel hull than to a transparent, yielding gill-net. The cages are streamlined, to reduce drag through the water, and they are strutted to maintain very high tension on the net material. The cages present a hard, rounded surface to an approaching animal, which would naturally tend to deflect the animal in one direction or the other, rather than halt their progress, as might a flat wall or funnel net. To visually-orienting marine mammals such as humpbacks, this mesh would probably appear to present almost a solid surface. The more appropriate comparison would therefore be the interaction between anchored ships and humpback whales, rather than fishing gear and whales.

Celikkol (1999; excerpt included in Appendix VII) analyses the entanglement risk of various components of Sea Stations™ in an almost identical mooring array, and concludes: "Because there are no components of the mooring structure that are known to cause whale entanglements (i.e. lightly tensioned lobster pot lines, gill nets, cod traps, etc) the chance of whale entanglement should be considered unlikely to very unlikely", and then "The cages (themselves) do not impose any known whale entanglement risk."

Mitigation measures

Acoustic deterrence devices are sometimes used to prevent entanglement of harbor porpoises (*Phoecona phoecona*) in fixed fishing gear such as gill nets (Silber, Waples and Nelson, 1994). These techniques have recently been refined, and have met with some success (Greg Silber, pers. comm.). However, such measures are probably unnecessary in this situation, and may be inappropriate for use within the humpback whale Sanctuary.

As the humpbacks rely on visual cues rather than echolocation, streamers or other such devices might possibly be added to the mooring lines, to increase their visibility. However, these streamers themselves may then, as loose structures, become more of an entanglement risk than the mooring line itself. The only appropriate mitigation measure may be to make the lines as clearly visible as possible, by using distinctive coloration (black?). *Celikkol (1999) recommended that the bridle line buoys be painted in light colors, to improve visibility. This could also be adopted for our mooring buoys.*

Mattila and Walters (pers. comm.) also suggested that the number of mooring lines in the cage design should be kept to a minimum. KBWF have therefore taken this request to the project engineers at Net Systems, Inc. (manufacturers of the Sea Station™), with the intention of working on continual improvements in the mooring design.

The other potential mitigation measure, that is being employed in the NMFS Atlantic Large Whale Take Reduction Plan (50 CFR 229, Federal Register Vol. 66, No 190, 49896 – 49901) is for installation of weak links in fishing gear used in lobster and gillnet fisheries. However, these lines are usually in the order of around ½" in diameter, with minimum breaking strains of as little as 600 lbs. It would not be possible for lines this small to be used on the offshore net pens and submerged cages, as currents and wave surge would result in continual breakage, resulting in constant maintenance, risk of loss of the net pens, and thereby 'ghost' gear, which "presents an additional entanglement risk to whales, other marine mammals, and fish" (ibid, p 49898)

Monitoring and Reporting

KBWF will undertake, at our own cost, a monitoring plan for documenting all interactions between the project and marine mammals. The assistance of HIHWNMS staff or NMFS experts will be obtained, to designing a program that ensures the maximum practical amount of usable information is collected. Mattila and Walters (pers. comm.) indicated that detailed measures of abundance or spatial distribution were not needed, but that basic records of interactions would suffice (e.g., close approach of a whale, such as within 50 m, or whales rubbing against mooring lines or running into the cages).

All KBWF staff will also adhere to Federal recommendations or instructions in the unlikely event of any entanglement. The initial response will be to immediately call the NOAA Marine Mammal Stranding Hotline (1 888 256 9840). KBWF has also indicated to HIHWNMS officials that the company would be enthused to have staff trained in appropriate first-response measures. The officials considered this worth pursuing further, but indicated that there were some concerns about liability, or establishment of appropriate certification standards for such training. KBWF recognizes the complexity of these issues, with Sanctuary protocols and ESA considerations, but still affirms our willingness to assist Sanctuary or NMFS staff in any such manner that is deemed appropriate.

7.2.3 Recreation

The survey results indicate negligible use of the proposed offshore farm lease area. The greatest impacts of the proposed fish farm on existing recreational use of the area will be the visual impact upon divers and boaters of any buoys or surface cages, as they pass to or from the preferred dive sites at the Unualoha shoreline and Makako Bay. *This has been even further reduced by the change in the farm plan from a mixed array of surface and submersible cages to the six main cages being all submersible Sea Stations™, and there being only two, smaller (50 ft diameter) surface cages for nursery work or harvesting. KBWF is also no longer requesting exclusivity around the cages, but is only seeking restrictions within the overall lease area on anchoring, SCUBA-diving, swimmimg, and boat-speed. These requests are simply for safety reasons.*

The passage of boats through the *lease* area will not be impeded. No anchoring will be permitted within this area, as the anchors could become entangled in the cage mooring lines. Fishing by the public from unanchored boats (trolling, or line-fishing from drifting boats) will still be permitted,

but with the caveat that any fishing lines that become entangled in the cage mooring lines must be left in place, and cannot be retrieved by divers. Recreational SCUBA diving or commercial SCUBA dive tours will not be permitted anywhere within the lease area, because of liability concerns.

The loss of access *to these activities within this* relatively small area of ocean space is not considered significant, as KBWF's survey work indicates that there is virtually no fishing or other recreational use of the area. Any surface cages or other surface obstructions within the *lease* will be clearly marked with navigation lights, as per U.S. Coast Guard requirements.

7.2.4 Noise and air quality

The fish farm will not contribute measurably to ambient noise levels. Boat engines and other equipment used by the farm will generate some minor noise during farm operation, but this will be insignificant compared with the noise from the nearby Kona International Airport. Likewise, the exhaust from the small boat engines and pressure washers will have an insignificant effect on air quality.

7.2.5 Aesthetics

The impact of the project on the community's aesthetic enjoyment of the area will be, to a large extent, based on value judgments and perceptions of how the oceans should be used. In community meetings, there has generally been very strong support for the broad goals of the project. There is wide recognition of the severely depleted status of bottomfish species in Hawaii. There is strong support for the project's goal of developing the hatchery rearing techniques for bottomfish species and ornamental reef fishes, both to realize the economic benefits of farming of these species, and for the potential environmental benefits from possible restocking programs to improve wild populations.

The visual impact of the project will be minor, compared with the adjoining properties of Kona International Airport, and the aquaculture operations at NELHA. *These impacts will also be further reduced by the change to all submersible grow-out cages, and the request now for only two small surface cages for nursery and harvest work.* These will not represent any significant impact on the view plane, as indications are that these pens will not be readily discernible from more than 2 miles away (i.e., up to the beginning of the Palisades subdivision).

There was a general consensus from meetings with the community of support for the proposed fish farm project. There was wide recognition that the project fits in well with the overall atmosphere of innovative aquaculture at NELHA, and the need for Kona to develop alternative industries beyond tourism. Fisherfolk and other mariners recognize the validity of the criteria that KBWF has used to select this site (c.f. deeper or shallower sites), and have not expressed a strong preference for the project to be located elsewhere.

Given this support, the project will, it is hoped, be viewed as a positive development for the area, and will be considered an aesthetic asset – something which adds to the Big Island's overall ambiance as a center for innovative, environmentally-friendly industries.

7.2.6 Cultural practices and traditional resources

Access to, or practice of any customary activities will not be significantly constrained by the project, because of the paucity of benthic and fish resources within this depth range, on the bare sand bottom, *and because of the change in the proposal such that we are no longer requesting exclusive use of the entire water column. The exclusive control over the waters (and the fish) inside the net cages is consistent with traditional and cultural practices that identified fish traps or lobster traps – and the animals therein – as the private property of the trap owner. The same principles apply here.*

KBWF held extensive discussions with fishermen and kupuna from the Kekaha district. Abridged transcripts of meetings with kupuna and with Royal Order of Kamehameha officials are appended (AppendixVIII (d) and (e)). Throughout all of these discussions, the only concern expressed about conflict with customary or traditional uses of the area was that it might negatively impact the 'opelu ko'a in the area. However, in private follow-up meetings with the most knowledgeable kupuna, the locations of the traditional 'opelu ko'a were determined to be outside of the proposed project location (Kepa Maly, in litt, 8/26/02; see Appendix 8 (f)).

Anecdotes from the experiences with the project off Ewa Beach are probably the best means of assessing any potential impacts to the traditional 'opelu ko'a in the area. Fishermen in Oahu originally expressed opposition to the establishment of the fish farm; now, however, they are reportedly very supportive of its presence (Randy Cates, pers. comm.). The 'opelu fishermen, in particular, have reacted positively to the farm's presence, because of the benefits that it has brought in terms of increased catches, and greater regularity of catches.

Evidence from the Ewa Beach fish cage is that the 'opelu may be attracted to the cage for some periods, but that the schools still do move up and down the coast (Randy Cates, pers. comm.). The cage therefore does not draw all of the 'opelu in the region, but simply increases the probability of fish being found in the cage area, and increases their catchability. The cage may also increase the overall of abundance of 'opelu, rather than simply aggregating those fish already found in the area. For these reasons, then, the cage probably will not exclude 'opelu from other nearby areas, such as the traditional ko'as. These 'opelu ko'as in the Kekaha area will probably not be severely impacted. If the farm is ever removed, then the 'opelu abundance and distribution patterns would presumably return to the original status.

The development of offshore fish farming *might later* involve some loss of access, but it also offers opportunity for development, protection and enhancement of culturally significant practices or traditional resources. This is best exemplified by the proposal for the offshore fish farm north of Kawaihae harbor, which was conceived by a group of Hawaiian fishermen as a means of better utilizing the tuna resource. The company, Ahi Nui Tuna Farming Company, is primarily owned by these native Hawaiian fishermen.

7.2.7 Land use and environmental compatibility

a. Current usage

The dedication of the Unualoha ocean space to commercial aquaculture is not incompatible with the other industrial uses of the area: Kona International Airport and NELHA area aquaculture and energy production.

b. Submerged lands issues and the public trust

The amended ocean leasing law directly addresses the issue of distribution of lease payments, as it relates to the State's obligations to the Office of Hawaiian Affairs (OHA). KBWF will adhere to the law regarding all ceded lands payments.

With the change in cage type to all submersible grow-out cages, the project as now proposed imposes little on the public trust. The public trust is also supported through this project, and the public interest is upheld and enhanced, by two unique aspects of the proposed project: marine fish hatchery development and aquaculture training. This project offers strong potential for environmental and educational benefits. By establishing the economic incentive of commercial culture of these fish species, the project increases the profile and the potential funding for research and development into hatchery methods for these high-value food fish and ornamental fish species. The methods developed and facilities constructed to support this project could be readily adapted to produce fingerlings for release under programs for reef restocking of overfished species. Funding for such restocking programs might be obtained through either private foundations, Federal or State programs.

BPI has an extensive record of fostering training and extension of innovative aquaculture developments. The company has been instrumental in developing the fledgling pearl culture industry in Hawaii and the U.S. affiliated Pacific Islands. Over the years, BPI has trained university graduate and undergraduate students, pearl farm managers and workers, and hatchery personnel for various projects. BPI has developed the concept of the "nucleus estate pearl farm model" (with USDA assistance), as a means for training Marshallese and native Hawaiians in pearl farm operations and management, and for setting up satellite pearl farms in other areas of the islands. The Office of Hawaiian Affairs has expressed interest in participation in these training and extension plans. BPI is working towards formation of a Hawaiian Pearl Partnership – an association including a pearl farm, jewelers and retail outlets, traditional pearl shell carving artisans and training programs, and marine ecologists and public education authorities - to help track the recovery of the imperiled native Hawaiian pearl oyster. BPI's subsidiary in the Marshall Islands, Black Pearls of Micronesia, Inc., is also leading industry development, with a joint-operating agreement for the BPOM hatchery to assist wider industry growth. BPI has also established, with NMFS funding, a program for re-training of unemployed Marshall Islands fishermen in the lucrative pearl seeding profession.

In the discussions with the community interests and kupuna groups in Kona, it was repeatedly requested that some of the lease payments or other consideration be returned directly to Kona, to compensate for the loss of public access due to the farm's presence. A special "Core Group

Meeting" was held (April 23, 2002; transcript available at www.blackpearlsinc.com) specifically to discuss ways of addressing these concerns. One of the suggestions that arose from this "Core Group Meeting" was that some share of the lease payments from the farm rent be made available through the Special Land Development Fund (designated as "for aquaculture purposes", and administered by the Land Division, DLNR) for cultural, conservation or education groups in Kona, either for reef restocking programs or for other educational or shoreline conservation programs. One suggestion was for a broad alliance for reef restocking to include the marine fish hatchery (or hatcheries), with fish nursery operations at existing community-focused cultural or educational facilities. Such alliances have proven very successful for reef restocking efforts elsewhere, such as with white sea bass, in California (Mark Drawbridge, pers. comm.). In that meeting, KBWF representatives stated expressly that they were not able to ask for such a condition as part of KBWF's lease application or CDUA. Instead, the request for such consideration should come from the public, during the process of reviewing the KBWF proposal.

7.2.8 Cumulative impacts

There will be no cumulative impact resulting from the project. Approval of this one fish farm application will not obligate DNLR to issue subsequent leases to either this or subsequent applicants. If this lease is issued, it will be either the second or third such lease in the State. There will clearly be no cumulative environmental impacts for farms that are located over 30 miles distant from each other.

7.2.9 Irreversible and irretrievable commitment of resources

The proposed project requires the commitment of a long-term lease of submerged lands, the water column and the surface, for the establishment of the offshore fish farm. This is neither irreversible nor irretrievable. Chapter 190 D HRS, as amended, specifically addresses the requirement for any lessee vacating an ocean lease to remove all equipment and to restore the site to its original condition. The one commercial lease that has been issued to date for offshore farming in Hawaii (for Cates International, Inc., CII, off Ewa Beach) requires comprehensive insurance for recovery and removal of any lost or damaged farm materials, and for any other damage that might be inflicted by the farm. Further, CII has had to post a surety bond to cover costs for removal of any farm materials and rehabilitation of the site in the event of the company ceasing operations. KBWF would expect such conditions to also be imposed upon any lease that would be granted for any other fish farming lease in Hawaiian State waters.

All impacts on the benthos or water quality will be temporary, and reversible. In areas of soft sediments and strong currents, such as are found in the proposed lease area, the habitat could be expected to recover very rapidly from any perturbation that might occur.

7.2.10 Summary of operating constraints

Operating constraints discussed in the above sections are summarized in Table 4, below.

TABLE 4 : SUMMARY OF OPERATING CONSTRAINTS

TOPIC	ISSUE OR IMPACT	OPERATING CONSTRAINT OR MITIGATING CIRCUMSTANCE
Water quality	Excretion by fish may result in elevated levels of nitrogen as ammonia, nitrites or nitrates in the immediate area downcurrent from the cages.	Evidence from Oahu farm suggests increased levels are barely measurable more than 100 m downstream. Regular water quality monitoring program already established at the NELHA site includes ammonia, nitrites and nitrates. Ongoing monitoring at site to be conducted according to EPA, State Dept of Health and DLNR requirements, *and reports to be made publicly available to Kona community.*
	Additional solids from uneaten food, fish feces or fouling on the cage or moorings may increase levels of organic suspended solids in immediate area downcurrent from the cages.	Prudent farm management strategies ensure that levels of uneaten food are kept to a minimum. Water quality monitoring will include turbidity. Increased numbers of benthic and infaunal organisms such as worms, urchins, crabs, and sea cucumbers will mitigate any increase in organic particulates.
Terrestrial Flora / Fauna	N/A.	None. No significant bird use of the area.
Marine Biota	Negligible short-term impacts on benthic community.	Depauperate benthic community on deep sand substrate.
	Increased settlement of bivalves, sponges, and other invertebrates on the fish cages and mooring lines.	This recruitment will not result in any measurable decrease in recruitment to the reef areas around Keahole or Unualoha. On cleaning of cages and moorings, fouling will fall to the bottom and form part of the detrital load.
	Attraction of demersal fishes to the cage by fish feed, fouling, or other aggregation tendancies.	This attraction will not result in any measurable decrease in standing stocks on the reef areas around Keahole or Unualoha.
Rare, threatened or endangered species	Potential to inhibit movements of threatened green sea turtles or endangered hawksbill turtles.	None. Taut line moorings will eliminate risk of entanglement. Cages and moorings will not present an obstruction to movements.
	Potential to disrupt endangered humpback whales in the Hawaiian Islands Humpback Whale National Marine Sanctuary.	None. Taut line moorings will eliminate risk of entanglement. Cages and moorings will not present a significant obstruction to whale movements. Laws protecting threatened species will be followed.
	Potential to disturb endangered Hawaiian Monk Seals.	None. Monk seals are rare around the main Hawaiian Islands. Taut line moorings will eliminate risk of entanglement. Laws protecting threatened species will be followed.

Recreation	Lease will *no longer* exclude public from inner 9 acre "central safety buffer area".	*Public will be allowed access to entire lease area. Only the inside of the cages will be considered exclusive use.* Area presently offers virtually no tangible assets or resources; currently unused by the public except for occasional transit. Access to surrounding waters will be permitted.
	Lease will preclude fishermen or other boaters from anchoring within *90 acre lease area.*	Area presently offers virtually no tangible assets or resources; currently unused by the public except for occasional transit. Usual deep water fishing methods do not require anchors.
	Lease will preclude SCUBA diving within *90 acre lease area.*	Area is currently unused by the public, except for occasional transit.
Noise and Air Quality	Noise and air emissions during construction or operation of the farm will be minimal.	None.
Aesthetics	*Two small surface cages will be used for nursery rearing and harvesting from the submersible cages.*	Visual impact of project will be insignificant, compared with the nearby Natural Energy Laboratory and Kona International Airport.
Cultural Practices and Traditional Resources	*Restricted use of waters inside of the cages.*	None. Negligible traditional resources or cultural practices in area.
	Limited activity (no anchoring, *SCUBA-diving, or swimming) within 90 acre lease area.*	None. Negligible traditional resources or cultural practices in area.
	Potential impact on traditional 'opelu ko'a.	Unknown potential to draw fish away from ko'as. Oahu farm experience indicates 'opelu are often found around farm, but still maintain patterns of movement throughout the area.
Land Use Compatibility and Environmental Justice	Impacts from restricted use of lease area may include changes in public perceptions of the use of ocean space.	The project will require *only minimal* restricted use of the lease area. The legislature allowed for exclusive aquaculture lease for State submerged lands in the 1999 amendments of 190 D HRS, which were extended in 2002.
	Community or cultural groups or individuals may object to ceded lands being used for private projects.	The amended 190 D HRS directly addresses the issue of revenue sharing with the Office of Hawaiian Affairs. There is also considerable public good to be gained from this project in improved environment and employment opportunities for Hawaiians in rural areas of the State.

	Community or cultural groups or individuals have expressed strong interest in seeing some of the benefits from the farm lease rental being directed towards appropriate activities in Kona.	Lease rentals to be paid to Special Land and Development Fund for planning research and development of the aquaculture industry. There is some potential for directing some proportion of funds to reef restocking or other marine educational or training activities in Kona.
	There is a constitutional requirement for legislative oversight of any disposition of the public lands trust.	The amended 190 D HRS addresses this issue by requiring an annual report to the legislature by the implementing agency (Aquaculture Development Program, in DOA).
Cumulative	None.	N/A

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APPENDIX I (a) : SUMMATION OF NELHA WATER QUALITY DATA FOR THE AREA AROUND KEAHOLE POINT, Comprehensive Environmental Monitoring Program, Quarterly Data Summary, 4/1/2000 - 6/30/2000.
Prepared by : Natural Energy Laboratory of Hawaii Authority

The Natural Energy Laboratory of Hawaii Authority

COMPREHENSIVE ENVIRONMENTAL MONITORING PROGRAM

Quarterly Data Summary

Fourth Quarter

FY 1999-2000

1 April 2000 - 30 June 2000

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
SEAWATER SUPPLY

SURFACE
SEAWATER

SITE ID	DATE D-M-Y	JULIAN DATE	PO4 (µM)	NO3 (µM)	NH4 (µM)	SI (µM)	TDP (µM)	TDN (µM)	TOC (mgC/L)	TSS (mg/L)	ALK (mEq/L)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)
SSW	10-Apr-00	2000.28	0.16	0.17	0.06	7.64	0.31	5.21	1.03	2.55	2.253	34.932	23.8	8.263	-76.6	23.7	6.66
SSW	15-May-00	2000.37	0.08	0.08	0.10	1.67	0.32	5.02	1.01	2.35	2.228	34.721	25.0	8.267	-78.3	24.1	6.71
SSW	6-Jun-00	2000.43	0.13	0.03	0.01	2.00	0.22	5.15	1.01	2.15	2.236	34.725	25.5	8.251	-78.6	24.2	6.67

DEEP 40'
SEAWATER

SITE ID	DATE D-M-Y	JULIAN DATE	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TDN (µM)	TOC (mgC/L)	TSS (mg/L)	ALK (mEq/L)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)
DSW40'	10-Apr-00	2000.28	3.06	41.1	0.06	86.4	3.07	43.8	0.71	0.80	2.342	34.393	10.3	7.571	-36.6	23.7	1.21
DSW40'	15-May-00	2000.37	3.02	40.8	0.04	83.5	3.17	43.8	0.64	1.00	2.277	34.367	7.6	7.585	-38.8	23.9	1.12
DSW40'	6-Jun-00	2000.43	3.05	41.8	0.04	83.1	3.13	43.8	0.68	1.05	2.316	34.334	7.5	7.543	-37.4	23.7	1.00

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
QUARTERLY SAMPLES

COASTAL
SEAWATER

SITE ID	DATE D-M-Y	JULIAN DATE	TIME (2400)	TIDE (ft)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TP (µM)	TDN (µM)	TOC mgC/L	TURBIDITY (NTU)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)	Chl a (µg/L)	Fecal Coliform Bact/100 ml	Enterococci Bact/100 ml
C1	18-Apr-00	2000.23	943	-0.2 Low	1.85	51.0	0.74	452	1.91	1.93	56.3	0.64	0.19	17.787	23.4	7.990	-61.6	24.9	7.19	0.30	<1	<1
C5	18-Apr-00	2000.23	1000	-0.2 Low	0.19	1.10	0.17	7.90	0.38	0.37	6.24	1.03	0.11	34.529	24.2	8.252	-76.9	25.2	7.12	0.14	<1	<1
C8	20-Apr-00	2000.07	914	0.0 Ebb	0.24	1.48	0.08	10.3					0.08	34.550	23.9	8.232	-75.9	24.4				
C11	18-Apr-00	2000.23	1020	-0.1 Flood	0.18	0.71	0.26	4.71	0.36	0.36	7.02	1.06	0.18	34.629	24.2	8.258	-77.1	24.9	7.19	0.15	<1	<1
C12	18-Apr-00	2000.23	1037	-0.1 Flood	0.26	1.75	0.22	8.50	0.45	0.38	7.60	1.07	0.11	34.431	24.3	8.283	-78.6	24.8	7.27	0.16	<1	<1
C16	18-Apr-00	2000.23	1107	0.1 Flood	0.20	0.87	0.20	8.14	0.38	0.39	7.15	1.06	0.14	34.459	24.3	8.286	-79.0	25.6	7.35	0.15	<1	<1
C17	20-Apr-00	2000.24	945	-0.1 Low	0.31	2.58	0.12	40.0					0.12	33.562	23.9	8.270	-78.1	24.4				
C22	20-Apr-00	2000.24	1000	-0.1 Low	0.30	3.44	0.08	40.0					0.23	33.506	23.7	8.247	-76.8	24.3				
C24	18-Apr-00	2000.23	1127	0.2 Flood	2.86	98.6	0.43	559	2.30	2.33	105	0.65	0.23	12.443	23.4	8.165	-71.8	25.0	8.22	0.20	2	2
C27	18-Apr-00	2000.23	1141	0.3 Flood	0.19	1.11	0.32	16.0	0.39	0.39	7.33	1.00	0.13	34.248	21.4	8.271	-78.0	25.3	7.21	0.13	<1	<1
C30	20-Apr-00	2000.24	1110	0.0 Flood	0.31	3.25	0.12	50.3					0.13	33.453	23.7	8.259	-77.5	24.3				

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
QUARTERLY SAMPLES

OFFSHORE
SEAWATER

SITE ID	DATE D-M-Y	JULIAN DATE	TIME (2400)	PO4 (µM)	NO3 (µM)	NH4 (µM)	SI (µM)	TDP (µM)	TP (µM)	TDN (µM)	TOC (mgC/L)	TURBIDITY (NTU)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)	Chl a (µg/L)	Fecal Coliform Bact/100 ml	Enterococci Bact/100 ml
TRANSECT NUMBER 1																					
01-1S	17-Apr-00	2000.30	1004	0.15	0.28	0.02	4.78	0.35	0.36	7.07	1.02	0.10	34.592	24.3	8.256	-77.4	24.7	7.05	0.11	<1	<1
01-1B	17-Apr-00	2000.30	1004	0.14	0.14	0.06	2.74	0.34	0.33	6.28	1.06	0.14	34.641	24.2	8.256	-77.4	24.7	7.19	0.09	<1	<1
01-2S	17-Apr-00	2000.30	1000	0.14	0.13	0.02	6.38					0.06	34.648	24.2							
01-2B	17-Apr-00	2000.30	1000	0.14	0.06	0.04	2.14					0.06	34.664	24.2							
01-3S	17-Apr-00	2000.30	955	0.14	0.21	0.01	3.78					0.08	34.611	24.2							
01-3B	17-Apr-00	2000.30	955	0.13	0.11	0.02	2.45					0.09	34.660	24.2							
01-4S	17-Apr-00	2000.30	951	0.14	0.38	0.04	5.78					0.05	34.567	24.2							
01-4B	17-Apr-00	2000.30	951	0.13	0.14	0.02	2.00					0.06	34.675	24.2							
01-5S	17-Apr-00	2000.30	946	0.19	1.40	0.02	16.8					0.05	34.221	24.3							
01-5B	17-Apr-00	2000.30	946	0.12	0.16	0.01	4.50					0.10	34.665	24.2							
TRANSECT NUMBER 2																					
02-1S	17-Apr-00	2000.30	1102	0.15	0.36	0.08	4.34	0.37	0.36	5.86	1.04	0.11	34.609	24.3	8.269	-78.1	24.3	BROKEN	0.05	<1	<1
02-1B	17-Apr-00	2000.30	1102	0.13	0.20	0.13	2.59	0.35	0.38	5.65	0.99	0.09	34.603	24.3	8.261	-77.7	24.4	7.59	0.12	<1	5
02-2S	17-Apr-00	2000.30	1056	0.12	0.21	0.11	3.35					0.04	34.650	24.3							
02-2B	17-Apr-00	2000.30	1052	0.12	0.19	0.15	5.29					0.08	34.646	24.2							
02-3S	17-Apr-00	2000.30	1052	0.12	0.36	0.15	7.20					0.06	34.618	24.3							
02-3B	17-Apr-00	2000.30	1047	0.13	0.04	0.04	2.82					0.06	34.648	24.2							
02-4S	17-Apr-00	2000.30	1047	0.13	0.36	0.15	3.68					0.06	34.611	24.3							
02-4B	17-Apr-00	2000.30	1047	0.13	0.04	0.11	2.48					0.10	34.657	24.2							
02-5S	17-Apr-00	2000.30	1042	0.14	0.11	0.01	10.3					0.05	34.647	24.3							
02-5B	17-Apr-00	2000.30	1042	0.13	0.13	0.01	2.85					0.13	34.637	24.2							
TRANSECT NUMBER 3																					
03-1S	16-May-00	2000.38	1008	0.17	0.41	0.09	5.11	0.37	0.36	6.48	0.99	0.10	34.664	25.2	8.245	-77.7	25.2	7.13	0.20	<1	<1
03-1B	16-May-00	2000.38	1008	0.17	0.39	0.09	6.59	0.36	0.36	5.61	1.11	0.13	34.644	25.3	8.255	-78.2	24.9	7.63	0.18	<1	<1
03-2S	16-May-00	2000.38	1005	0.16	0.41	0.10	4.72					0.10	34.666	25.2							
03-2B	16-May-00	2000.38	1005	0.14	0.28	0.12	3.69					0.11	34.668	25.3							
03-3S	16-May-00	2000.38	1002	0.15	0.26	0.05	3.97					0.08	34.671	25.3							
03-3B	16-May-00	2000.38	1002	0.14	0.32	0.09	3.43					0.08	34.671	25.3							
03-4S	16-May-00	2000.38	958	0.12	0.24	0.09	3.17					0.06	34.685	25.5							
03-4B	16-May-00	2000.38	958	0.13	0.31	0.10	8.14					0.14	34.673	25.3							
03-5S	16-May-00	2000.38	954	0.11	0.18	0.09	2.44					0.09	34.704	25.5							
03-5B	16-May-00	2000.38	954	0.14	0.35	0.09	4.20					0.09	34.687	25.2							
TRANSECT NUMBER 4																					
04-1S	16 May 00	2000.38	918	0.19	0.52	0.10	6.66	0.35	0.37	6.14	0.97	0.16	34.595	25.1	8.236	-77.1	24.9	7.10	0.22	<1	<1
04-1B	16 May 00	2000.38	915	0.19	0.61	0.12	6.38	0.34	0.35	6.20	1.00	0.24	34.589	25.0	8.236	-77.1	24.8	7.60	0.20	<1	<1
04-2S	16 May 00	2000.38	911	0.19	0.47	0.10	8.22					0.15	34.588	25.1							
04-2B	16 May 00	2000.38	911	0.19	0.45	0.12	6.02					0.12	34.586	25.1							
04-3S	16-May-00	2000.38	907	0.17	0.33	0.09	5.55					0.08	34.606	25.1							
04-3B	16 May 00	2000.38	907	0.16	0.30	0.05	4.99					0.11	34.633	25.1							
04-4S	16-May-00	2000.38	903	0.15	0.23	0.05	3.96					0.05	34.642	25.1							
04-4B	16-May-00	2000.38	903	0.13	0.18	0.05	4.42					0.07	34.663	25.5							
04-5S	16 May 00	2000.38	857	0.14	0.36	0.05	5.05					0.08	34.628	25.2							
04-5B	16-May-00	2000.38	857	0.14	0.33	0.10	3.30					0.10	34.673	25.1							
TRANSECT NUMBER 5																					
05-1S	11-Apr-00	2000.28	959	0.12	0.22	0.04	3.64	0.31	0.31	5.58	1.10	0.07	34.830	24.4	8.273	-77.5	24.5	7.17	0.07	<1	1
05-1B	11-Apr-00	2000.28	959	0.11	0.05	0.08	2.81	0.28	0.29	5.81	1.12	0.05	34.860	24.4	8.270	-77.4	24.7	7.39	0.10	<1	<1
05-2S	11-Apr-00	2000.28	955	0.12	0.13	0.02	3.22					0.08	34.838	24.4							
05-2B	11-Apr-00	2000.28	955	0.12	0.03	0.06	2.76					0.08	34.864	24.4							
05-3S	11-Apr-00	2000.28	951	0.12	0.17	0.07	3.96					0.06	34.822	24.5							
05-3B	11-Apr-00	2000.28	951	0.10	0.02	0.11	2.90					0.07	34.867	24.4							
05-4S	11-Apr-00	2000.28	946	0.11	0.14	0.08	3.84					0.06	34.825	24.5							
05-4B	11-Apr-00	2000.28	946	0.10	0.01	0.06	2.48					0.06	34.863	24.4							
05-5S	11-Apr-00	2000.28	941	0.12	0.17	0.06	4.32					0.07	34.821	24.5							
05-5B	11-Apr-00	2000.28	941	0.09	0.01	0.06	2.34					0.06	34.866	24.4							
TRANSECT NUMBER 6																					
06-1S	11-Apr-00	2000.28	1104	0.14	0.83	0.08	12.4	0.28	0.28	6.55	1.10	0.07	34.592	24.4	8.269	-77.4	24.7	7.08	0.05	<1	<1
06-1B	11-Apr-00	2000.28	1104	0.11	0.08	0.10	4.45	0.24	0.20	5.46	1.10	0.08	34.796	24.4	8.272	-77.4	24.9	7.74	0.08	<1	<1
06-2S	11-Apr-00	2000.28	1100	0.11	0.51	0.06	9.08					0.07	34.658	24.4							
06-2B	11-Apr-00	2000.28	1100	0.10	0.01	0.04	3.55					0.05	34.839	24.4							
06-3S	11-Apr-00	2000.28	1055	0.11	0.58	0.06	13.6					0.10	34.625	24.5							
06-3B	11-Apr-00	2000.28	1055	0.10	0.02	0.02	4.69					0.13	34.831	24.4							
06-4S	11-Apr-00	2000.28	1049	0.12	0.72	0.04	11.1					0.05	34.560	24.5							
06-4B	11-Apr-00	2000.28	1049	0.10	0.01	0.04	2.73					0.06	34.845	24.4							
06-5S	11-Apr-00	2000.28	1042	0.10	0.22	0.06	6.54					0.07	34.726	24.6							
06-5B	11-Apr-00	2000.28	1042	0.09	0.01	0.08	2.59					0.07	34.846	24.5							

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
QUARTERLY SAMPLES

OUTFALL 4
NPPE Trench

SITE ID	DATE D-M-Y	JULIAN DATE	TIME 2400)	TIDE (ft)		PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TP (µM)	TDN (µM)	TOC mgC/L	TURBIDITY (NTU)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)	Chl a (µg/L)	Fecal Coliform Bact/100 ml	Enterococci Bact/100 ml
SURFACE	24-Apr-00	2000.32	1039	0.3	Ebb	3.04	78.1	0.12	564	3.09		79.1	0.59	0.15	13.404	24.0	8.145	-71.4	24.8	8.14	3.39	1	1
BOTTOM	24-Apr-00	2000.32	1046	0.3	Ebb	1.86	43.5	0.34	434	2.18		50.4	0.95	0.90	18.220	27.0	8.383	-85.3	24.9	11.58	14.4	1	<1

OUTFALL 5
Aquaculture Trench

SITE ID	DATE D-M-Y	JULIAN DATE	TIME 2400)	TIDE (ft)		PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TP (µM)	TDN (µM)	TOC mgC/L	TURBIDITY (NTU)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)	Chl a (µg/L)	Fecal Coliform Bact/100 ml	Enterococci Bact/100 ml
OF 5	24-Apr-00	2000.32	1109	0.3	Ebb	0.64	0.16	0.12	46.5	1.66		18.7	1.92	4.7	33.517	22.6	8.361	-83.9	24.6	8.73	70.4	1	6

ANCHIALINE
PONDS

SITE ID	DATE D-M-Y	JULIAN DATE	TIME 2400)	TIDE (ft)		PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TP (µM)	TDN (µM)	TOC mgC/L	TURBIDITY (NTU)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	mv	TEMP/M (Deg C)	DO (ppm)	Chl a (µg/L)	Fecal Coliform Bact/100 ml	Enterococci Bact/100 ml
A1	24-Apr-00	2000.32	1020	0.3	Ebb	3.31	23.4	8.43	584	3.51	3.76	40.7	1.47	0.96	13.241	26.4	8.059	-66.4	25.0	14.59	0.88	34	1
A2	24-Apr-00	2000.32	955	0.3	Ebb	3.41	119	0.16	662	3.29	3.31	118	0.62	0.04	8.044	21.4	8.040	-65.2	24.5	8.10	0.02	1	1

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
MONTHLY SAMPLES

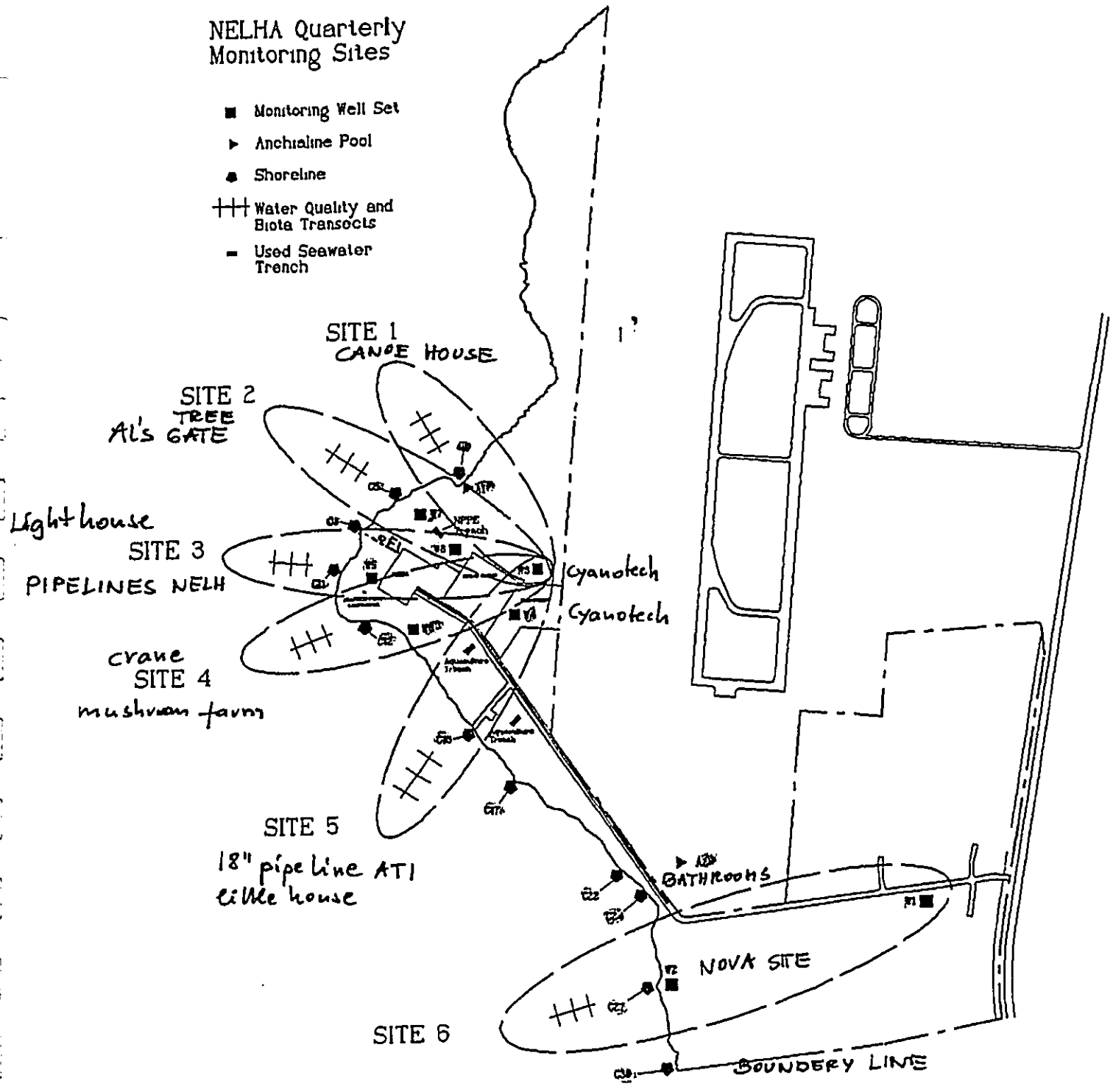
GROUND
WATER

SITE/Depth (feet)	DATE D-M-Y	JULIAN DATE	TIME (2400)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TDN (µM)	TOC (mgC/L)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	DO (ppm)	Fecal Coliform Bact/100ml	Enterococci Bact/100ml
W1/135	10-Apr-00	2000.28	1140	3.40	82.7	0.04	660	3.24	88.9	0.59	8.903	19.8	7.915	7.03	<1	<1
W1/135	15-May-00	2000.38	1049	3.34	82.5	0.25	627	3.35	88.6	0.58	8.901	20.4	7.910	7.26	35	<1
W1/135	5-Jun-00	2000.43	1052	3.36	83.6	0.09	647	3.36	90.0	0.57	8.523	20.4	7.905	7.29	<1	<1
W2/53.5	10-Apr-00	2000.28	1215	0.97	20.1	0.02	250	1.06	22.3	0.31	29.127	19.1	7.913	3.65	<1	<1
W2/53.5	15-May-00	2000.38	1116	1.03	22.4	0.17	269	1.04	25.1	0.29	28.096	19.0	7.920	3.79	<1	<1
W2/53.5	5-Jun-00	2000.43	1119	1.00	20.4	0.04	273	1.00	22.6	0.31	28.202	19.0	7.911	3.80	<1	<1
W2A/24.5	10-Apr-00	2000.28	1210	2.21	58.5	0.02	539	2.39	62.3	0.48	15.574	19.7	7.954	5.96	<1	2
W2A/24.5	15-May-00	2000.38	1111	2.36	53.9	0.33	499	2.37	57.1	0.44	16.560	19.9	7.941	5.66	<1	1
W2A/24.5	5-Jun-00	2000.43	1114	2.54	59.2	0.09	535	2.52	64.8	0.49	14.905	19.8	7.955	6.29	<1	1
W2B/14.5	10-Apr-00	2000.28	1205	3.34	83.1	0.11	640	3.04	90.1	0.62	8.918	20.8	8.024	8.00	<1	<1
W2B/14.5	15-May-00	2000.38	1106	3.32	87.1	0.33	626	3.26	91.9	0.64	8.304	20.9	8.038	8.15	<1	<1
W2B/14.5	5-Jun-00	2000.43	1109	3.31	84.5	0.13	643	3.39	91.9	0.61	8.609	20.9	8.023	8.17	<1	744
W3/63.5	12-Apr-00	2000.29	1118	1.37	24.6	0.11	354	1.44	27.6	0.39	25.933	20.9	7.880	3.69	<1	<1
W3/63.5	17-May-00	2000.38	1055	1.36	24.2	0.02	347	1.41	27.0	0.37	25.975	20.8	7.880	3.72	<1	<1
W3/63.5	6-Jun-00	2000.44	1133	1.34	23.7	0.03	347	1.41	26.5	0.34	25.905	21.8	7.871	3.66	<1	<1
W3A/34	12-Apr-00	2000.29	1113	3.36	82.7	0.28	672	3.27	89.1	0.62	9.017	22.2	8.030	7.49	<1	<1
W3A/34	17-May-00	2000.38	1050	3.31	83.4	0.89	675	3.35	87.1	0.59	8.630	22.2	8.035	7.75	1	<1
W3A/34	6-Jun-00	2000.44	1128	3.26	82.3	0.26	673	3.34	91.4	0.61	8.879	22.1	8.028	7.68	<1	<1
W3B/25	12-Apr-00	2000.29	1108	3.39	81.9	0.07	678	3.27	89.7	0.71	8.907	22.8	8.052	7.74	<1	1
W3B/25	17-May-00	2000.38	1045	3.30	82.5	0.16	680	3.32	90.1	0.55	8.576	22.6	8.061	7.85	1	<1
W3B/25	6-Jun-00	2000.44	1123	3.28	85.4	0.15	680	3.31	92.8	0.58	8.540	22.8	8.051	7.85	1	<1
W4/69	12-Apr-00	2000.29	1053	2.25	40.2	0.03	465	2.25	43.1	0.45	21.119	21.6	7.941	4.45	<1	<1
W4/69	17-May-00	2000.38	1030	2.05	38.0	0.11	433	2.07	39.2	0.46	21.777	21.6	7.924	7.65	<1	<1
W4/69	6-Jun-00	2000.44	1106	1.94	35.2	0.03	427	2.06	37.8	0.35	22.335	21.6	7.917	7.52	<1	<1
W4A/39.5	12-Apr-00	2000.29	1048	16.6	133	0.05	185	18.1	148	0.74	15.157	22.3	8.442	1.53	<1	<1
W4A/39.5	17-May-00	2000.38	1025	16.7	100	0.05	193	17.8	105	0.64	17.298	22.1	8.390	0.99	<1	1
W4A/39.5	6-Jun-00	2000.44	1101	15.7	90.6	0.13	198	16.3	90.6	0.59	18.052	22.0	8.399	1.18	<1	<1

KEAHOLE POINT COOPERATIVE ENVIRONMENTAL MONITORING PROGRAM
MONTHLY SAMPLES

GROUND WATER

SITE/Depth (feet)	DATE D-M-Y	JULIAN DATE	TIME (2400)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	TDP (µM)	TDN (µM)	TOC (mgC/L)	SALINITY (o/oo)	TEMP/F (Deg C)	pH	DO (ppm)	Fecal Coliform Bact/100ml	Enterococci Bact/100ml
W5/18	10-Apr-00	2000.28	1012	5.70	86.6	0.07	256	5.44	91.5	0.79	25.977	23.0	7.644	2.00	<1	1
W5/18	15-May-00	2000.38	925	5.67	80.6	0.21	279	5.69	85.2	0.79	25.289	23.8	7.653	2.23	<1	<1
W5/18	5-Jun-00	2000.43	926	5.36	69.6	0.04	278	5.38	76.9	0.88	25.585	23.3	7.621	2.02	<1	<1
W5A/28	10-Apr-00	2000.28	1017	5.08	72.2	0.07	176	4.89	78.2	0.80	29.837	22.4	7.637	1.44	<1	<1
W5A/28	15-May-00	2000.38	930	5.22	66.4	0.22	193	5.30	70.3	0.79	29.683	22.5	7.620	1.16	<1	<1
W5A/28	5-Jun-00	2000.43	931	5.14	62.7	0.05	202	5.26	67.6	0.76	29.667	22.8	7.584	1.04	<1	<1
W5B/55	10-Apr-00	2000.28	1027	3.98	53.8	0.11	166	3.90	58.1	0.78	33.146	23.2	7.690	2.30	<1	<1
W5B/55	15-May-00	2000.38	935	4.21	52.7	0.08	186	4.31	56.6	0.77	33.506	24.0	7.682	2.27	<1	<1
W5B/55	5-Jun-00	2000.43	936	4.10	51.1	0.05	187	4.16	54.2	0.79	33.477	24.0	7.661	2.14	<1	<1
W6/49.6	10-Apr-00	2000.28	1054	5.82	64.0	0.09	164	5.79	67.5	0.83	30.183	16.8	7.720	5.27	<1	<1
W6/49.6	15-May-00	2000.38	1005	5.67	62.6	0.17	167	5.76	66.9	0.79	30.384	17.1	7.714	5.57	<1	<1
W6/49.6	5-Jun-00	2000.43	1006	5.59	60.3	0.09	186	5.80	65.2	0.77	30.485	17.1	7.699	5.25	<1	<1
W6A/18	10-Apr-00	2000.28	1044	7.95	95.3	0.03	257	7.62	103	0.91	25.762	21.1	7.627	4.23	<1	<1
W6A/18	15-May-00	2000.38	955	8.01	94.5	0.17	253	7.95	104	0.84	26.657	21.2	7.614	3.90	<1	1
W6A/18	5-Jun-00	2000.43	956	7.63	89.3	0.03	252	7.69	100	0.89	26.941	21.1	7.584	4.50	<1	1
W6B/29	10-Apr-00	2000.28	1049	6.14	77.2	0.02	188	5.79	82.9	0.85	28.211	18.8	7.752	5.03	<1	<1
W6B/29	15-May-00	2000.38	1008	6.12	74.9	0.18	177	6.13	81.1	0.82	29.714	18.9	7.746	5.03	<1	<1
W6B/29	5-Jun-00	2000.43	1001	6.01	73.7	0.03	192	6.09	80.7	0.81	29.925	19.0	7.731	4.97	<1	<1
W7/58	12-Apr-00	2000.28	well plugged - unable to collect													
W7/58	17-May-00	2000.38	well plugged - unable to collect													
W7/58	6-Jun-00	2000.44	1015	2.79	67.3	0.03	231	2.82	71.9	0.76	32.493	22.4	7.818	0.33	<1	<1
W7A/34	12-Apr-00	2000.29	1008	4.07	66.4	0.03	150	3.98	70.1	0.78	29.897	22.2	7.767	2.50	<1	<1
W7A/34	17-May-00	2000.38	948	3.95	69.6	0.02	147	4.10	75.2	0.80	29.977	21.9	7.718	2.10	<1	<1
W7A/34	6-Jun-00	2000.44	1010	4.16	72.9	0.03	200	4.29	79.6	0.75	29.871	21.9	7.687	1.93	<1	<1
W7B/20	12-Apr-00	2000.28	well plugged - unable to collect													
W7B/20	17-May-00	2000.38	947	3.84	76.7	0.04	396	3.82	88.7	0.65	21.054	23.3	7.739	3.72	<1	<1
W7B/20	6-Jun-00	2000.44	1011	3.85	77.7	0.02	407	3.95	83.6	0.63	22.363	23.5	7.707	3.33	<1	<1
W8/65	12-Apr-00	2000.29	932	4.54	49.8	0.06	78.4	4.56	53.7	1.03	32.463	23.3	7.810	3.11	<1	<1
W8/65	17-May-00	2000.38	923	3.64	73.1	0.02	70.3	3.67	76.2	0.85	31.388	21.2	7.816	2.43	<1	<1
W8/65	6-Jun-00	2000.44	940	3.50	67.5	0.02	72.0	3.55	75.6	0.89	31.194	20.2	7.737	1.43	<1	<1
W8A/39	12-Apr-00	2000.29	927	5.04	63.2	0.05	197	4.97	68.7	0.79	28.309	22.5	7.798	2.17	<1	<1
W8A/39	17-May-00	2000.38	918	5.01	63.6	0.02	188	5.06	67.7	0.82	28.486	22.5	7.772	1.76	<1	<1
W8A/39	6-Jun-00	2000.44	935	4.87	63.9	0.03	178	5.02	71.7	0.92	29.139	22.4	7.721	1.88	<1	<1
W8B/25	12-Apr-00	2000.29	922	5.05	104	0.08	414	4.77	110	0.68	19.610	22.0	7.649	3.52	<1	<1
W8B/25	17-May-00	2000.38	913	4.90	102	0.06	415	4.87	104	0.81	19.868	22.3	7.663	3.80	<1	<1
W8B/25	6-Jun-00	2000.44	930	4.87	103	0.04	409	4.89	113	0.67	20.421	22.4	7.626	3.24	<1	<1


NELHA Quarterly
Monitoring Sites
Monitoring Well Set
Anchialine Pool
Shoreline
Water Quality and
Biota Transects
Used Seawater
Trench
SITE 1
CANOE HOUSE
SITE 2
TREE
Al's GATE
Lighthouse
SITE 3
PIPELINES NELH
Cyanotech
Cyanotech
crane
SITE 4
mushroom farm
SITE 5
18" pipe line ATI
cille house
BATHROOMS
NOVA SITE
SITE 6
BOUNDERY LINE

APPENDIX I (b) : BOTTOM CURRENT SURVEY, KEAHOLE POINT, HAWAII.
Prepared by Edward K. Noda and Lawrence E. Brower, James K. Look Laboratory of Oceanic Engineering, University of Hawaii. Technical Report No. 47. (excerpts).

UNIVERSITY OF HAWAII

JAMES K. K. LOOK LABORATORY
OF OCEANOGRAPHIC ENGINEERING

DEPARTMENT OF OCEAN ENGINEERING

TECHNICAL REPORT NO. 47
U. HAWAII-LOOK LAB- 79 - 47

BOTTOM CURRENT SURVEY KEAHOLE POINT, HAWAII In Conjunction With The PROPOSED OCEAN THERMAL ENERGY CONVERSION (OTEC) SEACOAST TEST FACILITY

BY

Edward K. Noda & Lawrence E. Brower

September 1979

PREPARED UNDER
Contract from
Department of Planning & Economic Development
State of Hawaii through
Hawaii Natural Energy Institute
University of Hawaii

Technical Report No. 47

University of Hawaii-Look Lab-79-47

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TABLE OF CONTENTS

I. INTRODUCTION AND OBJECTIVES

Due to its geographically isolated location and coupled with its lack of fossil fuel resources, the State of Hawaii is presently dependent on imported oil to supply both fuel for transportation and for electrical energy operation. Recognizing this critical dependency, the State of Hawaii has made a commitment both in spirit and backed by funds for the search and development of alternate sources of natural energy which can be produced within the State itself.

One of the results of this commitment was the enactment of a bill by the 1974 State Legislature establishing a State Natural Energy Laboratory, which led to the creation of the Natural Energy Laboratory of Hawaii (NELH). After a detailed site selection study, Keahole Point, Hawaii was selected as the location for the NELH facility. One of the primary criteria for the selection of the Keahole Point site centered around the concept of generating electrical energy through Ocean Thermal Energy Conversion (OTEC). The Keahole Point site was particularly appealing since the OTEC process requires large sources of cold and warm water which are directly available nearshore.

One of the proposed onsite OTEC projects presently being considered by the Department of Energy is the development of an OTEC Seacoast Test Facility (STF) including a deep, cold-water intake pipeline from shore to a water depth of about 2000 ft. This facility would be utilized to carry out onshore OTEC research and development activities dealing with bio-fouling, corrosion and heat transfer characteristics of newly designed OTEC heat exchangers and other system components.

The conceptual design of the Seacoast Test Facility cold-water intake pipeline involves an innovative design feature where the pipeline is actually suspended 20 to 40 feet above the ocean bottom. The purpose of this feature is to isolate the pipeline from sudden changes in terrain characteristics and to avoid the abrasive affects of the hard, volcanic bottom material. In order to provide the pipeline with buoyancy, polyethylene material was selected which has a specific gravity less than that of seawater. Thus the proposed pipeline is suspended off the bottom due to its natural buoyancy. Of primary concern during the design of the STF suspended, cold-water pipeline was the magnitude of the ocean currents near the bottom along the pipeline route. If

large, bottom currents were prevalent, the drag load on the pipeline due to the current could force it to ocean-bottom, thereby abrading the relatively soft, plastic pipe material. Consequently, in order to provide bottom current design data along the proposed pipeline route, a bottom current survey was sponsored by the Department of Planning and Economic Development, State of Hawaii, and the final results of this survey are herein reported.

II. CURRENT SURVEY METHODOLOGY

1. SITE CHARACTERISTICS AND CURRENT METER LOCATIONS AND SCHEDULE

Figure 1 describes the Keahole Point, Hawaii offshore bathymetry [from Noda (1977)] which is the proposed site for the OTEC Seacoast Test Facility intake and exhaust pipelines. Also shown in Figure 1 is the current survey axis which was utilized to orient the location of current meter deployments. The orientation and location of this current survey axis is in close proximity to the proposed location of the STF cold-water intake pipeline.

2. CURRENT METER LOCATIONS

During the conceptual planning of this current survey program, one of the important objectives was to obtain current data at predetermined locations along the current survey axis in order to provide representative data along the entire pipeline route. In order to logistically carry out this objective, exact vessel positioning data was necessary along the profile. To provide this navigational capability, two benchmarks were accurately located along the current survey axis. Thus, prior to a deployment or retrieval operation, visual targets were erected over these benchmarks. By positioning the survey vessel such that these targets were co-linear, the vessel could be accurately located along the current survey axis. The location of these benchmarks are:

Designation	North Coordinate (ft)	East Coordinate (ft)	Elev. (ft)
Forward Benchmark	326915.1	306331.9	~20
Rear Benchmark	327203.8	306888.5	~20

Positioning the survey vessel along the current survey axis is only part of the navigational technique. In order to then locate the vessel at the proper depth location along the profile, a Raytheon DE-731 Recording

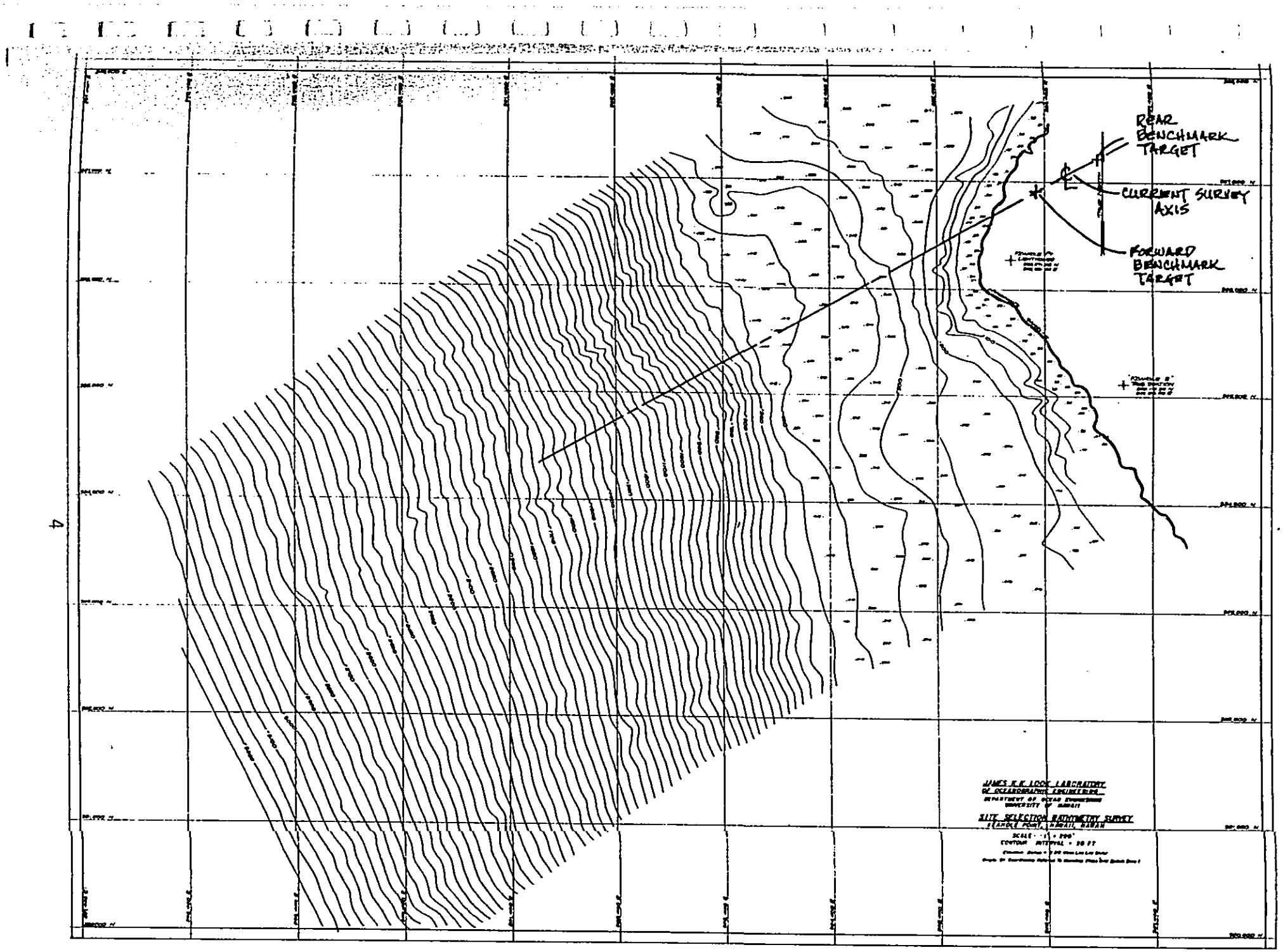


FIGURE 1: KEAHOLE POINT BATHYMETRY CHART

Fathometer was utilized. Thus, combining these two independent navigational aids, the current meter positions could be accurately located during both deployment and retrieval.

Figure 2 describes the cross-sectional view of the bottom profile along the current survey axis shown in Figure 1. Also shown in Figure 2 are the approximate locations of the current meters during this survey. Five current measurement locations were used, designated A thru E, during the course of this project and are briefly described below.

Location A: At the upper edge of the nearshore dropoff; current meter located near the bottom.

Location B: Location representative of currents in the shelf zone; current meter located at about 100 ft below the surface, to be representative of mid-water currents.

Location C: At the upper edge of the deep dropoff; current meter located near the bottom.

Location D: At the lower section of the deep dropoff; current meter located near the bottom.

Location E: Location representative of the major slope; current meter located near the bottom.

3. INSTRUMENTATION AND EQUIPMENT

A. Current Meters.

The current meters selected for this project were General Oceanics InSitu Film Recording Winged Current Meters. For shallow water applications at Location A and B, Model 2010 current meters were installed, while all other locations used the Model 2011-2 with a manufacturer's depth rating in excess of 6000 ft.

These General Oceanics winged current meters work on the principle of drag and buoyancy versus current speed. As the current flows past the meter, the inclination of the meter housing and attached wing provides a measure of the current speed. The Model 2010 meter is a positively buoyant instrument,

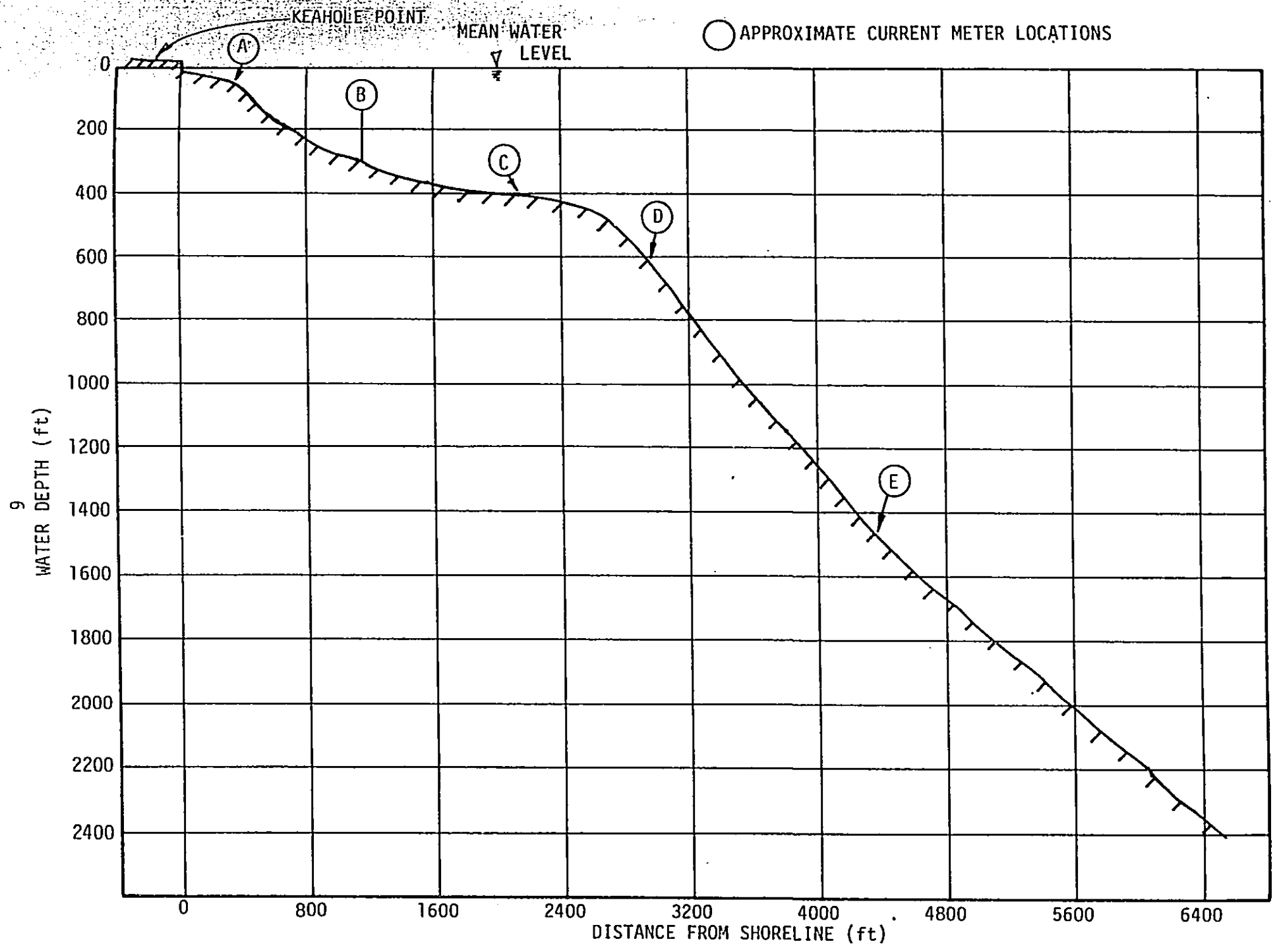


FIGURE 2: CROSS SECTIONAL VIEW OF BOTTOM PROFILE AT KEAHOLE POINT, HAWAII ALONG THE CURRENT SURVEY AXIS SHOWN IN FIGURE 1

including a Model 3011 Film Recording Data Logger consisting of a single frame Kodak Super 8 Analyst/Surveillance camera used to record the tilt angle of the housing and compass orientation of the meter wings. The data recording interval is selectable and for the entire project a frame rate of 1 per 15 minutes was selected. The Model 2011-2 is a negatively buoyant meter utilizing the same film recording data logger as in the Model 2010. These two current meter models have different wing types and the calibration curves for each model is shown in Figures 3 and 4. Photograph 1 describes the General Oceanics winged current meter and Photograph 2 shows the Model 3011 film recording data logger.

B. Moorings.

One of the major difficulties in the planning of a continuous current monitoring program, particularly for deep water current meter locations, is the technique for retrieval of the sensors. With water depth extending down to 1500 ft, surface or nearsurface location markers are cumbersome and prone to vandalism. Also, current and wave drag on the marker/retrieval line would have a significant and deleterious affect on the current data. The easiest retrieval technique would be to utilize acoustic releases, which release the anchoring weight upon a command from a surface deck unit. While acoustic releases are the ideal solution, they are also very expensive and far beyond the budget allocation of this project.

The retrieval technique selected for this project used timed releases. Instead of releasing the anchoring weight upon receipt of a surface command as is characteristic of acoustic releases, for the timed releases the anchoring weight is dropped following passage of a pre-set time interval. Under most circumstances, particularly in open-ocean surveys where weather conditions are unpredictable, use of timed releases would be unsatisfactory. However, the Keahole Point offshore area is an anomaly in that the local wind and wave pattern bears little correlation with the dominant tradewind pattern. Protected by the Hualalai volcano, typical local wind and wave conditions off Keahole Point are very moderate even when gale force winds are blowing from the NE. Thus wave conditions are of significant concern only when strong wind conditions arise from the south thru east. Since this wind condition occurs very rarely and coupled with the very close proximity to shore of the current

TABLE 1: Current Monitoring Schedule

Location	Data Recording Period	Current Sensor Depth (ft)	Water Depth (ft)	Mooring Type
A	9/10-10/11/78	35	55	1
A	10/13-11/15/78	35	55	1
A	11/16-12/13/78	35	55	1
B	11/28-11/29/78	80-100	310	2
B	12/14/78-1/17/79	80-100	310	2
C	9/10-10/11/78	419	444	3
C	10/13-11/15/78	383	408	3
C	11/17-12/13/78	359	384	3
C	12/15/78-1/18/79	395	420	3
D	12/15/78-1/18/79	611	636	3
E	9/10-10/11/78	1423	1428	3
E	10/13-11/15/78	1439	1464	3
E	11/17-12/13/78	1475	1500	3

Water depth measured with a Raytheon DE-731 Fathometer at the time of deployment.

survey. Included in this table are the location designations, the data recovery period, estimated sensor and total water depth and mooring type. Finally Table 2 describes a record of both data and instrument recovery for the survey.

TABLE 2: Record of Recovery

Item	Attempts	Success	Recovery
Current Meters/Moorings	14 Deployments	14 Retrievals	100 %
Explosive Bolts	17 Installed	15 Fired	88.2%
VHF Transmitter	8 Installed	6 Functioned	75 %
Current Meter Data	15 Deployed	13 Functioned	86.7%

IV. RESULTS

The analyzed current data is given in Appendix A. The following section presents a description of the results by location.

A. Location A.

Figures A1, A2 and A3 show the statistics and histograms for each of the three months of recording at Station A. These figures show that the largest current conditions occurred during the first month of observation (Figure A1) with a maximum recorded speed of 128.6 cm/sec (2.5 knots). All three months of observations indicate a predominant southward direction of current flow.

Figures A4, A5 and A6 show the time series plots during the three months of observations at Location A. It should be noted that the histogram plots and associated statistics include all observed data while the time series graphs utilize data averaged over one hour in order to filter any extreme observations. Figure A4 indicates the occurrence of significantly large currents from September 23-30 and from October 3-7, 1978. During these periods the current flowed in the south-southwesterly direction. Notice in these time series plots the periodic oscillation of the current vector is primarily in the north-south directions. This periodicity is most probably due to tidal fluctuations with typical fluctuations less than 1 knot. Also notice the interesting feature in Figure A4 during the large mean current flow periods that the periodic tidal fluctuations continue to be evident, superimposed on the mean current flow. Finally, the stick diagrams in Figures A4 to A6, which are 12 hour averages of the current vector, graphically show the periods of major current flow.

The progressive vector diagrams are shown in Figures A7, A8 and A9. Again, these figures indicate the dominance of the south-flowing current. Figures A10, A11 and A12 show the U, V and rotary spectral plots of the currents recorded at Location A. From previous figures it is not surprising that for the three months of observations an order of magnitude difference exists in the spectral energy levels of the north-south current component versus the east-west component, the north-south dominating. The rotary spectral plots show

little difference between the clockwise and counterclockwise components of the current indicating no preference of rotation.

One of the important features of these spectral plots is the shape of the curve. Notice in Figures A10, A11 and A12 that significant energy levels occur at the very low frequencies or large periods which tend to indicate either the existence of very long periodic fluctuations such as seasonal phenomena or mean current flow conditions throughout the observation period. Moreover the peaks in the energy spectrums at the 6, 12, 18 and 24-hour periods indicate the influence of tidal fluctuations. In particular, since tidal changes in the Hawaiian Islands are predominantly semi-diurnal, the high energy peak at the 12-hour period is significant verification of this phenomenon.

Figures A13, A14 and A15 describe the kinetic energy spectrum of the current. In Figure A13 ordinate axis extends an order of magnitude greater in range than in Figures A14 and A15 indicating that the energy levels in the low frequencies were significantly larger during the first month of observations than during the final two months. Also, the spectral energy peaks at 6, 12 and 24-hour periods are clearly evident, with the 12-hour period peak predominant.

B. Location B.

Only about one month of data is available from Station B. The available data was recorded during two separated periods, however, during the first period data was obtained for only 1.7 days before the recording camera malfunctioned. Consequently very little information can be obtained from this data, but the analyzed data is included herein for completeness (Figures A16 to A20).

Figures A21 thru A25 describe the 34 days of observations obtained at Location B. Note that the current sensor was located at about 80-100 ft below the water surface in a total depth of water of about 310 ft. Figure A21 describes the statistics and histogram of the results and note that the maximum recorded current speed was 122 cm/sec (2.37 knots) with a mean velocity of 49 cm/sec (0.96 knots). Notice also that the dominant current direction was significantly northward.

Figure A22 describes the time series plots and graphically displays

the significant northward trend of the current data. Moreover superimposed on the mean northward flowing current are large periodic fluctuations in the magnitude of the current speed, probably due to tidal affects. Figure A23 shows the progressive vector diagram and again graphically indicates the dominant northward flow. Notice that the projected cumulative drift during the 34-day period is about 1200 kilometers.

Figures A24 and A25 describe the spectral energy distributions of the current. Again, the large energy distribution at the very low frequencies indicate a significant mean current during the entire observation period and major energy peaks at the 12 and 24-hour periods are tidal related.

C. Location C.

For Station C, four months of observations were obtained. Figures A26 to A29 show that the maximum recorded current during the observation period was 53 cm/sec (1.03 knots) with mean current velocities ranging from 8.5 to 10.9 cm/sec (0.16 to 0.21 knots) based on monthly averages. Figures A30 to A33 are the time series plots for Location C and show the dominance of tidal fluctuation affects versus mean current flow. The high variability of the direction data is evident in these figures. Figures A34 to A37 show progressive vector diagrams for each of the months of observation. Notice that there is a slight southward mean flow for the first 3 months of observations and during the last month a slight northward mean flow condition. Figures A38 to A45 describe the spectral energy characteristics of the current during the entire observation period on a monthly basis.

D. Location D.

Only one month of current observations was obtained at Station D. After 3 months of current data at Station E, it was decided to move to Station D and obtain one month of data. The objective of this move was to determine if any significant changes in current characteristics occurred between the upper and lower regions of the deep dropoff. Figures A46 to A50 describe the analyzed current data.

Figure A46 indicates a maximum recorded speed of 25 cm/sec (0.49 knots) with a mean speed during the observation period of 8.7 cm/sec (0.17 knots) with a northwest directional preference. The time series plots in Figure A47

indicate both a strong influence from tidal affects and a mean northwesterly flow direction. The progressive vector diagram in Figure A48 graphically indicates mean northwest-oriented flow conditions prevalent during the entire 34-day observation period. Finally Figures A49 and A50 show the spectral energy distribution of the current components.

E. Location E.

Three months of current observations were obtained at Station E and the results are described in Figures A51 to A65. Figures A51 to A53 indicate that the maximum current speed measured during the entire 3-month recording period was 25.9 cm/sec (0.50 knots) with monthly mean speeds of 8.9, 7.3 and 9.0 cm/sec. Current directional data indicates a preference flow toward the northwest. Figures A54 to A56 show the monthly time series plots of current components. From these time series graphs the consistent northwest current direction is evident for the entire observation period. Figures A57 to A59 show the monthly progressive vector diagrams and again the consistent northwesterly mean flow is remarkably stable. Finally, Figures A60 to A65 display the spectral energy distribution characteristics of the current components. In these figures the energy peak associated with the 12-hour period oscillation is the dominant characteristic and indicates that the bottom current is tide related.

SUMMARY

The four month current observation period in the waters off Keahole Point, Hawaii indicates the following:

1. In the nearshore zone ending at the upper edge of the shallow dropoff, Location A, the preferred current direction was towards the south. The maximum recorded current speed during the 3 months of observations was 128 cm/sec (2.5 knots) with a mean current of 16.8 cm/sec (0.3 knots).

2. In the shelf region, the current sensor located at Station B was 80-100 ft below the surface in a water depth of about 310 ft and thus represents a mid-water rather than bottom current condition. In this shelf zone a maximum recorded current speed of 122 cm/sec (2.37 knots) was recorded and a very significant mean current of 49 cm/sec (0.95 knots) computed. Moreover during the 1 month of data obtained at Location B, the dominant direction was northward.

3. Proceeding into deeper water, as the deep dropoff is approached, Location C, the bottom current direction exhibits a highly variable characteristic with only a very slight preference towards the south. The maximum recorded current speed during the 4 months of observations at Location C was 53 cm/sec (1.0 knot) with an average mean current speed of 9.5 cm/sec (0.19 knots).

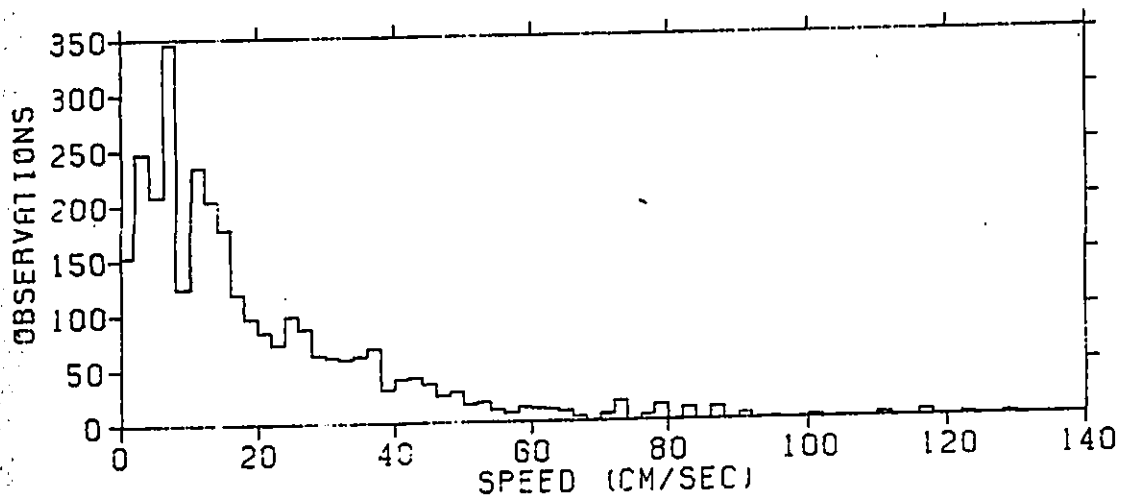
4. Continuing beyond the deep dropoff, at Location D, immediately below the dropoff in a water depth of 636 ft and at Location E in a water depth of about 1500 ft, the recorded current conditions are very similar. Both stations show a strong northwest oriented mean flow characteristic which indicates that the current is flowing parallel to the bathymetry contours. The maximum recorded speed at Station D during the one month survey period was 25 cm/sec (0.49 knots) with a mean speed of 8.7 cm/sec (0.17 knots) while the recorded maximum current speed at Location E during the 3 month observation period was 25.9 cm/sec (0.5 knots) with a 3-month average mean speed of 8.4 cm/sec (0.16 knots).

FIGURE A1

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION A
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 10.67 METERS
OBSERVATION PERIOD = 1500 10 SEP 78 TO 0841 11 OCT 78 (30.7 DAYS)
N = 2940, DT = 15.06 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	19.58	334.61	18.29	1.950	8.017	128.58	0.0
U	-2.88	96.50	9.82	-1.349	6.247	21.92	-68.26
V	-12.37	460.22	21.45	-1.102	5.284	44.93	-126.22

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



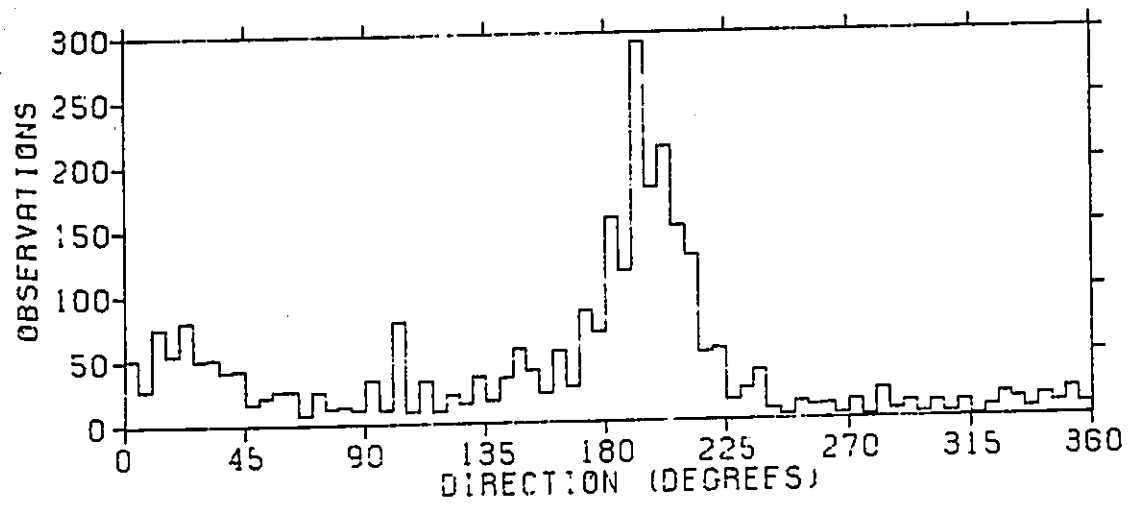
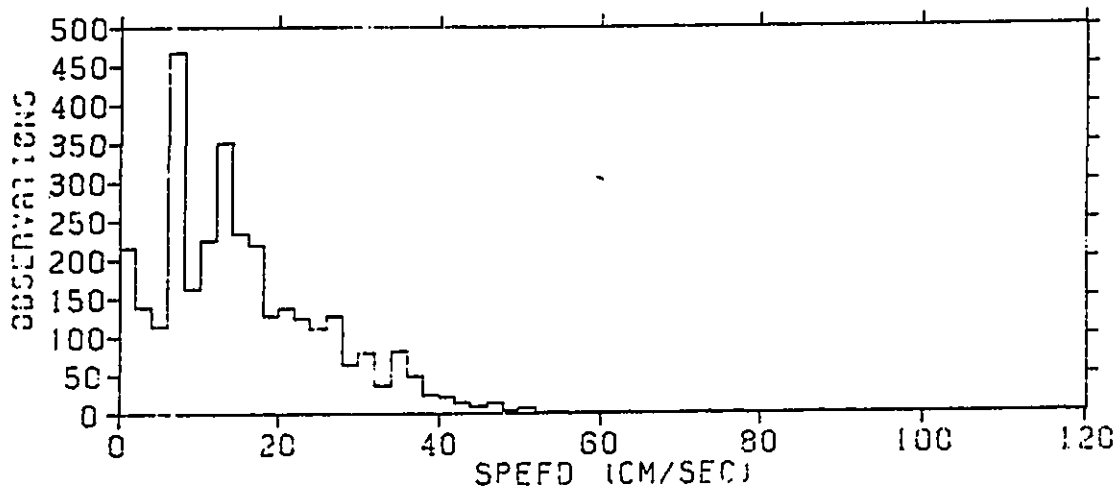


FIGURE A2

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION A
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 10.67 METERS
OBSERVATION PERIOD = 1145 13 OCT 78 TO 0930 15 NOV 78 (32.9 DAYS)
N = 3160, DT = 15.00 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	15.68	116.04	10.77	1.341	7.116	116.12	0.0
U	0.12	40.59	6.37	-0.375	3.691	26.79	-39.26
V	-7.20	269.42	16.41	-0.214	3.593	39.82	-113.99

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



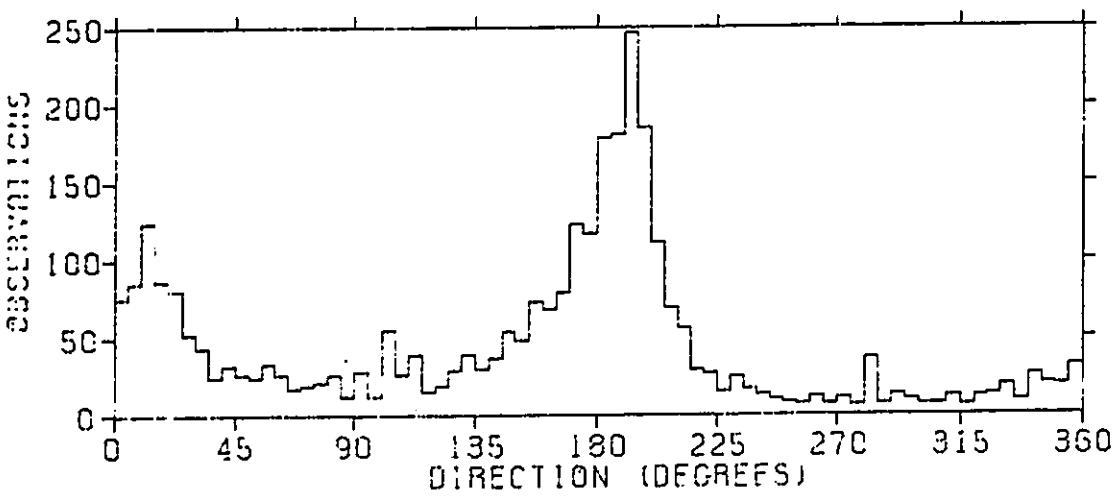
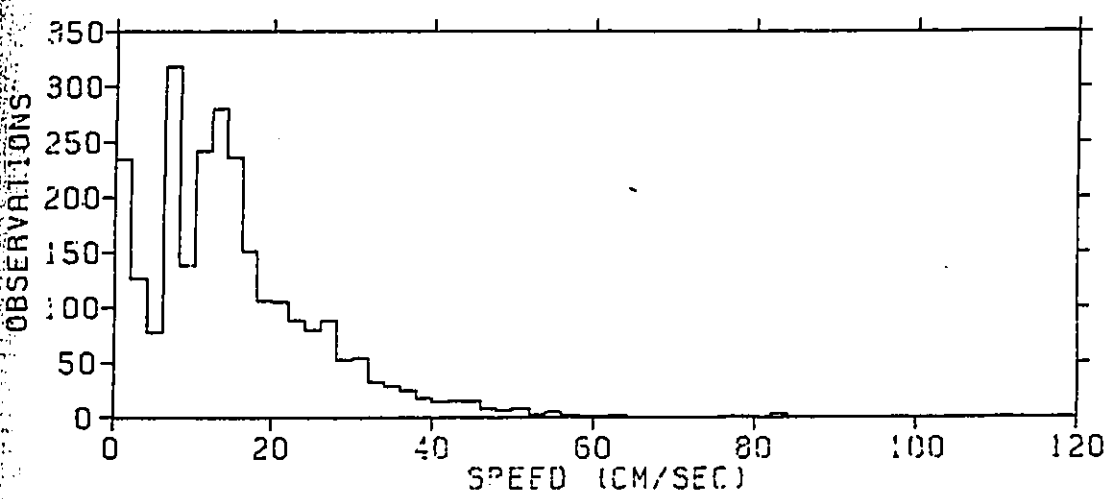


FIGURE A3

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION A
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 10.67 METERS
OBSERVATION PERIOD = 1445 16 NOV 78 TO 0604 13 DEC 78 (26.6 DAYS)
N = 2560, DT = 14.99 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	15.04	119.94	10.95	1.657	8.544	110.46	0.0
U	-0.35	45.49	6.74	-0.329	4.934	45.41	-42.83
V	-7.14	249.54	15.80	-0.381	4.332	44.44	-107.18

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



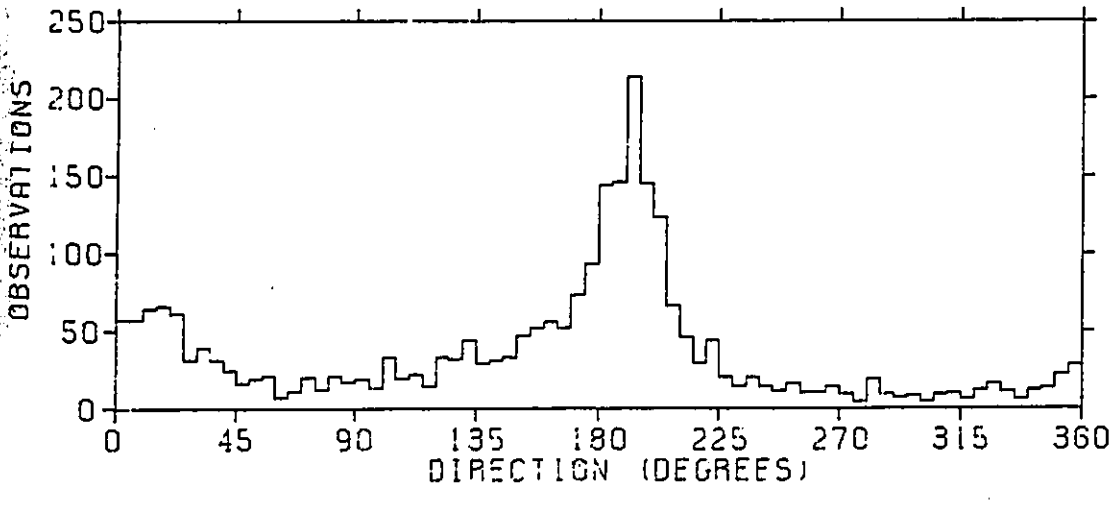


FIGURE A4a

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION A .
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 10.67 METERS
OBSERVATION PERIOD = 1500 10 SEP 78 TO 1439 30 SEP 78 (20.0 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)

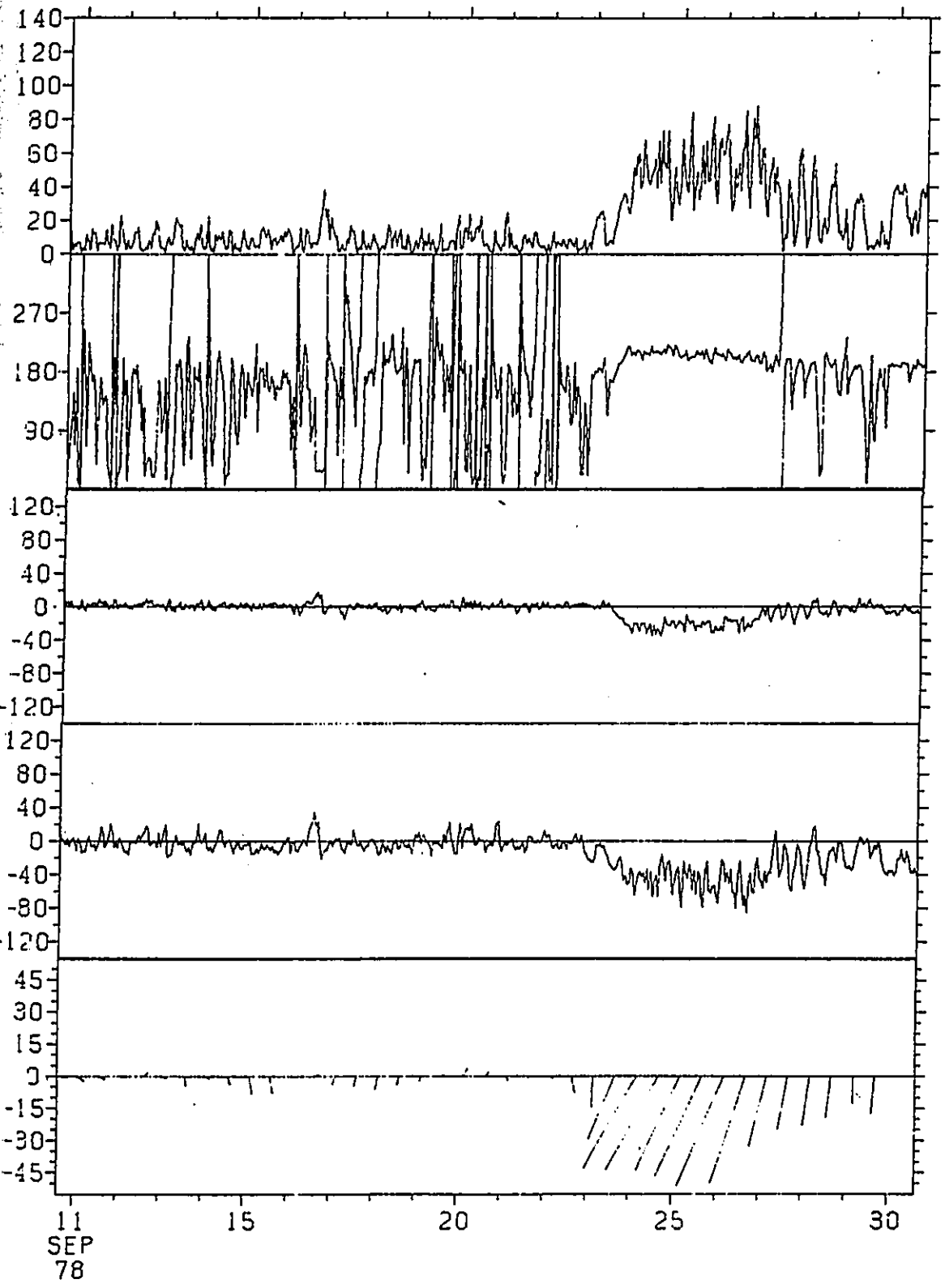


FIGURE A4b

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION A
LOCATION = LAT 19 44.0N. LONG 156 03.2W. DEPTH = 10.67 METERS
OBSERVATION PERIOD = 1500 30 SEP 78 TO 0846 11 OCT 78 (10.8 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)

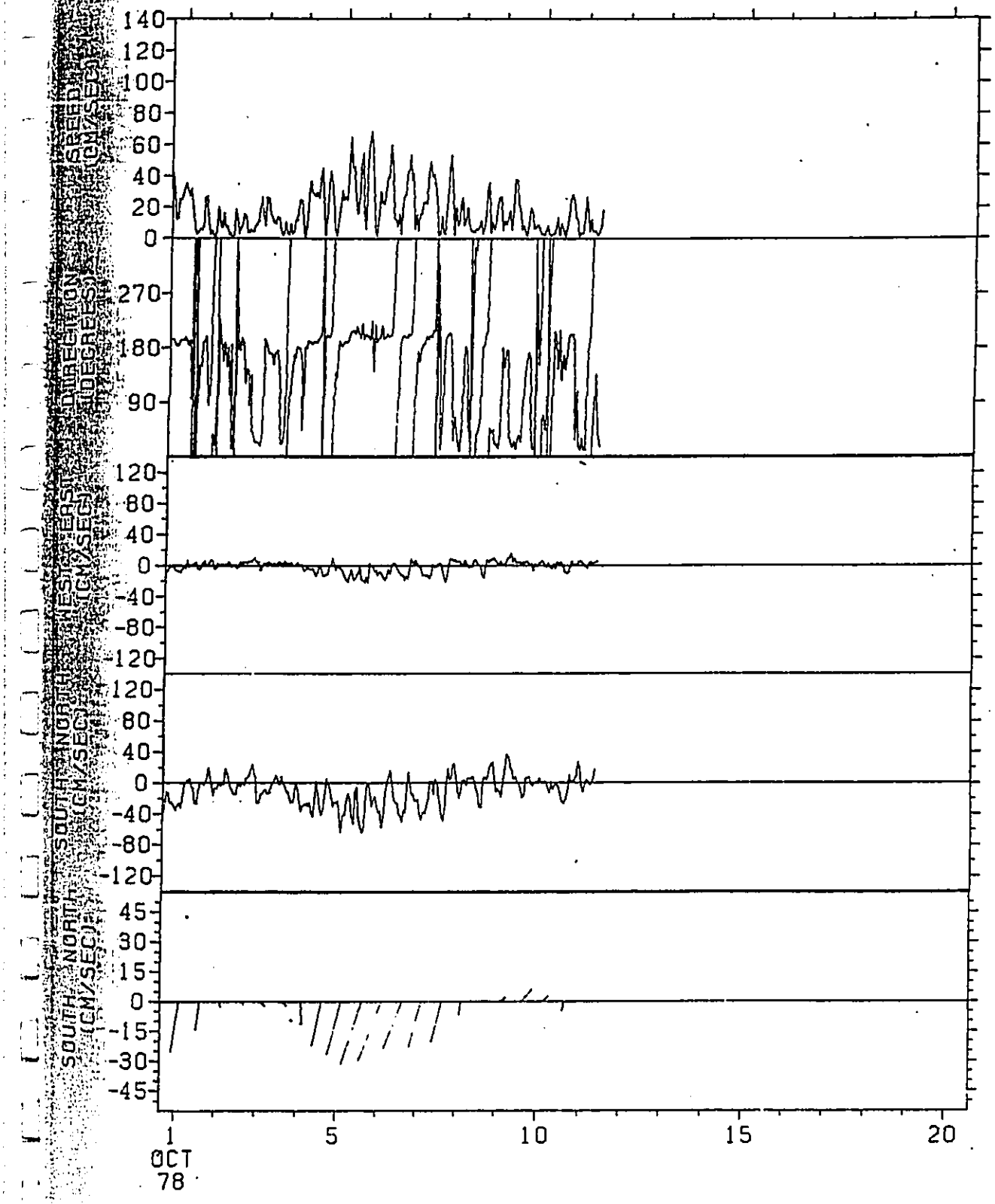
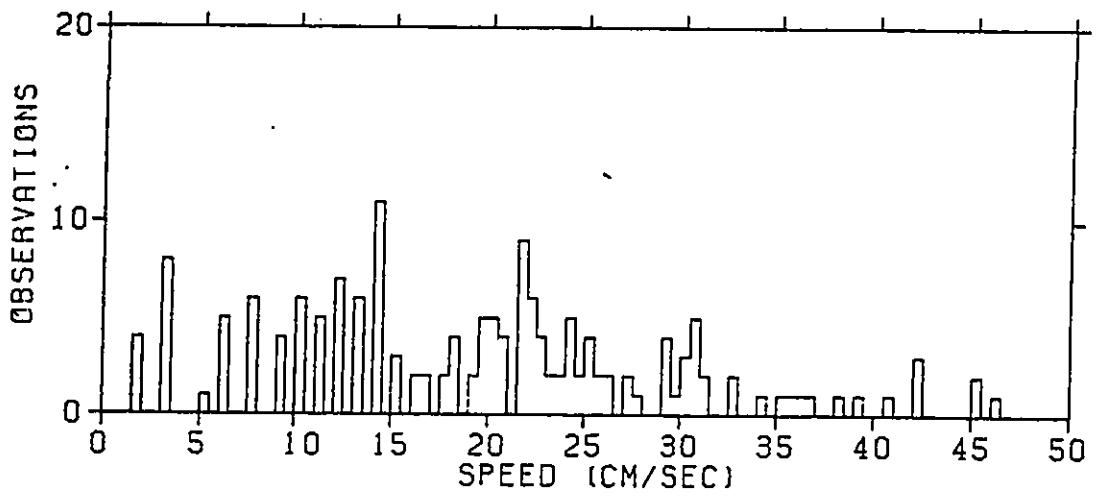


FIGURE A16

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION B
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 30.49 METERS
OBSERVATION PERIOD = 1000 28 NOV 78 TO 0245 30 NOV 78 (1.7 DAYS)
N = 164, DT = 15.00 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	19.45	100.36	10.02	0.405	2.827	46.23	1.84
U	2.29	54.00	7.35	-1.133	7.617	19.79	-37.86
V	-1.38	417.57	20.43	-0.369	1.957	37.83	-46.23

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



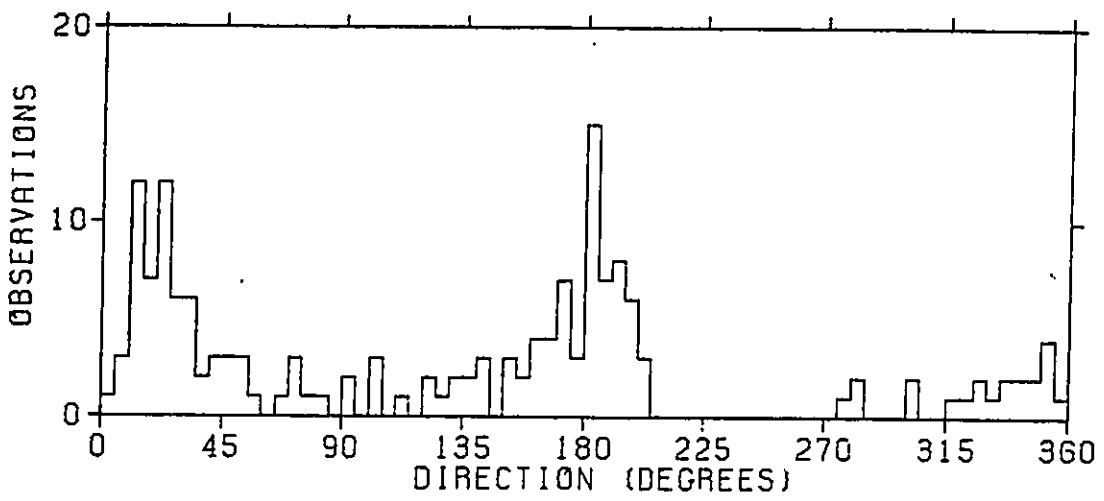
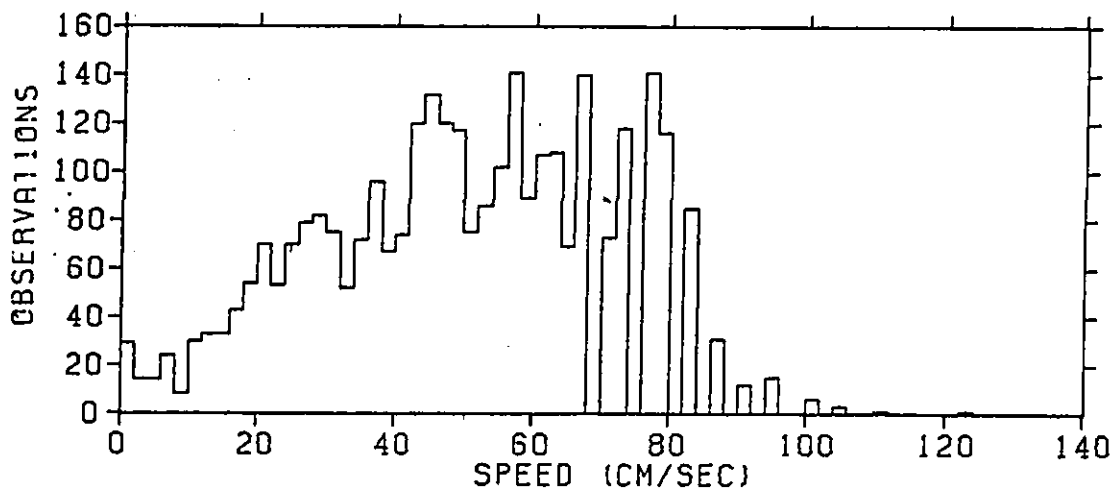


FIGURE A21

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION B
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 30.49 METERS
OBSERVATION PERIOD = 1000 14 DEC 78 TO 0854 17 JAN 79 (34.0 DAYS)
N = 3080, DT = 15.88 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	49.33	436.78	20.90	-0.123	2.483	122.16	0.0
U	-2.75	94.36	9.71	-0.115	3.867	41.19	-67.38
V	43.54	873.49	29.55	-0.961	3.654	122.09	-77.64

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



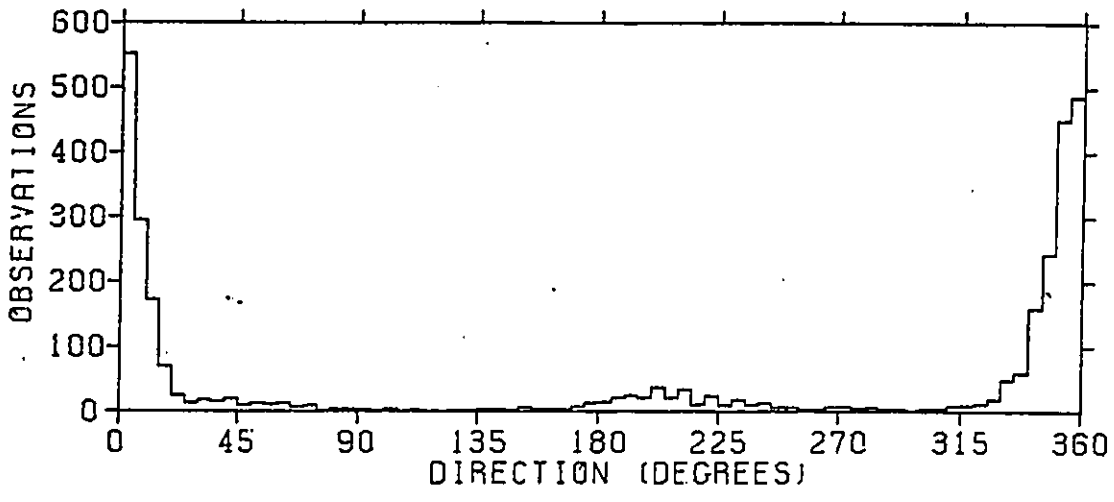


FIGURE A22a

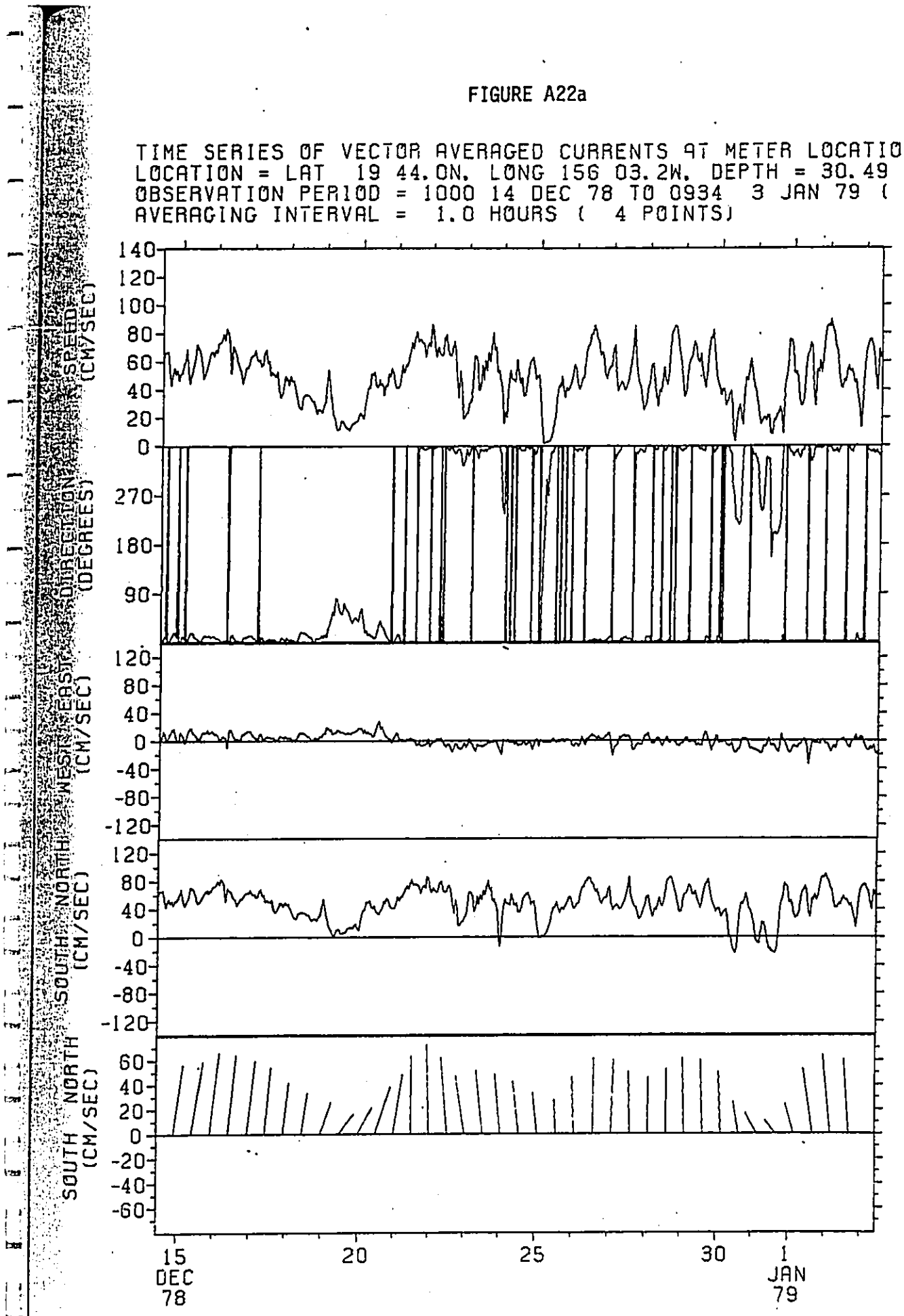

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION B
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 30.49 METERS
OBSERVATION PERIOD = 1000 14 DEC 78 TO 0934 3 JAN 79 (20.0 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)
SPEED (CM/SEC)
DIRECTION (DEGREES)
WEST EAST (CM/SEC)
SOUTH NORTH (CM/SEC)
SOUTH NORTH (CM/SEC)
140
120
100
80
60
40
20
0
270
180
90
120
80
40
0
-40
-80
-120
120
80
40
0
-40
-80
-120
60
40
20
0
-20
-40
-60
15
DEC
78
20
25
30
1
JAN
79

FIGURE A22b

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION B
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 30.49 METERS
OBSERVATION PERIOD = 1000 3 JAN 79 TO 0904 17 JAN 79 (14.0 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)

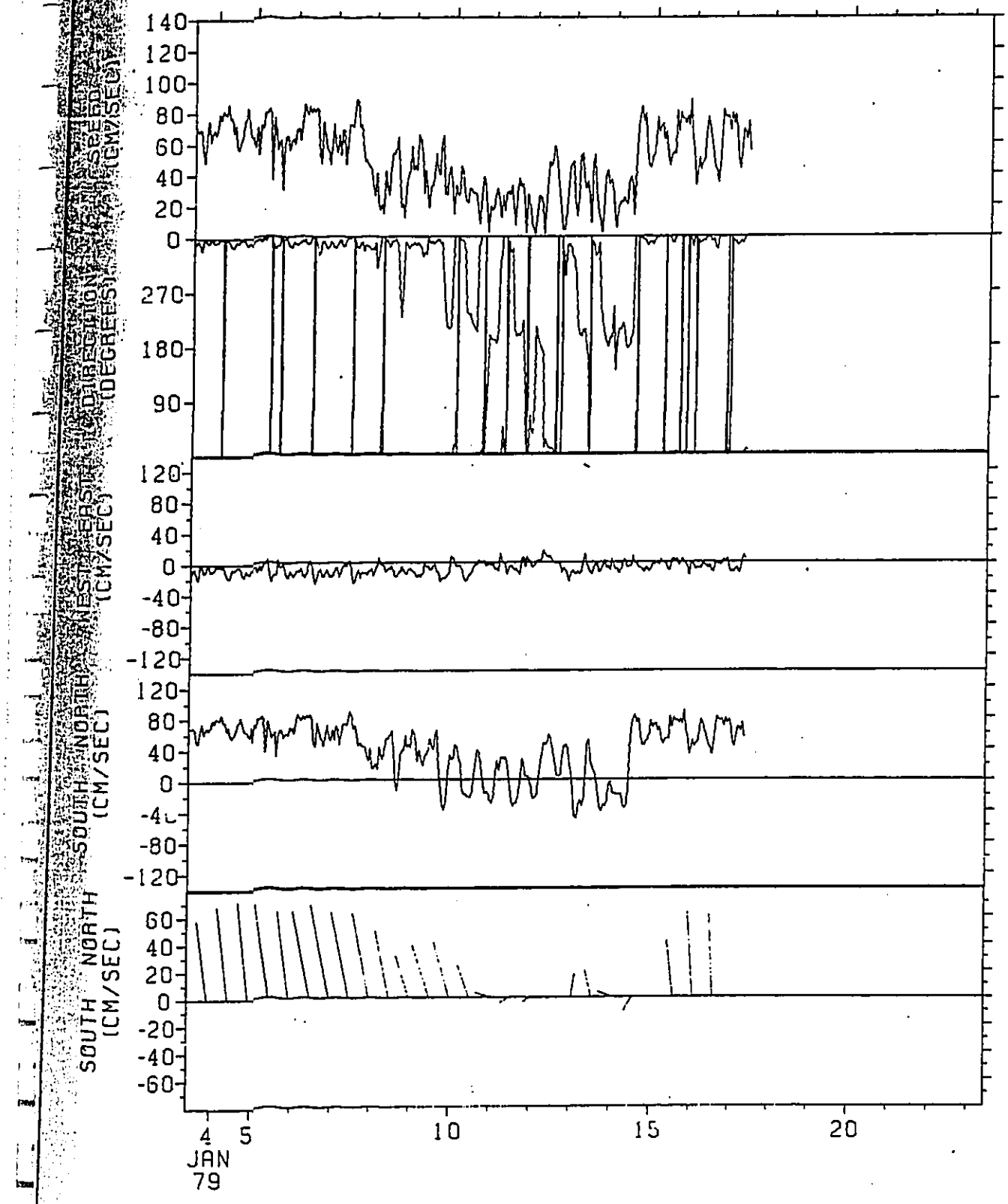
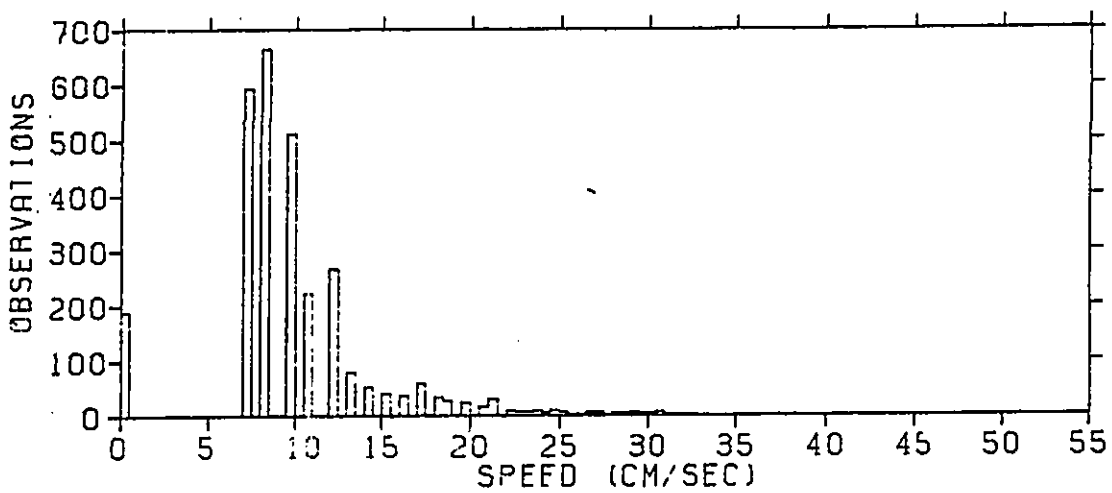


FIGURE A26

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION C
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 146.3 METERS
OBSERVATION PERIOD = 1444 10 SEP 78 TO 0205 11 OCT 78 (30.5 DAYS)
N = 2952, DT = 14.87 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	10.18	28.40	5.33	1.630	9.320	51.29	0.0
U	-0.10	43.38	6.59	0.111	3.141	29.47	-23.23
V	-1.66	85.83	9.26	-0.163	3.495	27.67	-42.52

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



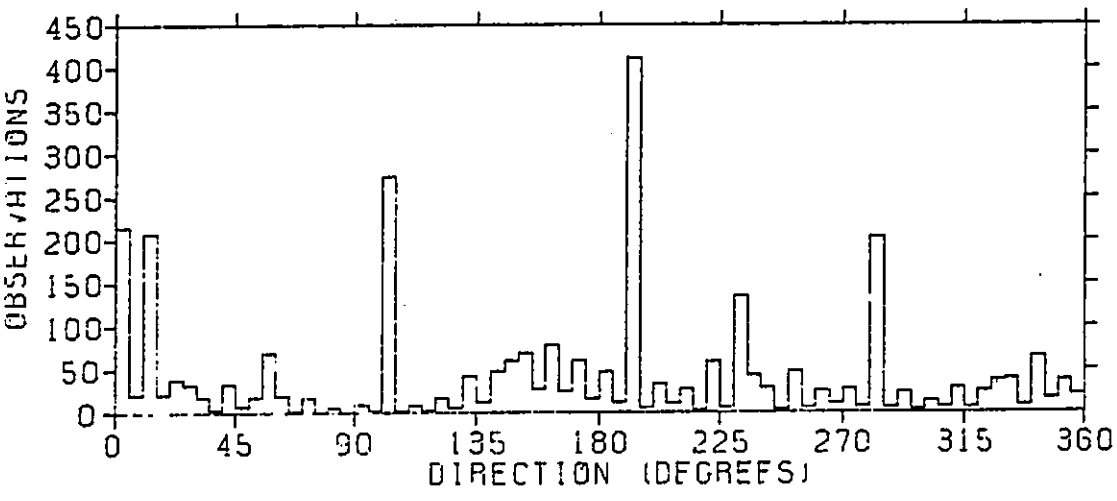
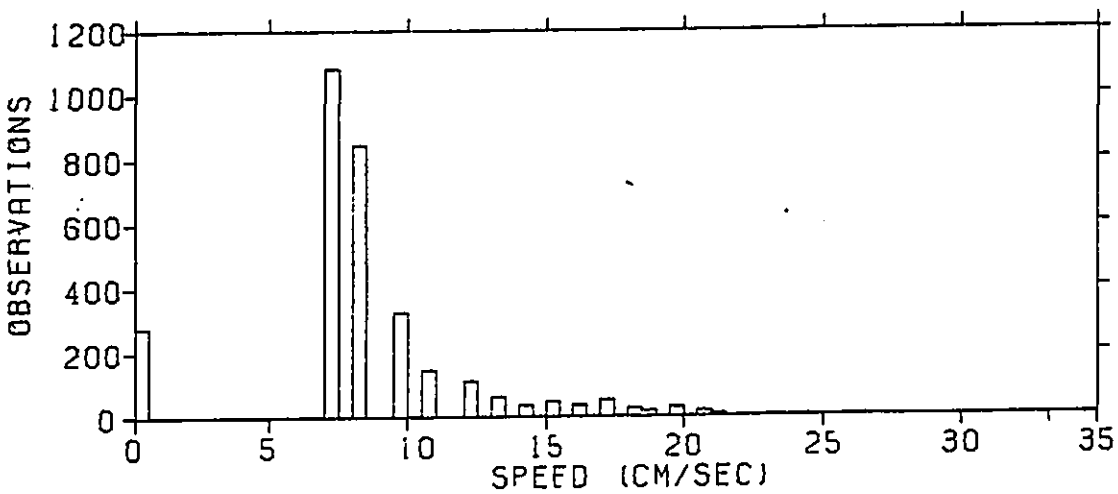


FIGURE A27

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION C
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 146.3 METERS
OBSERVATION PERIOD = 1115 13 OCT 78 TO 0949 15 NOV 78 (33.0 DAYS)
N = 3132, DT = 15.15 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	8.55	16.81	4.10	0.636	6.051	34.84	0.0
U	-0.43	50.62	7.11	0.167	2.644	26.29	-26.20
V	-0.71	38.60	6.21	0.618	3.801	27.50	-23.09

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



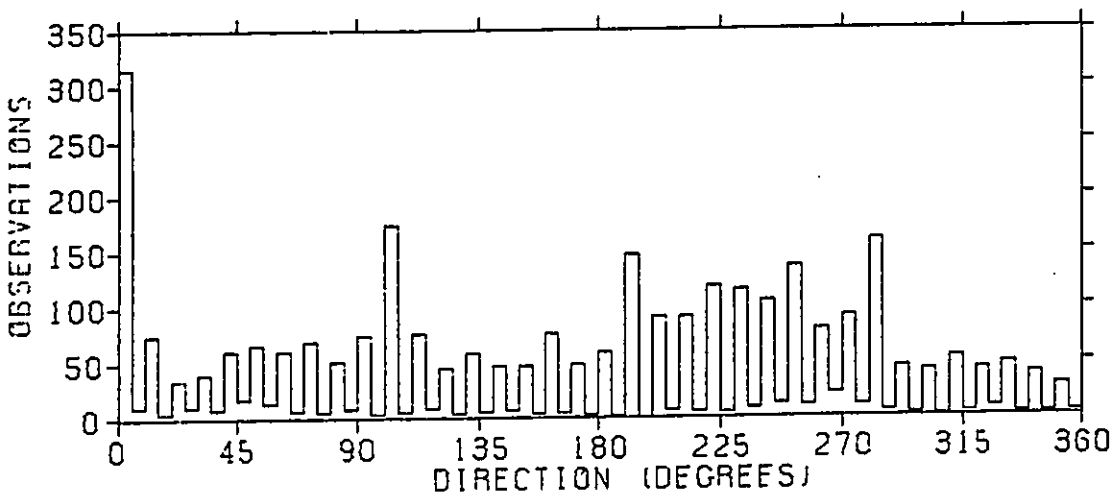
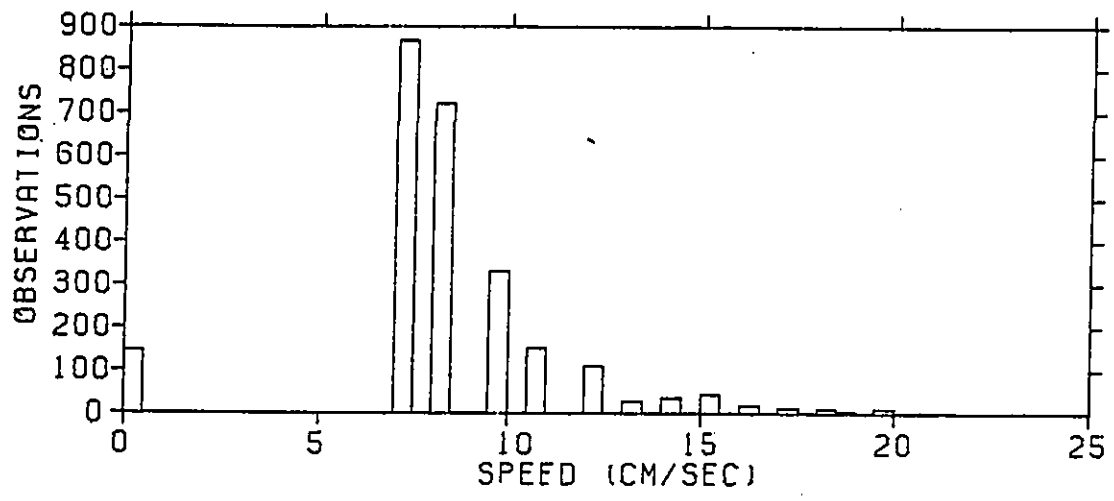


FIGURE A28

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION C
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 146.3 METERS
OBSERVATION PERIOD = 0930 17 NOV 78 TO 0915 13 DEC 78 (26.0 DAYS)
N = 2496, DT = 15.00 MINUTES, UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	8.46	9.82	3.13	0.043	6.531	24.42	0.0
U	-0.11	47.89	6.92	0.284	2.160	20.56	-19.79
V	-1.93	29.84	5.46	0.354	2.959	20.92	-24.12

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



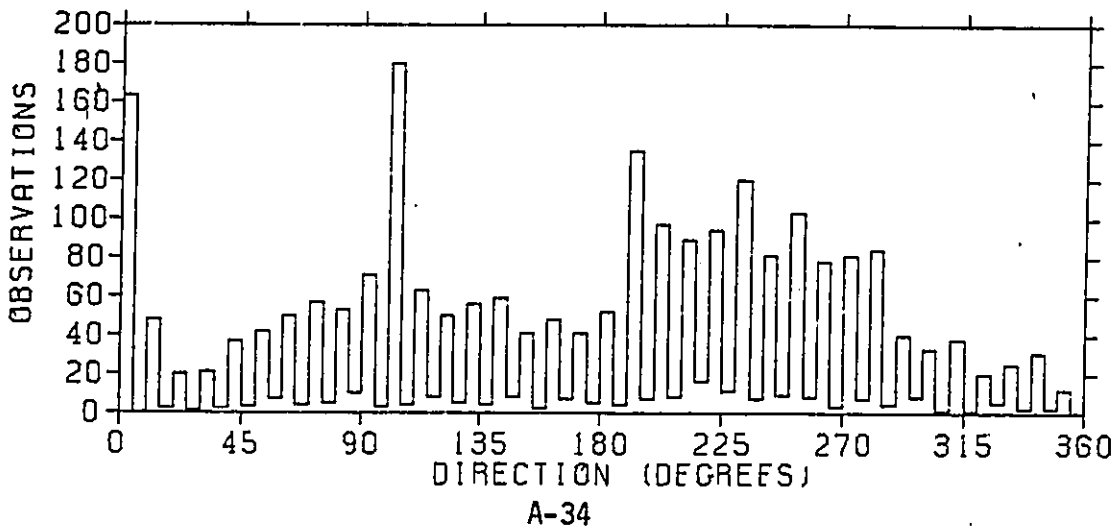
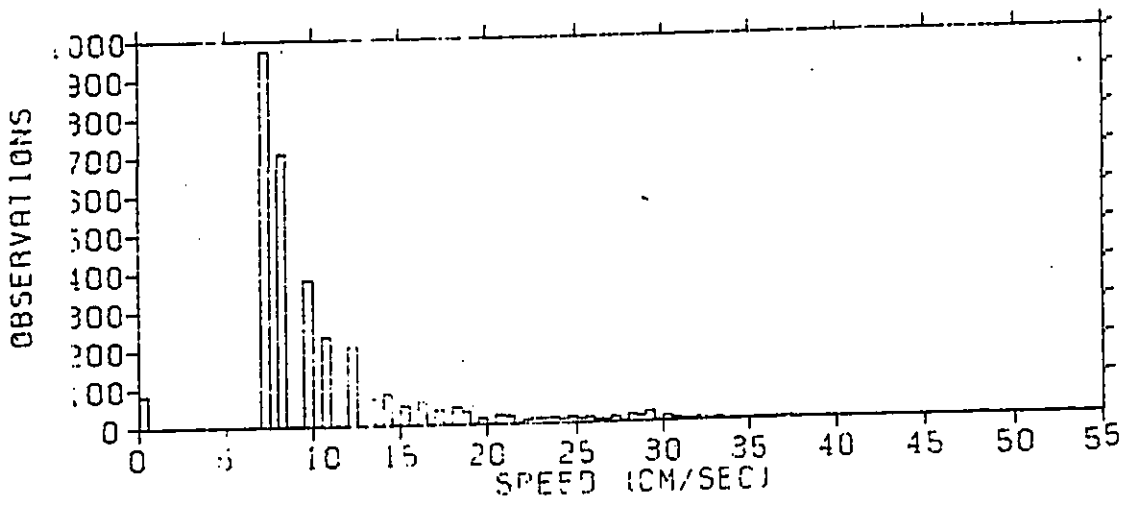


FIGURE A29

STATISTICS AND HISTOGRAMS OF CURRENTS AT METER LOCATION C
LOCATION = LAT 19 44.0N, LONG 156 03.2W, DEPTH = 146.3 METERS
OBSERVATION PERIOD = 1055 15 DEC 78 TO 0840 18 JAN 79 (33.9 DAYS)
N = 3256. DT = 15.00 MINUTES. UNITS = (CM/SEC)

	MEAN	VARIANCE	ST-DEV	SKEW	KURT	MAX	MIN
S	10.89	36.89	6.07	2.003	8.003	53.04	0.0
U	-1.02	49.32	7.02	0.057	2.433	19.21	-24.36
V	1.73	102.18	10.11	1.191	4.364	52.06	-22.83

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



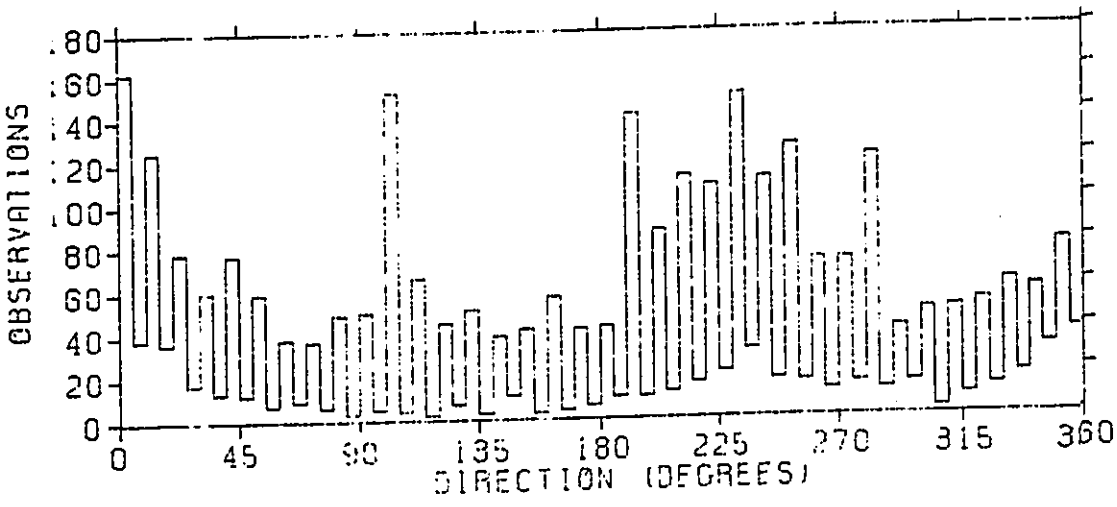


FIGURE A30a

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION C
LOCATION = LAT 19 44.0N. LONG 156 03.2W. DEPTH = 146.3 METERS
OBSERVATION PERIOD = 1444 10 SEP 78 TO 1417 30 SEP 78 (20.0 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)

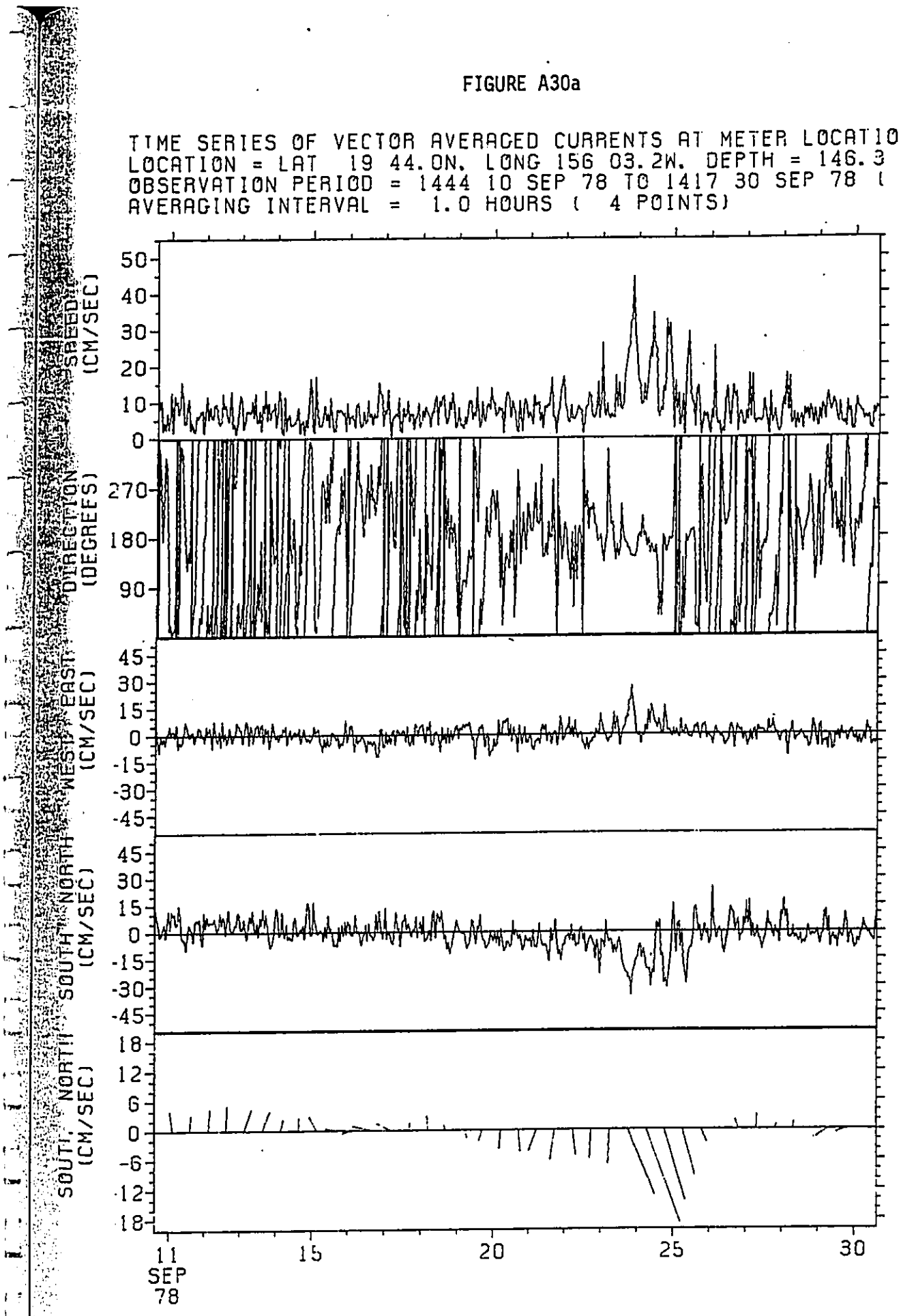
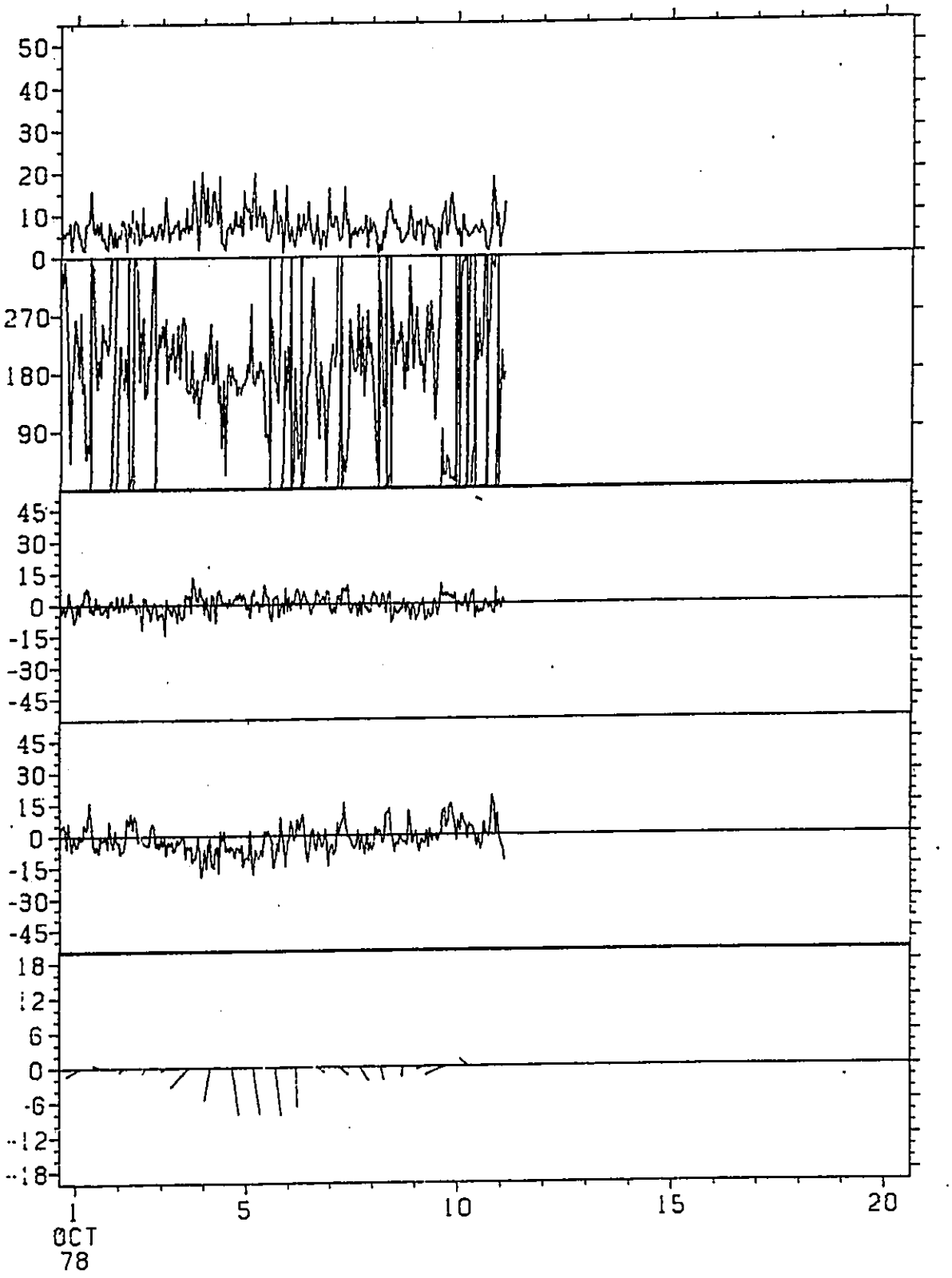
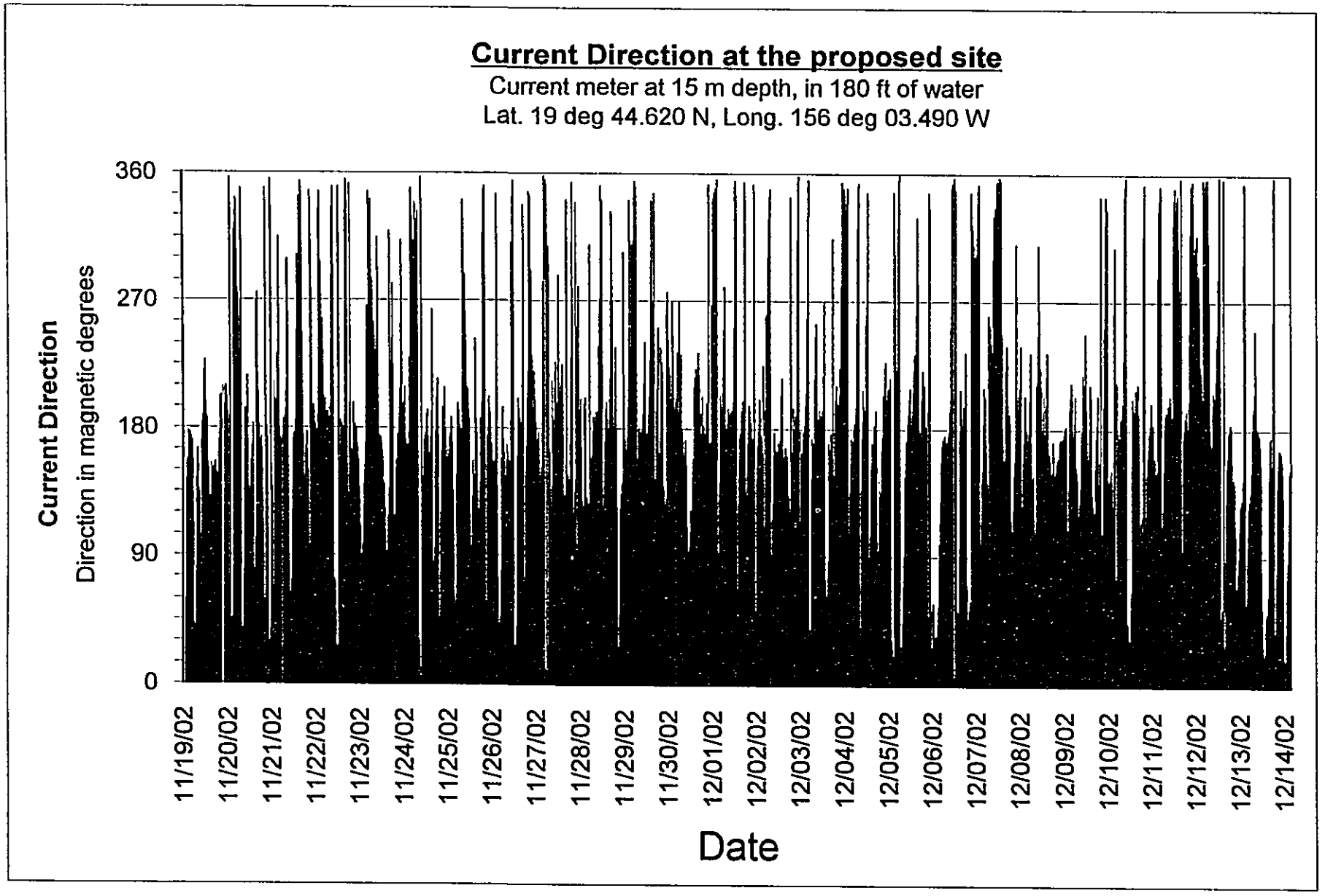
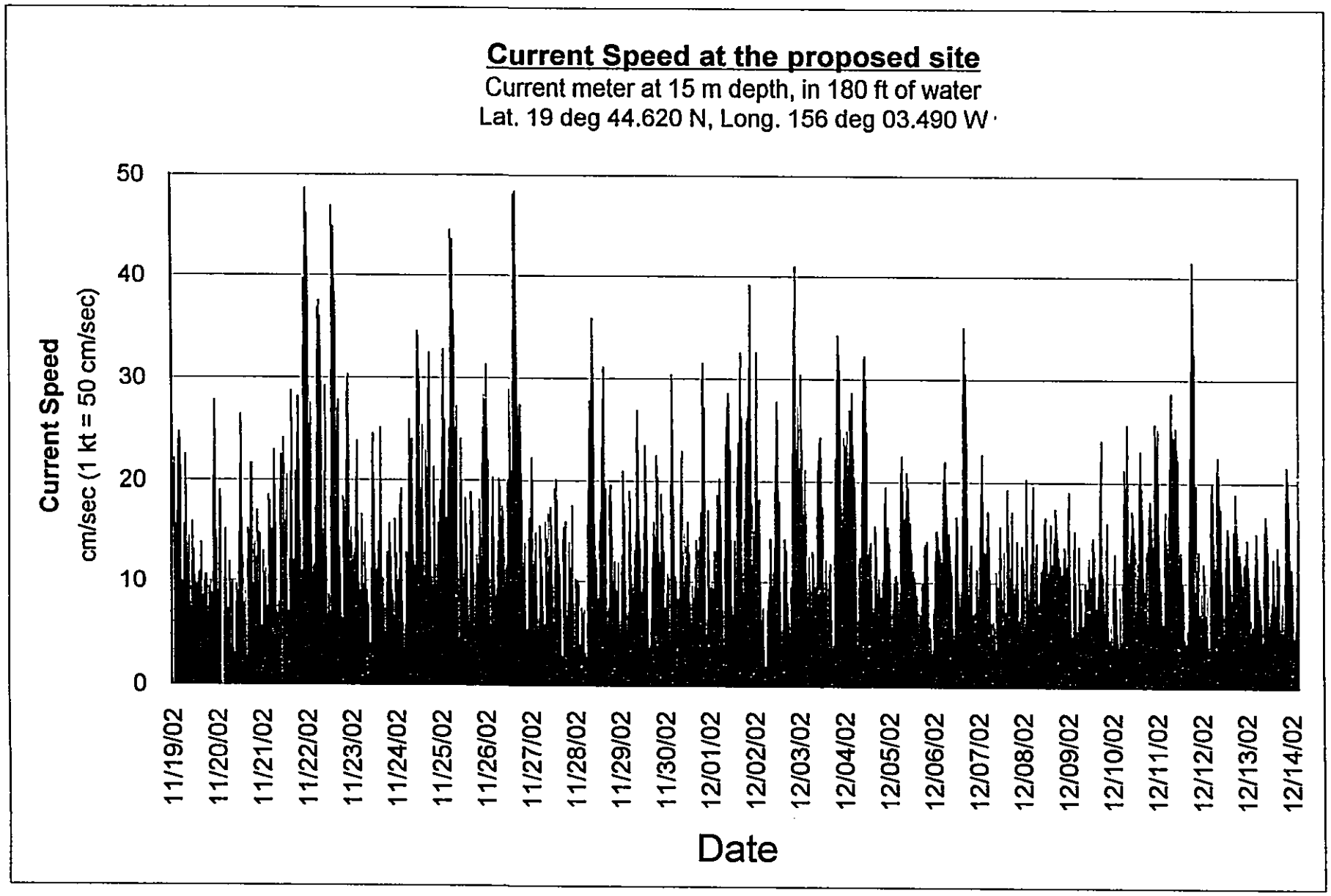


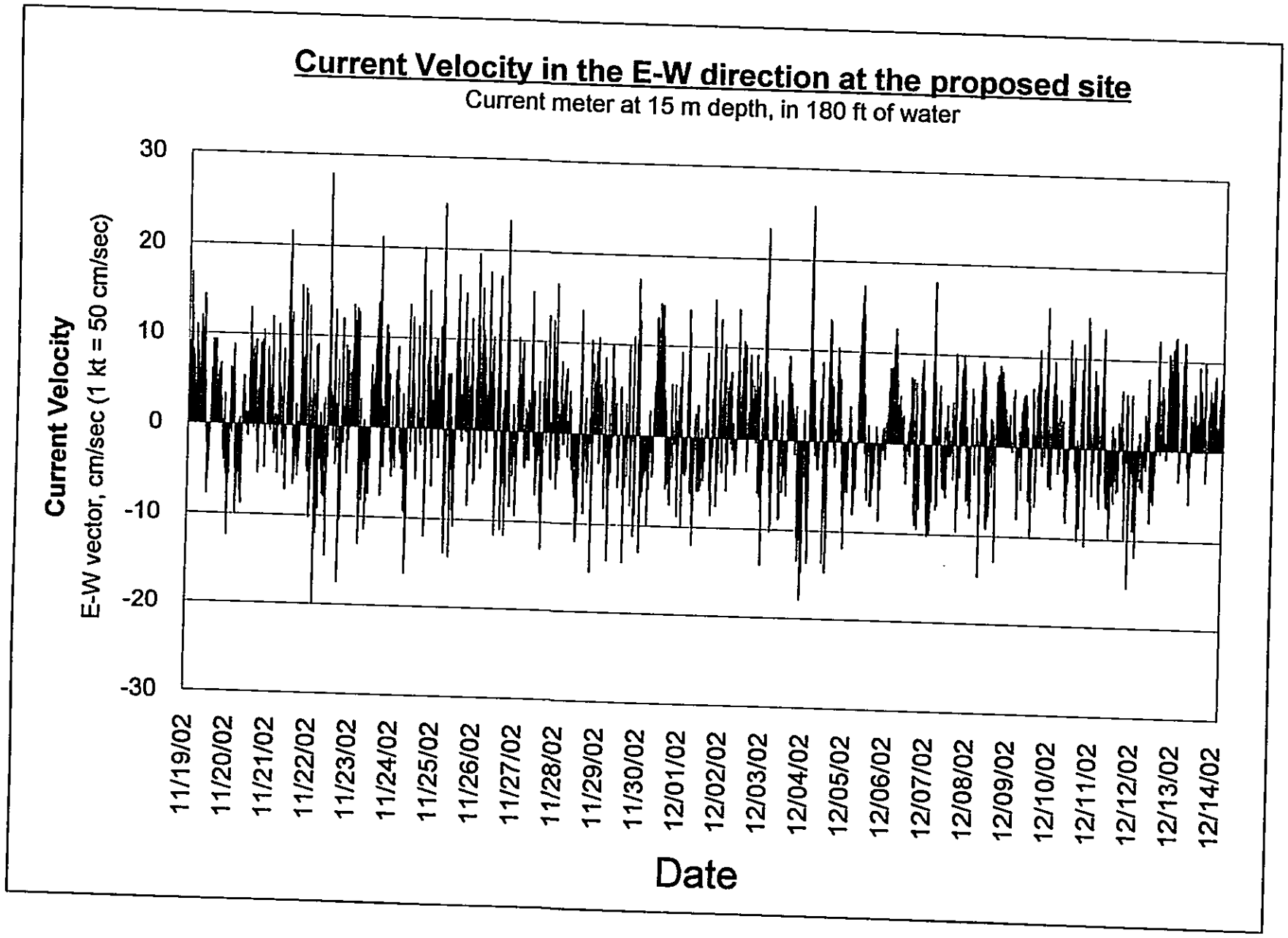
FIGURE A30b

TIME SERIES OF VECTOR AVERAGED CURRENTS AT METER LOCATION C
LOCATION = 1AT 19 44.0N. LONG 156 03.2W. DEPTH = 146.3 METERS
OBSERVATION PERIOD = 1444 30 SEP 78 TO 0217 11 OCT 78 (10.5 DAYS)
AVERAGING INTERVAL = 1.0 HOURS (4 POINTS)



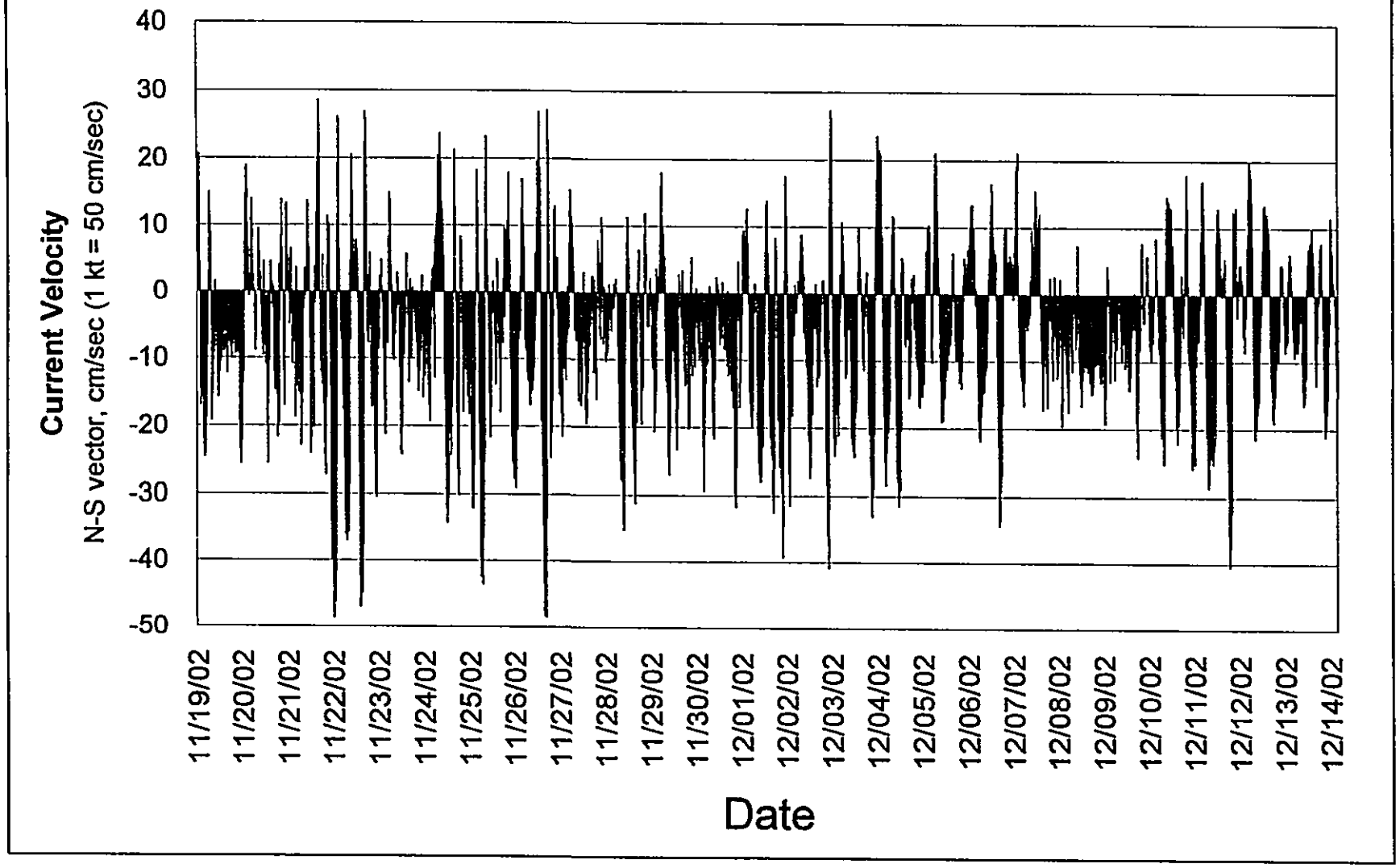






Current Velocity in the N-S direction at the proposed site

Current meter at 15 m depth, in 180 ft of water



APPENDIX I (c) : CURRENT DATA FROM METER ON SITE,

11 November – 14 December, 2002.

Direction, Speed, N-S vector and E-W vector.

APPENDIX I (d): ZONE OF MIXING LIMITATIONS AND MONITORING REQUIREMENTS FOR THE CATES INTERNATIONAL, INC., MOI FARM PROJECT OFF EWA BEACH, OAHU.

The following table is excerpted from NPDES Permit No. HI 0021792, Part C, Page 10 ("Authorization to discharge under the National Pollutant Discharge Elimination System).

	Limitations				Minimum Monitoring Requirements	
Parameter	Geometric Mean Not to Exceed the Given Value	Not to Exceed the Given Value More than Ten Percent of the time	Not to Exceed the Given Value More than Two Percent of the time	Unit	Frequency	Type of Sample
Total Nitrogen	110.00	180.00	250.00	µg/l	Once/month[1]	Grab
Nitrate + Nitrite Nitrogen	2.50	5.00	9.00	µg/l	Once/month[1]	Grab
Total Phosphorus	16.00	30.00	20.00	µg/l	Once/month[1]	Grab
Turbidity	0.20	0.50	1.00	N.T.U.	Once/month[1]	Grab
Total Zinc	86	86	86	µg/l	Once/month[1]	Grab
PH	7.6 – 8.6			Standard Unit	Once/month[1]	Grab[2]

1 The Permittee shall conduct the ZOM receiving water monitoring on the same day that the effluent monitoring.
2 The pH shall be tested within 15 minutes from the time the sample was collected.

APPENDIX II : BENTHIC COMMUNITY AND FISH BIOTA EVALUATION ON THE FRINGING REEF CREST INSHORE OF THE PROPOSED FISH SITE

Prepared by : West Hawaii Aquarium Project Team

ASSESSMENT
BLACK PEARLS, INC. SITE

FINAL REPORT

By WHAP TEAM

INTRODUCTION

The Black Pearls, Inc. site is located between Unualoha Point to the North and Ho'ona Bay just to the South. It is offshore and adjacent to the Keahole Airport, Kailua-Kona (approximately N 19°44.557' latitude and W 156°03.343' longitude). This site was surveyed on February 15, 2002. The primary goal of this project was to characterize the fish fauna and benthic habitat of this location.

METHODOLOGY

West Hawai'i Aquarium Project (WHAP) site marking and methodology was employed. Six stainless steel eyebolts were installed on the reef in the H pattern developed by WHAP to mark the site (figure 1). WHAP methodology employed consisted of two primary elements:

1. Belt transects for fishes:

Transects for fishes consisted of four 25-meter lines that were visually censused in a 2m wide by 4m high corridor on each side of the line by a pair of divers. The team makes two passes along the transect. On the first pass they swim high off the bottom and record mobile transient species that would likely move out of the area, and on the second low pass, the return leg, they count the cryptic fish. A 10-minute recon swim is done after the belt transects are completed to record fish species not seen on those transects.

2. Benthic characterization:

Digital videography of each 25m transects using methods developed by Hawai'i Coral Reef Assessment and Monitoring Project (CRAMP) was used. PointCount '99 software was utilized for this analysis.

RESULTS & DISCUSSION

FISHES

A total of 65 species of 20 families were observed with endemics constituting 16.9% of the total (Table 1). The introduced species *Cephalopholis argus* and *Lutjanus kasmira* were observed on the Recon (10-minute swim) only. The recent immigrant to Hawai'i *Balistes polylepis* was noted. *Abudefduf vaigiensis*, another recent immigrant however was not observed. No squirrelfishes or soldierfishes (Holocentridae) were observed. A very large school of pennantfish (*Heniochus diphreutes*) was observed at the slope during pin installation. In terms of trophic categories, Planctivores (69.55%) dominated this site (Table 2).

BENTHIC & CORAL COVERAGE

The area consisted of low to medium relief, basalt pavement with high coral cover, 50.1% live coral (Table 3). *Porites lobata* (29.18%), *Pocillopora meandrina* (8.18%), and old dead *P. lobata* (19.63%) were the dominant benthic elements of the site (Table 4). *Pocillopora eydouxi* was also present, however the majority of these were damaged. There was an anchor drag mark on the slope north of the center makai pin. Boulder habitat started at about the 30' depth and continued shoreward of the site. A steep slope at 50' covered by corals turning into rubble between 70-120' then graduating and gently sloping off into sand flats was seaward of the transects. No garden eels were observed. Max depth of survey 170 feet.

INVERTEBRATES

Of the six species of urchins surveyed, only three were recorded on the belt transects (Table 5). No *Acanthaster planci* were observed anywhere at the site.

CONCLUSIONS

The Black Pearls, Inc. site is characteristic of other areas along the West Hawai'i coast having drop-offs very close to shore. This is a high-energy environment during swells. The corals appeared healthy and the coverage was high. Fish populations were diverse and robust. The overall impression of this site was that of a vibrant and healthy reef comparable to some of Kona's best locations.

Table 1. List of fish species recorded at study site. Recon includes only those fish not observed on belt transects. Endemic species are in **bold** type.

Species	Transects	Recon
Abudefduf abdominalis		X
Acanthurus blochii		X
Acanthurus leucopareius		X
Acanthurus nigricans		X
Acanthurus nigrofuscus	X	
Acanthurus nigroris	X	
Acanthurus olivaceus	X	
Acanthurus dussumieri		X
Aphareus furca		X
Arothron meleagris		X
Aulostomus chinensis		X
Balistes polylepis		X
Cantherhines dumerilii		X
Canthigaster jactator	X	
Caranx melampygus		X
Centropyge potteri	X	
Cephalopholis argus		X
Chaetodon auriga		X
Chaetodon lunula		X
Chaetodon multicinctus	X	
Chaetodon ornatissimus	X	
Chaetodon quadrimaculatus	X	
Chaetodon unimaculatus		X
Chlorurus sordidus	X	
Chromis agilis	X	
Chromis hanui	X	
Chromis vanderbilti	X	
Chromis verater		X
Coris gaimard	X	
Ctenochaetus strigosus	X	
Decapterus macarellus		X
Diodon holocanthus		X
Exallias brevis	X	
Fistularia commersonii		X
Forcipiger flavissimus		X
Gomphosus varius	X	
Gymnothorax meleagris	X	
Halichoeres ornatissimus	X	
Labroides phthirophagus		X
Lutjanus kasmira		X
Macropharyngodon geoffroyi	X	
Melichthys niger	X	
Melichthys vidua	X	
Mulloidichthys flavolineatus		X
Naso hexacanthus	X	
Naso lituratus	X	

Table 1. List of fish species recorded at study site. Recon includes only those fish not observed on belt transects. Endemic species are in **bold** type.

Species	Transects	Recon
Naso unicornis		X
Oxycheilinus unifasciatus	X	
Paracirrhites arcatus	X	
Paracirrhites forsteri	X	
Parupeneus cyclostomus		X
Parupeneus multifasciatus	X	
Plectroglyphidodon johnstonianus	X	
Pseudocheilinus octotaenia	X	
Pseudocheilinus tetrataenia	X	
Scarus dubius		X
Scarus psittacus	X	
Scarus rubroviolaceus	X	
Stethojulis balteata	X	
Sufflamen bursa	X	
Thalassoma duperrey	X	
Xanthichthys auromarginatus	X	
Zanclus cornutus	X	
Zebrasoma flavescens	X	
Zebrasoma veliferum		X
Totals	38	27

Table 2. Overall fish trophic levels.

Trophic Level	% Fish Overall
Planctivores	69.55
Carivores (invertibrates)	15.54
Herbivores	9.21
Coralivores	2.81
Detritovores	2.47
Piscivores	0.43

Table 3.

Mean % Cover Substrate Category Totals

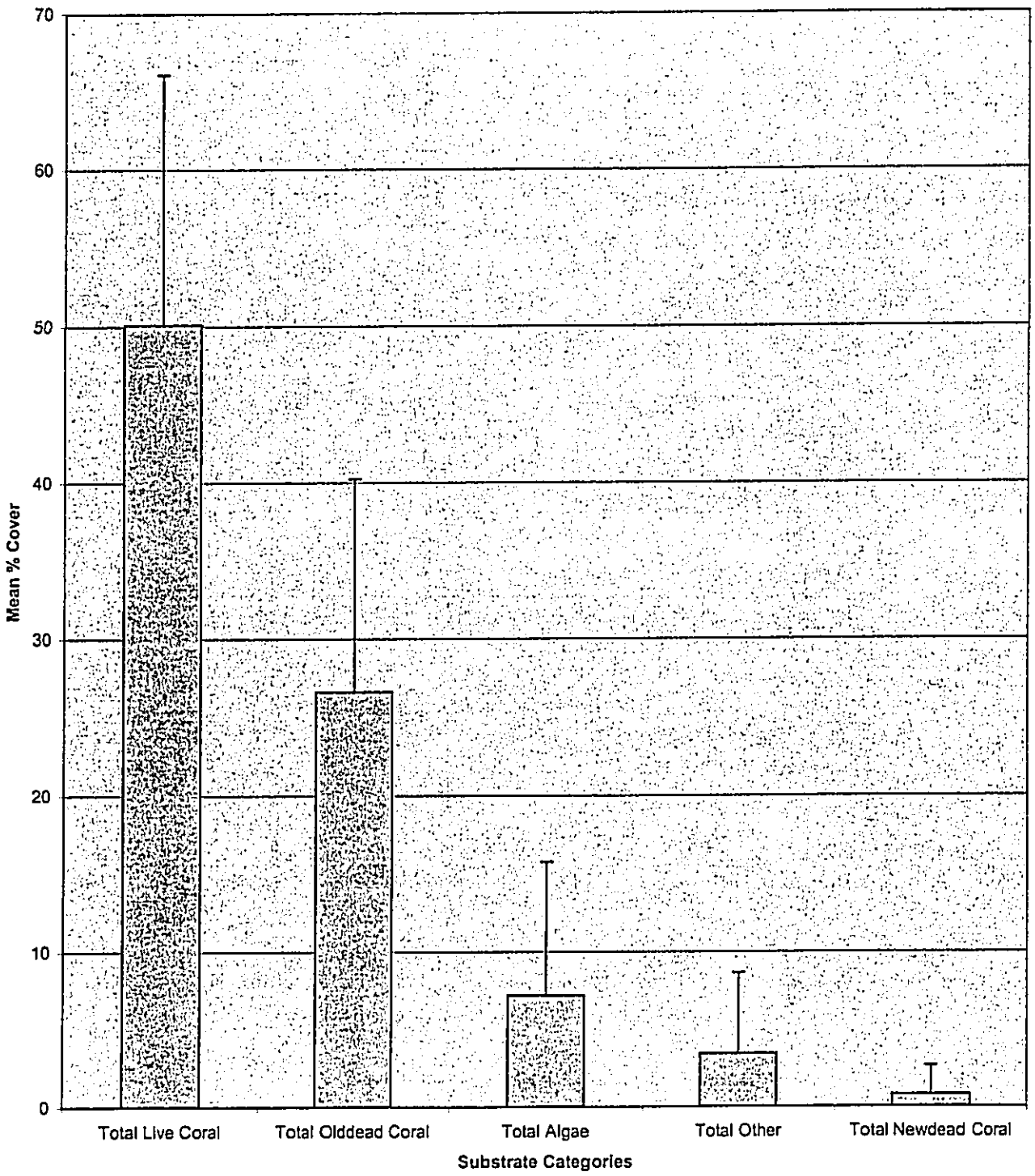


Table 4.

Mean % Cover of Substrate Types

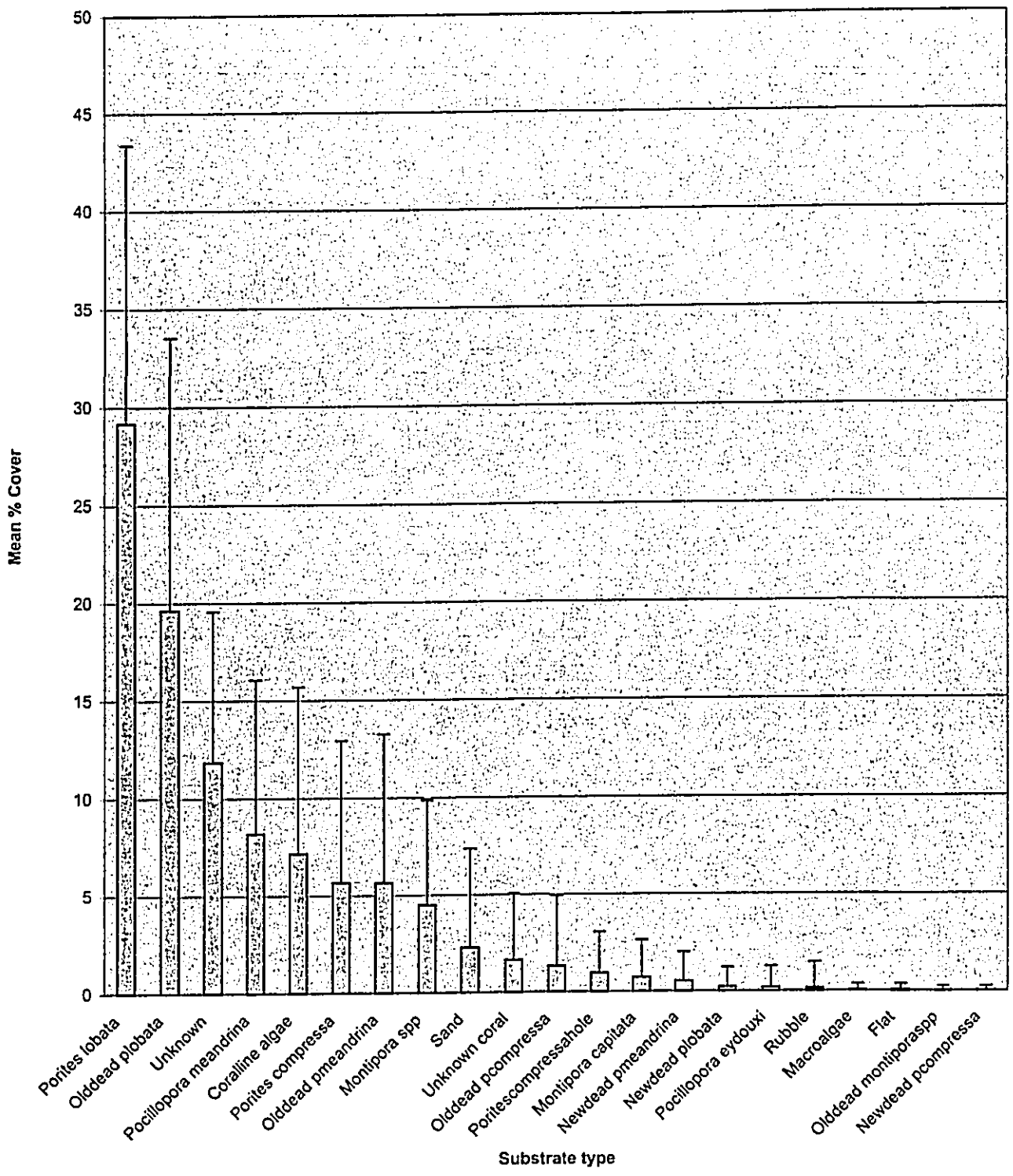


Table 5. Number of urchins on belt transects.

Species	Common Name	transect A	B	C	D
Chondrocidaris gigantea	Rough-spined urchin				
Diadema paucispinum	Long-spined urchin	3	1		
Echinothrix calamaris	Banded urchin				
Echinothrix diadema	Blue-black urchin			8	1
Heterocentrotus mammilatus	Red pencil urchin				
Tripneustes gratilla	Collector urchin	2	1		1

Table 6. Mean (#/4) of fishes on belt transects ranked in order of overall abudance.
Diet codes are: A=Algae, C=Corals, D=Detritus, F=Fish, I=Invertebrates, P=Plankton.
Endemic species are in **bold** type.

Family	Species	Diet	Transect				Mean	SD	% of Tot
			A	B	C	D			
Pomacentridae	*Chromis vanderbilti*	P	109	362	228	80	194.75	128.58	66.40
Cirrhitidae	*Paracirrhites arcatus*	I	16	17	17	29	19.75	6.18	6.73
Acanthuridae	*Acanthurus nigrofuscus*	A	16	13	25	18	18.00	5.10	6.14
Acanthuridae	*Ctenochaetus strigosus*	D	7	7	9	6	7.25	1.26	2.47
Pomacentridae	*Chromis agilis*	P	20	1	2	1	6.00	9.35	2.05
Labridae	*Pseudocheilinus tetrataenia*	I	5	3	10	3	5.25	3.30	1.79
Labridae	***Thalassoma duperrey***	I	6	0	6	4	4.00	2.83	1.36
Pomacentridae	*Plectroglyphidodon johnstonianus*	C	3	1	6	3	3.25	2.06	1.11
Balistidae	*Sufflamen bursa*	I	0	5	4	4	3.25	2.22	1.11
Canthigasteridae	***Canthigaster jactator***	I	4	0	5	2	2.75	2.22	0.94
Chaetodontidae	***Chaetodon multicinctus***	C	3	2	4	2	2.75	0.96	0.94
Labridae	*Pseudocheilinus octotaenia*	I	5	3	2	1	2.75	1.71	0.94
Labridae	*Halichoeres ornatissimus*	I	3	1	4	2	2.50	1.29	0.85
Pomacentridae	***Chromis hanui***	P	6	0	0	3	2.25	2.87	0.77
Acanthuridae	*Zebrasoma flavescens*	A	4	2	1	2	2.25	1.26	0.77
Labridae	*Gomphosus varius*	I	2	1	3	1	1.75	0.96	0.60
Mullidae	*Parupeneus multifasciatus*	I	4	0	1	2	1.75	1.71	0.60
Chaetodontidae	*Chaetodon ornatissimus*	C	4	2	0	0	1.50	1.91	0.51
Acanthuridae	*Acanthurus olivaceus*	A	0	2	1	2	1.25	0.96	0.43
Acanthuridae	*Naso lituratus*	A	1	2	1	1	1.25	0.50	0.43
Scardiae	*Scarus psittacus*	A	0	1	0	4	1.25	1.89	0.43
Scardiae	*Chlorurus sordidus*	A	0	1	0	3	1.00	1.41	0.34
Balistidae	*Xanthichthys auromarginatus*	P	1	0	0	2	0.75	0.96	0.26
Zanclidae	*Zanclus cornutus*	I	2	0	0	1	0.75	0.96	0.26
Acanthuridae	*Acanthurus nigroris*	A	1	0	0	1	0.50	0.58	0.17
Pomacanthidae	***Centropyge potteri***	A	1	1	0	0	0.50	0.58	0.17
Chaetodontidae	*Chaetodon quadrimaculatus*	C	0	0	0	2	0.50	1.00	0.17
Labridae	***Macropharyngodon geoffroyi***	I	0	2	0	0	0.50	1.00	0.17
Balistidae	*Melichthys vidua*	A	0	2	0	0	0.50	1.00	0.17
Labridae	*Oxycheilinus unifasciatus*	F	1	0	0	1	0.50	0.58	0.17
Cirrhitidae	*Paracirrhites forsteri*	F	0	0	1	1	0.50	0.58	0.17
Labridae	***Stethojulis balteata***	I	1	0	0	0	0.33	0.50	0.11
Labridae	*Coris gaimard*	I	0	0	0	1	0.25	0.50	0.09
Bleniidae	*Exallias brevis*	C	0	0	1	0	0.25	0.50	0.09
Muraenidae	*Gymnothorax meleagris*	F	0	1	0	0	0.25	0.50	0.09
Balistidae	*Melichthys niger*	A	1	0	0	0	0.25	0.50	0.09
Acanthuridae	*Naso hexacanthus*	P	0	0	1	0	0.25	0.50	0.09
Scardiae	*Scarus rubroviolaceus*	A	0	0	1	0	0.25	0.50	0.09
	Totals		226	432	333	182	293.3		

Table. 7

Cover Type	102	103	104	105	107	112	113	114	115	116	118	119	122	123	130	131	134	136	137	138	202	204	206	209	211
Porites lobata	36	46	68	22	38	22	4	6	14	14	12	60	16	16	46	28	48	24	30	22	60	36	30	36	36
Porites compressa	10	12	0	18	16	8	0	0	2	6	12	4	14	10	12	16	14	30	0	0	0	0	8	20	6
Pocillopora meandrina	2	4	4	14	2	12	6	4	0	32	4	0	16	8	28	20	2	0	12	4	0	0	6	0	14
Pocillopora eydouxi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montipora capitata	0	0	0	0	0	0	0	0	4	2	0	2	0	8	0	4	4	12	0	0	0	4	0	0	0
Montipora spp	2	0	0	0	0	14	8	0	0	6	2	0	2	2	0	2	0	2	0	0	0	0	2	4	2
Unknown coral	8	0	8	18	4	0	0	6	0	2	4	0	20	6	0	2	0	0	0	2	0	0	2	2	0
Total Live Coral	58	62	80	72	60	56	18	16	20	62	34	66	68	50	86	72	68	68	42	28	60	40	48	62	58
Olddead pcompressa	8	8	0	0	8	0	0	0	0	0	24	12	0	4	0	0	8	0	0	0	0	0	0	0	0
Olddead plobata	2	18	2	0	0	8	2	2	10	8	14	8	0	8	6	10	2	18	32	24	16	6	18	16	16
Olddead pmeandrina	2	0	0	4	0	6	0	8	0	0	0	0	0	0	0	0	10	0	6	8	0	38	20	0	8
Olddead montiporaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Olddead.Coral	12	26	2	4	8	14	2	10	10	8	38	20	0	12	6	10	20	18	38	32	16	44	38	16	24
Newdead plobata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Newdead pmeandrina	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	0	0	0	0	0
Newdead pcompressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Newdead.Coral	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	0	0	0	0	0
Coralline algae	2	0	4	4	0	20	40	24	48	8	8	0	2	14	0	8	2	12	10	2	6	2	2	4	0
Macroalgae	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Algae	2	2	4	4	0	22	40	24	48	8	8	0	2	14	0	8	2	12	10	2	6	2	2	4	0
Poritescompressahole	6	2	0	4	8	4	0	0	0	0	2	4	4	0	0	2	2	0	0	0	0	0	0	6	0
Rubble	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand	0	0	0	0	0	0	2	10	6	4	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0
Flat	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Other	6	2	0	4	8	4	2	12	6	6	2	4	4	0	0	2	2	0	0	22	0	0	0	6	0
Unknown	22	8	14	14	24	4	38	38	16	16	18	10	24	24	8	8	8	2	10	12	18	14	12	12	18
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table. 7

216	218	219	220	222	223	226	228	229	230	232	233	234	237	240	301	302	308	317	319	322	323	325	326	327	328	329	330	331	332
50	20	40	22	14	24	10	30	38	54	42	16	42	48	28	34	32	10	16	24	34	28	20	20	20	22	24	24	18	10
0	28	0	0	2	0	2	12	0	8	0	32	6	10	8	18	6	12	0	0	10	8	2	6	6	0	0	0	0	8
0	2	18	0	10	8	4	14	10	2	0	8	0	0	0	4	12	6	0	26	2	6	2	16	10	0	18	28	0	24
0	0	0	0	0	0	0	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	0	0	2	0	2	0	0	0
0	2	2	4	6	4	0	4	0	0	2	4	8	0	4	6	2	12	6	8	2	4	10	16	2	6	0	2	12	8
4	2	0	0	0	0	0	2	2	0	0	0	0	6	2	0	0	0	0	0	0	0	0	2	4	2	0	0	0	0
54	54	60	26	34	36	16	62	54	72	44	60	60	64	42	62	52	40	26	58	48	46	34	60	44	30	44	54	30	50
0	0	0	0	0	0	0	6	0	0	0	0	2	0	2	4	0	2	0	0	10	0	0	0	2	0	0	0	0	2
18	30	28	48	38	30	30	8	4	4	28	16	20	22	42	20	14	16	48	14	22	30	20	18	26	40	42	28	52	26
10	0	2	0	4	0	12	14	8	6	2	8	0	0	2	0	24	30	0	12	12	10	12	0	4	0	0	0	0	6
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
28	30	30	48	42	30	42	28	12	10	30	24	22	22	46	24	38	48	48	26	44	40	32	20	32	40	42	28	52	34
2	0	0	0	0	0	0	0	8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	6	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	2	0	0	0	0	6	8	0	0	2	2	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0
0	6	2	10	6	2	22	0	2	4	6	0	0	2	6	0	0	0	6	4	0	0	10	8	16	10	8	10	16	8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	6	2	10	6	2	22	0	2	4	6	0	0	2	6	0	0	0	6	4	0	0	10	8	16	10	8	10	16	8
2	2	0	0	0	0	0	4	0	0	0	12	2	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	16	10	4	0	0	0	0	0	2	0	0	0	0	0	18	0	0	0	14	0	0	18	2	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	0	0	16	10	4	4	0	0	0	12	4	4	0	4	0	0	18	0	0	0	14	0	0	18	2	0	0	0
14	8	6	16	2	22	16	0	24	14	20	2	12	8	6	10	8	12	2	12	8	14	10	12	2	2	4	8	2	8
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table. 7

333	335	336	337	338	401	402	403	406	410	412	413	417	418	420	422	424	427	428	430	431	434	436	437	439		Mean
16	54	28	22	18	36	30	24	30	46	38	34	20	6	8	4	50	42	30	30	42	44	34	18	46		29.175
0	0	2	0	4	4	8	6	6	2	6	10	0	2	0	0	0	0	0	0	0	0	0	2	0		5.675
6	4	10	0	0	10	10	10	0	2	14	14	0	10	20	14	12	10	14	18	12	10	10	0	20		8.175
0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0		0.2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0		0.725
22	0	8	4	10	4	6	20	14	6	0	0	0	0	0	22	0	0	6	6	14	4	10	6	14		4.5
2	2	0	0	0	0	0	0	0	2	2	0	2	4	0	2	0	0	0	0	0	2	4	0	0		1.65
46	60	48	26	32	54	54	60	50	58	60	58	22	22	32	42	62	54	50	54	68	60	58	28	80		50.1
0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0		1.325
36	14	28	52	50	16	12	8	12	8	14	0	50	40	24	36	24	14	10	28	10	20	8	20	8		19.625
8	8	0	0	2	12	14	14	22	18	4	0	0	0	2	2	6	0	6	0	8	0	18	14	6		5.65
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.025
44	22	28	52	52	28	26	24	34	26	18	0	50	40	26	38	30	16	16	28	18	20	26	34	14		26.625
0	0	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.225
0	0	0	0	0	0	4	2	0	2	8	0	0	0	0	0	0	0	2	0	0	0	0	0	0		0.525
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.025
0	0	0	0	0	0	4	2	2	4	10	0	0	0	0	0	0	0	2	0	0	0	0	0	0		0.775
2	10	14	14	14	6	2	4	0	6	0	20	18	2	14	8	2	22	6	4	4	4	0	6	4		7.15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.05
2	10	14	14	14	6	2	4	0	6	0	20	18	2	14	8	2	22	6	4	4	4	0	6	4		7.2
0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0		0.95
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0		0.15
2	4	0	4	0	0	0	0	2	2	0	0	6	12	18	6	0	0	0	0	0	0	0	0	0		2.3
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.05
2	4	0	4	0	0	0	0	2	2	0	2	6	12	18	6	0	0	0	0	0	0	0	12	0		3.45
6	4	10	4	2	12	14	10	12	4	12	20	4	24	10	6	6	8	26	14	10	16	16	20	2		11.85
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		100

Table. 7

St. Dev.		Mean (val)	St. Dev. (val)			All Categories				Totals
					Cover Type	Mean (val)	St. Dev. (val)		Cover Type	Mean (val)
14.20178		29.175	14.2017783		Porites lobata	29.175	14.20177828		Total Live Coral	50.1
7.252717		5.675	7.25271665		Olddead plobata	19.625	13.9078113		Total Olddead Coral	26.625
7.880074		8.175	7.88007421		Unknown	11.85	7.721579166		Total Algae	7.2
1.083828		0.2	1.08382819		Pocillopora meandrina	8.175	7.880074214		Total Other	3.45
1.91579		0.725	1.91579048		Coralline algae	7.15	8.525612937		Total Newdead Coral	0.775
5.367507		4.5	5.36750655		Porites compressa	5.675	7.252716645			
3.394336		1.65	3.39433631		Olddead pmeandrina	5.65	7.595968284			
15.97752		50.1	15.9775158		Montipora spp	4.5	5.367506552			
3.613529		1.325	3.61352943		Sand	2.3	5.062645528			
13.90781		19.625	13.9078113		Unknown coral	1.65	3.39433631			
7.595968		5.65	7.59596828		Olddead pcompressa	1.325	3.613529429			
0.223607		0.025	0.2236068		Poritescompressahole	0.95	2.11025225			
13.60042		26.625	13.6004235		Montipora capitata	0.725	1.91579048			
1.005995		0.225	1.00599469		Newdead pmeandrina	0.525	1.483879623			
1.48388		0.525	1.48387962		Newdead plobata	0.225	1.00599469			
0.223607		0.025	0.2236068		Pocillopora eydouxi	0.2	1.083828189			
1.868967		0.775	1.86896709		Rubble	0.15	1.341640786			
8.525613		7.15	8.52561294		Macroalgae	0.05	0.31421995			
0.31422		0.05	0.31421995		Flat	0.05	0.31421995			
8.548299		7.2	8.54829911		Olddead montiporaspp	0.025	0.223606798			
2.110252		0.95	2.11025225		Newdead pcompressa	0.025	0.223606798			
1.341641		0.15	1.34164079							
5.062646		2.3	5.06264553							
0.31422		0.05	0.31421995							
5.199562		3.45	5.19956181							
7.721579		11.85	7.72157917							
0		100	0							

Table. 7

St. Dev. (val)												
15.97751585												
13.60042349												
8.548299113												
5.199561812												
1.868967088												

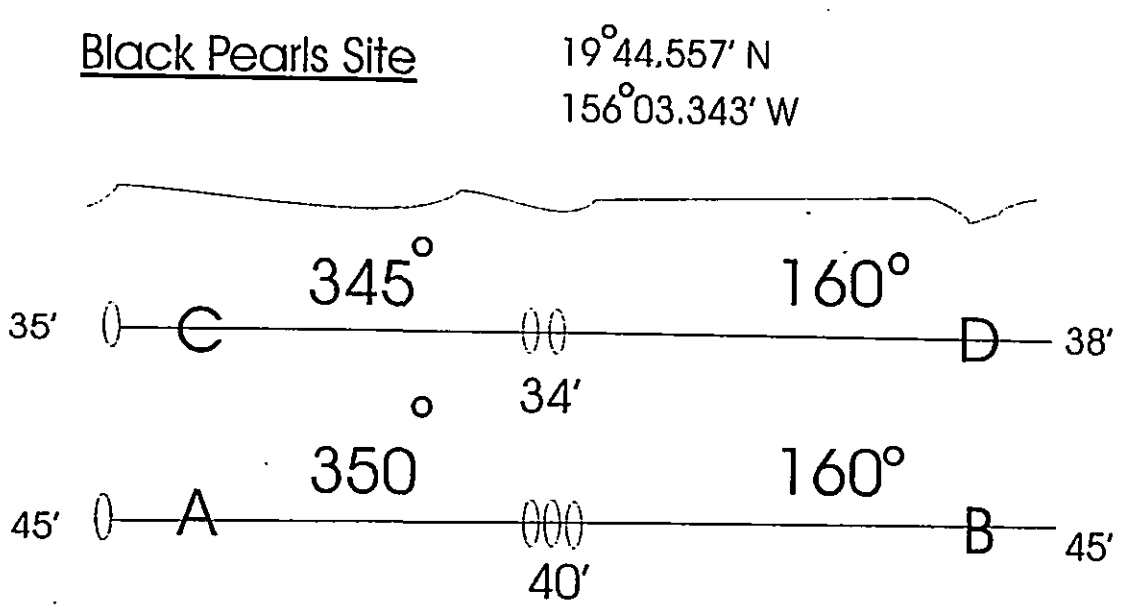

Black Pearls Site
19°44.557' N
156°03.343' W
345°
160°
35'
C
D
38'
34'
350
160°
45'
A
B
45'
40'

Figure 1.

APPENDIX III : RECREATIONAL FISHING AND OTHER USES OF THE KEAHOLE AIRPORT OFFSHORE AREA

Prepared by : Neil Anthony Sims, KBWF/BPI

RECREATIONAL USE SURVEY OF THE WATERS OFFSHORE AND SURROUNDING UNUALOHA POINT, KONA COAST, HAWAII

By : Dr Dale J. Sarver and Neil Anthony Sims
Kona Blue Water Farms dba Black Pearls, Inc.
P.O. Box 525, Holualoa, HI 96725

December 11th, 2001

INTRODUCTION:

This recreational use survey was conducted as an adjunct to a comprehensive Environmental Assessment (EA) of the Unualoha Point offshore area, as part of an application for a Conservation District Use Permit, and a concurrent application for an ocean lease (as specified under Chapter 190 D) for an offshore fish farm (Figure 1).

It is intended to provide an assessment of the level of public use in the area directly impacted by the fish farm, and in the surrounding waters.

This survey only covers boat-based activity. Other shore-based activity is addressed elsewhere in the EA.

METHODS :

A survey of boat activity north of Keahole Point was conducted by visual observation of the area by BPI employees, over a two month period : August and September, 2001. The survey therefore covered one month of summer vacation, when tourist and other recreational users may more frequently visit the site.

The Keahole area is very exposed to heavy North and West ocean swells, which primarily occur over the winter months (November – March). Strong trade winds also are prevalent in winter, and blowing generally from the North or Northeast. Recreational use of the Unualoha-to-Keahole area is therefore significantly diminished over winter.

Over the summer period, the Kona Coast is also occasionally subjected to smaller South or Southwest ocean swells. Under these sea conditions, the waters of Ho'ona Bay or Makako Bay are reasonably well protected. Recreational use of the area is therefore higher in the summer.

In general, therefore, the survey period covered two of the months when recreational activity is probably heaviest. If extrapolated over the whole year, the use figures here probably represent an overestimate. However, for the purposes of this survey, such an overestimate is considered a conservative, preferable approach.

The survey design covered all 61 days of the two-month period, with a prescribed three observations each day. Observations were intended to be each three hours, on the hour, with the time moving forward incrementally, by one hour each day, to provide overall coverage each three days between 9 a.m. and 5 p.m. The pattern of planned observations for the first week of August (the start of the survey) is shown in Table 1.

TABLE 1 : SURVEY DATA SHEET, SHOWING TIMES AND AREAS OBSERVED

UNUALOHA AREA RECREATIONAL USE SURVEY : AUG-SEPT, 2001							
DATE	DAY	TIME	AREAS :	(List no. boats and activity)			
			OFFSHORE OF FARM	FARM AREA	UNUALOHA SHORE	MAKAKO BAY	HO'ONA BAY
08/01/01	WED	09:00 AM					
		12:00 AM					
		03:00 PM					
08/02/01	THUR	10:00 AM					
		01:00 PM					
		04:00 PM					
08/03/01	FRI	11:00 AM					
		02:00 PM					
		05:00 PM					
08/04/01	SAT	09:00 AM					
		12:00 AM					
		03:00 PM					
08/05/01	SUN	10:00 AM					
		01:00 PM					
		04:00 PM					
08/06/01	MON	11:00 AM					
		02:00 PM					
		05:00 PM					
08/07/01	TUES	09:00 AM					
		12:00 AM					
		03:00 PM					

Not all observations were able to be completed on each day. A total of 150 observations were made, instead of the planned 183 (a total of almost 82% coverage).

For any one observation, an observer stood at a designated vantage point, on the lava shelf near the shoreline to the north of Keahole Point lighthouse (Figure 1). This provided a clear view of all the waters north of Keahole. The delineation between the offshore and farm areas was made by relating the proposed farm area to the appropriate compass headings that described the area. Rock markers were used to facilitate sightings. Boats that were in deeper water inside of the farm area were attributed to either Unualoha Shore or Makako Bay, depending on which site they were closes to.

High-powered binoculars (Focal brand, 10 x 50 mm) were used to closely observe the vessels, to identify the specific activities they were engaged in. A vessel flying the dive flag was presumed to be diving. Other vessels at anchor which were not displaying the dive flag were presumed to not be diving. Swimmers or snorkelers were often visible on the surface near the boat, but these boats may also have been involved in bottom fishing. They may also have been diving, however, and simply not displayed the dive flag. Transiting boats were those under power where no fishing gear was evident (poles or lines trolling behind. Only those where the fishing gear was obviously in use were classified as trolling.

RESULTS :

Site and type of use :

Only one boat was seen in the proposed farm area over the entire two month period: a single vessel in transit (Figure 2). There was also limited activity in the area offshore of the proposed farm area, with only 16 instances (8 boats transiting, 6 trolling, and 2 sailing the offshore waters).

The greatest use encountered over the survey was for diving along the shoreline. Boats at anchor, diving, represented over 71% of total observations (68 events, out of a total of 96 boat/events observed over the survey period). The greatest majority of these were along the Unualoha shoreline (68%, or 46 events), with considerably fewer in Makako Bay or Ho'ona Bay (15 and 7 events, respectively; almost all at anchor, diving).

There were several instances of close interaction between vessels and spinner dolphins. On 9/24/01, at 11 am, two boats were observed together in deeper water along the edge of the reef drop-off, at Unualoha shoreline, drifting around a school of spinner dolphins, with divers in the water. These boats were classified as "At anchor, diving" activity. Two boats, on two separate occasions, were also observed at anchor, with divers in the water, in close proximity to a dolphin school along the Unualoha shoreline. On one instance, a boat transiting out of the Makako Bay area was also seen to be idling close to a school of dolphins, but no divers were seen in the water.

Time of use :

The use of the area was somewhat greater in August (54 instances) than in September (42 instances). Heaviest use was in the first three weeks of August, when on ten days the activity over the course of the day averaged at or above one event per observation (Figure 3). Over these three weeks, the overall average activity was 2.3 events per day. Thereafter, use declined to almost half (average of 1.2 events per day). This coincides with the peak summer holiday period.

In the week after September 11th, use was relatively high (2 events per day), indicating that there was no immediate impact from the terrorist events which occurred then.

Most of the diving activities at Makako Bay and Unualoha shoreline was in the morning, between 9 am and 12 midday. This is when most commercial dive tours are operating. In the afternoons, when the onshore winds are prevalent, diving and other boating activity inshore is significantly reduced. There was not a single instance of a boat at Makako Bay after 12 midday (Figure 4), and most activity along the Unualoha shoreline was in the morning hours (Figure 5). A few dive boats were observed along the Unualoha shoreline in the early afternoons (1300 – 1400 hrs, ibid), but almost no events occurred thereafter.

Activities offshore of the farm site occurred throughout the day, with peaks of activity in the middle morning and mid-afternoon. This perhaps reflects the time of greatest activity of charter boats on the fishing grounds, or of half-day excursions for tourists up to Mahaiula Bay.

DISCUSSION :

Negligible use of the proposed area :

The survey results indicate negligible use of the proposed offshore farm lease area. The greatest impacts of the proposed fish farm on existing recreational use of the area will be the visual impact upon divers, as they pass to or from the preferred dive sites at the Unualoha shoreline and Makako Bay. The surface activity on the farm site would represent some level of navigational hazard, but provided that the surface vessels and other floating structures are sufficiently marked, the additional risks would be minimal. KBWF is working with the U.S. Coast Guard, to devise appropriate marking and lighting arrays, to minimize the risk of collision.

Impacts on commercial dive operators :

The diving activity along the shoreline (Unualoha to Ho'ona) is almost exclusively from commercial dive operations, taking tourist dive clients. This is reflected in the significant drop-off in activity after the third week of August. Also, there was no noticeable increase in activity on weekends, as would be expected if the dive activity consisted of a large component of local, non-commercial dive operations.

The survey actually under-reports dive activity in the area, as it does not consider the commercial dive tour boats, which take clients to the manta-ray dive site in Makako Bay, at night. Casual observations indicate that up to five boats may be present, at any one time. Some of these boats move into the Makako Bay area well before sunset, and may have been recorded as transiting or at anchor for observations made at 5 p.m. Regardless of the time of ingress and egress of these vessels, however, the impacts of the farm on these boats, and on the manta ray diving, will probably be no greater than the impacts on other recreational dive boats (i.e. a visual impact, and a navigational hazard).

The only potential additional impact would be if the farm were to use high-intensity lights at night, which may draw copepods to the farm, and therefore attract manta rays. This could conceivably draw manta rays away from the Makako Bay dive site, and detract from the night-diving experience there. There is no intention to place high-intensity lights on the farm, other

than special security lights, which would be activated in times of inclement weather, for safety, or when there is any intrusion onto the farm.

As this survey was conducted over the summer months, extrapolation over the full year would probably over-represent the level of year-round diving activities. In winter, the heavy north-west swells and strong NE trade winds severely curtail boating and diving in the area north of keahole Point.

Impacts on other commercial tour operators :

Extrapolation of these results over a full year would also probably over-represent the amount of offshore fishing, both by locals and by commercial charter fishing boats. The summer months are when most action occurs on the 'grounds', as the runs of small tuna (skipjack tuna, *Katsuwonus pelamis*, and yellowfin tuna, *Thunnus albacares*) and mahimahi usually peak around August and September. July and August are also the months when the big game fishing tournaments bring tourists and competitors from all over the world, for these celebrated events targeting Kona's famed billfish.

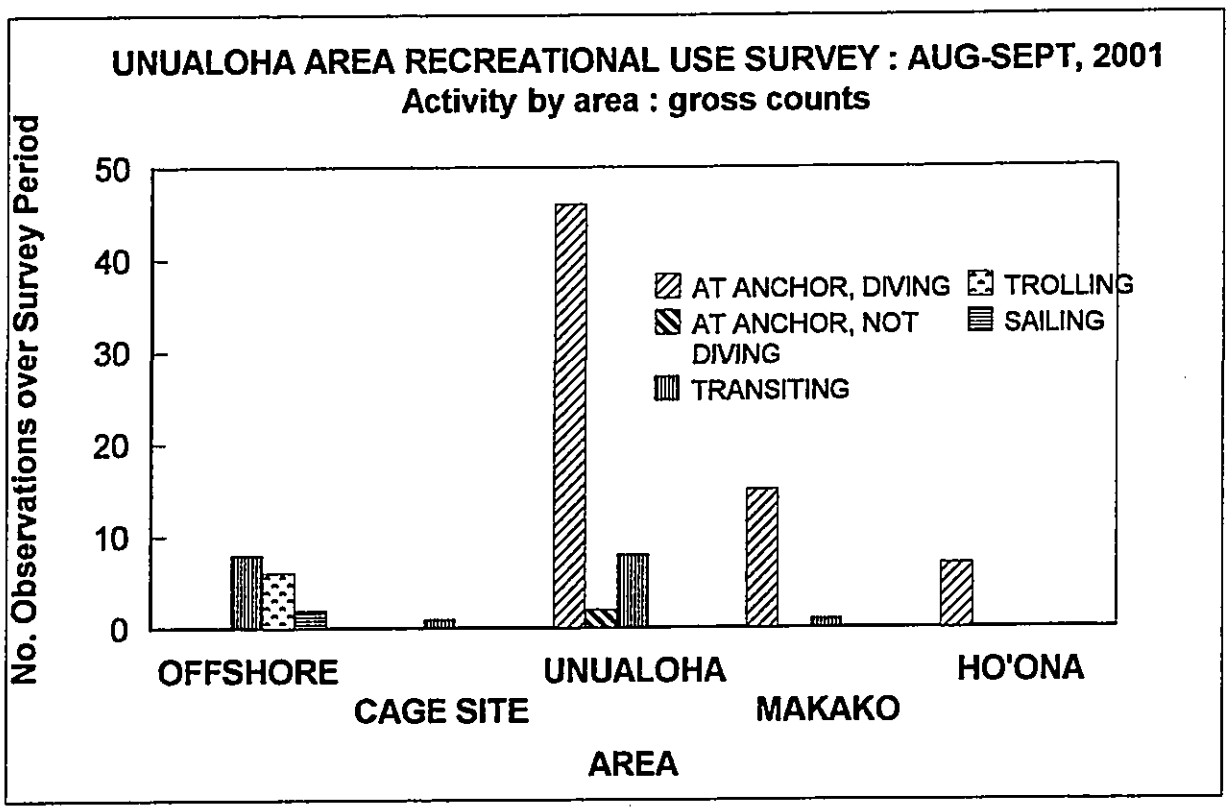
Most tourists engaging in big game fishing, and most of the fishing public locally, would probably support the concept of offshore fish farming as a means of reducing fishing pressure on wild stocks. Mahimahi, in particular, would attract a lot of attention and interest, as it is a pelagic species that is considered a 'flag fish' under IGFA rules.

By the same token, as this survey was conducted over the summer months, it does not reflect increased boat activity from whale watching tours, which in winter occasionally venture north of Keahole Point. Presumably, some of the boat traffic reported here as transiting through the area, is commercial marine mammal –watching, as in summer these tours may come into the spinner dolphin resting areas. The impacts on these marine mammal-watching tours would be similar to the impacts on commercial dive operations and commercial charter boat operators – a visual presence and navigational obstruction, the primary impact of which will be based on the *perceived* impacts of the farm on the Kona Coast marine environment.

Public perceptions and sustainable resource management:

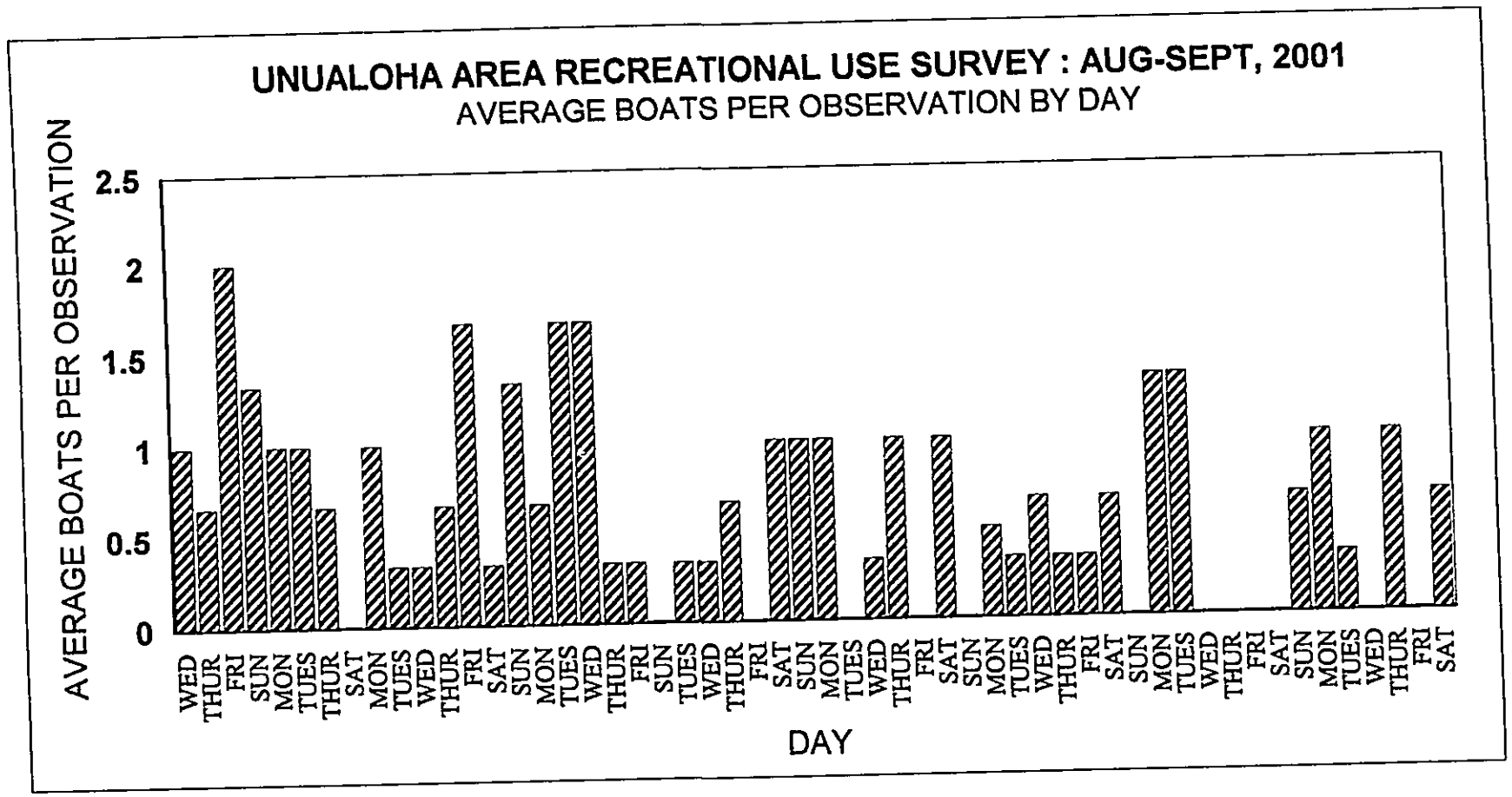
The presence of a commercial fish farm – particularly one which cultures native fish species which have been heavily overfished – could be as much an environmental positive as a detraction. Rather than being presented to visitors as an unsightly obstruction, the farm could help to foster the image of Kona, and especially NELHA, as a center for environmentally-conscious, sustainable marine resource development. Much would depend on the public profile of the operation, the other environmental impacts, and the perceived role that the farm plays in recruitment supplementation or other stock enhancement programs. The farm proponents are very much aware of this sensitivity, and will consciously strive to present the public image of the farm to the local community and to visitors as an environmental enhancement, which reflects Kona's leading role in marine research, development and management.

FIGURE 2



08/05/02 03:55:39 PM UNUALOHA REC SURVEY 2 Activity by Area.123

FIGURE 3



08/05/02 03:59:08 PM LINUALOHA REC SURVEY 4 Avg Use 123

FIGURE 4

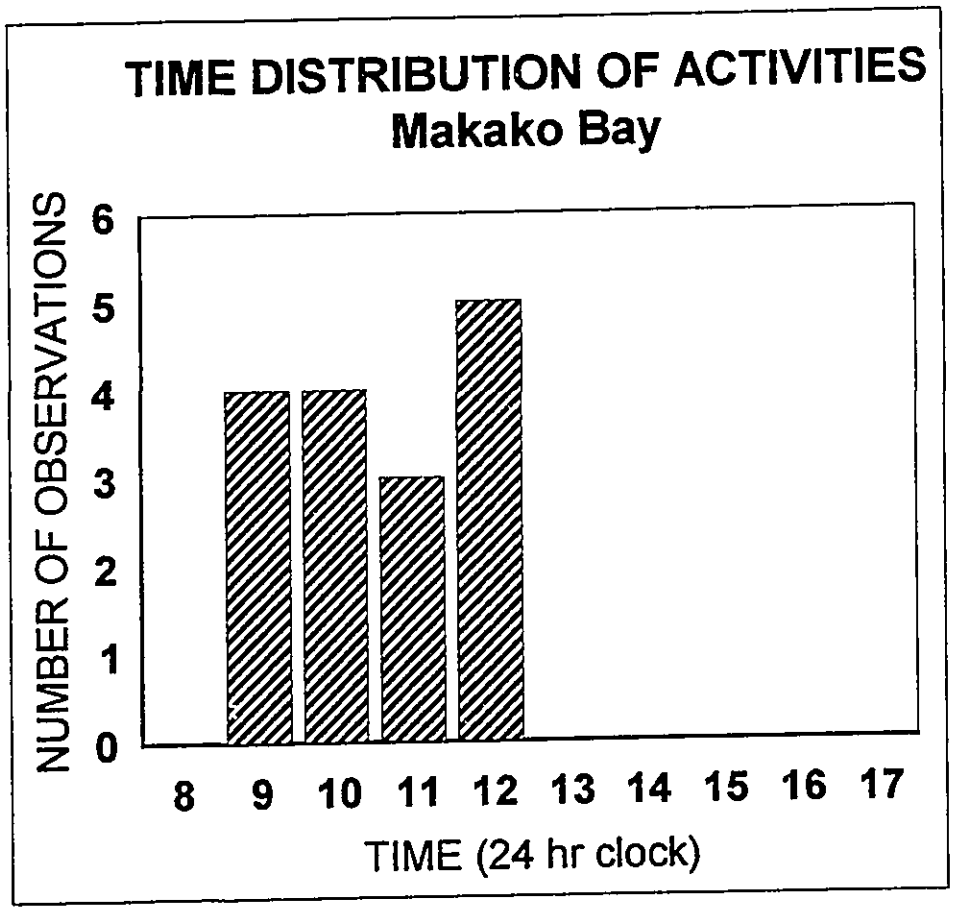
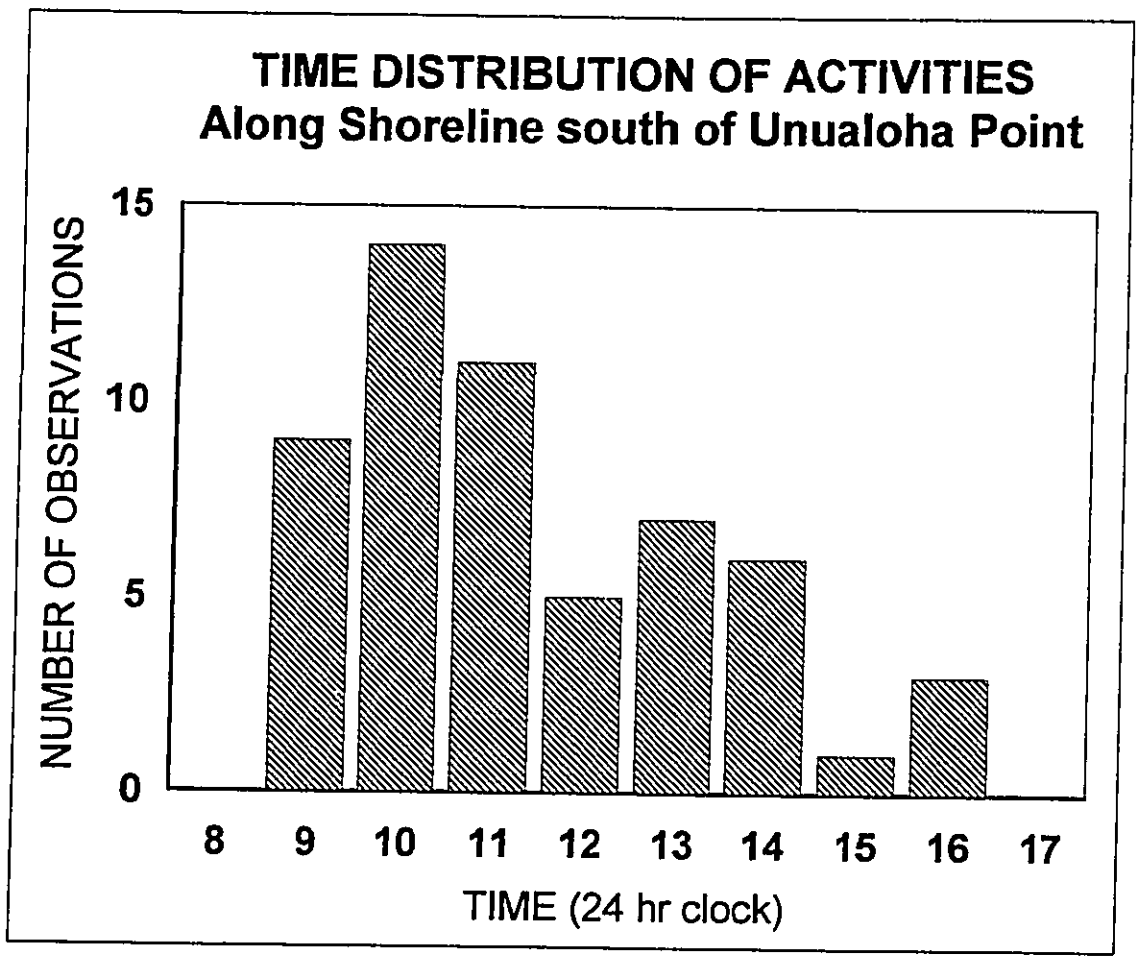

TIME DISTRIBUTION OF ACTIVITIES
Makako Bay
NUMBER OF OBSERVATIONS
0
1
2
3
4
5
6
8
9
10
11
12
13
14
15
16
17
TIME (24 hr clock)

FIGURE 5


TIME DISTRIBUTION OF ACTIVITIES
Along Shoreline south of Unualoha Point
NUMBER OF OBSERVATIONS
15
10
5
0
8
9
10
11
12
13
14
15
16
17
TIME (24 hr clock)

APPENDIX IV : EVALUATION OF THE NUTRIENT INPUT TO THE OFFSHORE ECOSYSTEM FROM FISH FEED (EA Bio Load b.123)

Prepared by : Neil Anthony Sims, KBWF/BPI

BIOLOGICAL LOADING IN WATER COLUMN FROM OPEN OCEAN FISH FARM

ORGANIC MATERIAL INPUT

Farm production capacity :	360,000	kg of fish produced per year
Feed Conversion Ratio :	1.5	: 1 dry feed to fish produced
Feed provided to fish :	540,000	kg of feed provided per year
Organic input to ocean :	180,000	kg of feed not converted to fish
Equivalent to a daily input of :	493	kg of feed per day

OCEAN VOLUME DILUTION

Water colmun cross section

Depth of water : 150 feet	50	metres
Width of cage area : 9 acres	200	metres
Cross section of water column	10,000	square metres

Water flowing through farm

Presume a 1 knot current	1,850	metres / hour
Over 24 hours	44,400	metres / day

Volume of water through farm = cross section of water column x water flowing through the farm

Volume of water =	444,000,000	cubic metres per day
=	444	million tonnes per day

BIOLOGICAL LOADING

Loading =	daily ration / daily ocean volume through cage area	
=	0.0000011	kg feed per cubic meter of water
=	0.0000000024	lbs of feed per liter of water
Equivalent to 1 lb of food in	409,242,424	liters of water
or 1 lb of food in	108,265,192	gallons of water

COMPARISON WITH AN OLYMPIC SWIMMING POOL

For comparative purposes, presume that an Olympic swimming pool has the following dimensions

Length =	50	meters
Width =	25	meters
Depth =	2	meters
Total volume =	2,500	cubic meters
or	657,895	gallons

Therefore, the Biological Loading is equivalent to

1 lb of food in	**164.6**	**Olympic swimming pools**

APPENDIX IV a :

RESULTS OF WATER QUALITY AND BENTHIC MONITORING AROUND THE MOI CAGES OFFSHORE OF EWA BEACH, OAHU.

The following is a synopsis of the results from the water quality monitoring that was associated with the first two stages of the Hawaii Offshore Aquaculture Research Project (HOARP I and II) operations which tested moi culture in submerged cages offshore of Oahu. The following was provided by Prof. Chuck Helsely, former Director of Hawaii Sea Grant, and Principal Investigator for the HOARP project. Prof. Helsely continues this work today with a water quality monitoring program around the cages for the commercial moi operation (HOARP III).

"During Phase I and Phase II of the HOARP experiment, sea water parameters of interest to the Department of Health (salinity, temperature, oxygen saturation (% O_2), acidity (pH), phosphates (PO_4), silicates ($Si(OH)_4$), nitrates (NO_3), ammonium (NH_4), total phosphorous (TP), total nitrogen (TN), and water clarity (turbidity)) were measured at a number of positions near the cage, and a few stations in the far field. None of these parameters seem to be significantly changed as a result of the cage being present, except for NH_4. During Phase I, observations near the cage yielded elevated NH_4 about 3 hours after feeding, out to distances of several cage diameters, but gave essentially background levels in the far field. During Phase III of HOARP (the current program) we have been focusing more on the far field. In the immediate vicinity of the cage we continue to find elevated NH_4, but we have not found any systematic changes that can be related to the presence of the cage beyond about 200 meters.

"We do see elevated NH_4 and TN results at times at the ZOM boundary (3000 feet), but at present we cannot relate these to the cage. If anything, we seem to see higher NH_4 and TN in the deeper and colder water at depths, near the bottom. Since these waters can be more than one degree Centigrade cooler that the surface waters, we are clearly in a separate water mass, and thus the results from the deeper waters are unlikely to be from the cage, which is entirely in the upper, well-mixed water mass. They may be related to discharges from the nearby sewer diffuser but we have not proven this conjecture. Thus, I believe it can be said that the cage is having little effect on the surrounding waters at distances of more than a few hundred meters.

"During times of slack current, we have noted substantial increases in NH_4 in the immediate vicinity of the cage. This is because mixing is minimal at these times, and thus the NH_4 tends to accumulate near the cage. Values as high as 50 ppb NH_4 were observed during Phase II. During times of moderate current (0.5 knots) we rarely see any NH_4 values above about 10 ppb.

"No other physical or water chemistry parameter seems to be cage related. This is not unexpected given the chemistry of the ambient waters and the amount of water exchanging with the cage.

"We have also been measuring, on a quarterly basis, changes in the benthic biota. We have observed no change in the overall benthic assemblage. We have seen changes in abundance of specific groups, particularly those thought to be opportunistic detritivores, in the immediate vicinity of the cage. Maximum changes have occurred immediately under the cage, with a very subdued change at distances of 80 meters from the cage. Control stations upstream and downstream of the cage at distances of about 400 meters show essentially no change in either abundance or species. I should emphasize that these are changes in abundance only, and that no change in assemblage is taking place that we have been able to document to present."

APPENDIX V : LETTER OF SUPPORT FROM KONA-KOHALA CHAMBER OF COMMERCE, by Ron Aronson, President, dated 6/4/02)

KONA-KOHALA
CHAMBER
OF COMMERCE

75-5737 Kuakini Hwy., Suite 208
Kailua-Kona, HI 96740
Phone: 808-329-1758 Fax: 808-329-8564
www.kona-kohala.com konakcc@gte.net

June 4, 2002

Mr. Dale Sarver
Kona Blue Water Farms
P.O. Box 525
Holualoa, HI 96725

Dear Mr. Sarver,

Thank you very much for giving a presentation to the Board of Directors of the Kona-Kohala Chamber of Commerce. We appreciate your time and effort and know the board members found your ideas very innovative and interesting.

The board is very supportive of all new enterprises that maintain our "quality of life" and Kona Blue Water Farms seeks to do this through the farming of Native Hawaiian fish. These native fish have been depleted by over fishing and this seems to be a way that we can continue to benefit from their nutritional value and to provide a stable source of fish for our restaurants and hotels.

Thank you again for your presentation and we look forward to working with you to bring this project to completion.

Yours truly,

Ron Aronson
President
Kona-Kohala Chamber of Commerce

APPENDIX VI : MANAGEMENT PLAN, APPENDED TO CDUA APPLICATION

MANAGEMENT PLAN

FOR AN OPEN OCEAN FISH FARM

OFFSHORE OF UNUALOHA POINT, NORTH KONA, HAWAII

PREPARED FOR :

Board of Land and Natural Resources,
pursuant to Section 13-5-24 R-1 HAR

PREPARED BY :

Kona Blue Water Farms
(a division of Black Pearls, Inc.)
P.O. Box 525, Holualoa, HI 96725

Dated : January 15, 2003

1. GENERAL DESCRIPTION

LOCATION

Pursuant to Section 13-5-34 HAR, Kona Blue Water Farms (a division of Black Pearls, Inc.) requests a Board Permit to allow an ocean lease for aquaculture, specifically an open ocean fish farm, offshore of Unualoha Point, North Kona, Hawaii (see Figure 1). The farm will occupy the surface, seafloor and water column of the State marine waters and submerged lands classified in the Resource Subzone per section 13-5-13 (5) HAR. This use is consistent with the Conservation District, and the Resource Subzone, as identified in section 13-5-24 R-1 i.e. AQUACULTURE.

The farm will be located in waters of 150 - 200 ft depth, over soft sand substrate, exposed to good current flows. For these reasons, we expect to see minimal environmental impacts (see attached Environmental Assessment). Because of its depth, and the paucity of the bottom biota, there is minimal use of the area at present. The proposed site lies inside of the marlin and tuna fishing grounds off Keahole Point (Figure 2).

The proposed site is a square, with a total area of 81 acres, and sides of 1,878 ft, with a center at Latitude 19 degrees 44.54 minutes North, and Longitude 156 degrees 03.63 minutes West. The depth at the center is approximate 180 ft. The outermost 72 acres will be used exclusively for mooring lines. No net pens will be sited in this outer area. The 9 acre area at the center of the lease will contain all of the net pens (see Figures 1, and 3 (a) and (b)). This central area will be a square with sides of 626 ft. The closest distance from the edge of this central area to shore is approximately 1,740 ft to the northeast, to Unualoha Point.

SPECIES CULTURED

The farm intends to culture only hatchery-reared fish that are native to Hawaiian waters.

No alien species will be introduced for culture on this farm. The keystone species will be mahimahi, as we have hatchery technology in hand for this fish. We are also currently developing hatchery techniques for kahala, opakapaka and other high value fish, and we will substitute these into the farm production as we develop suitable culture systems.

Within the first year we expect to be culturing both mahimahi and kahala. Within the second year we hope to initiate opakapaka cage trials, and move towards commercial-scale opakapaka culture in the third year. As the opakapaka come on line, they will substitute for the mahimahi in the production model.

NET PEN DESCRIPTIONS

We intend to use a combination of both submersible net pens and surface net pens, to accommodate the requirements of different species, stages of growth, and technology development. Both types of

pens offer advantages. Submersible pens are subject to less wear and tear, and less fouling, but require SCUBA diving to tend the fish, or to monitor feeding. Surface pens allow more careful monitoring of feeding and fish health, and may be required for some species, such as mahimahi, or for some grow-out stages of some species, such as nursery or harvest stages.

All mooring lines will be taut, and only taut mesh pens will be used. Anchors and moorings will be engineered to withstand up to 50 year storm conditions.

Any surface obstructions will be lit according to Coast Guard regulations, Class C, which call for amber or yellow lighting, with a slow flashing, visible for a minimum of one nautical mile.

The submersible net pens will be similar to the Sea Station 3000™, manufactured by Net Systems, Inc., of Bainbridge Island, Washington State, which are used on the moi farm operation off Ewa Beach, in Oahu. Each pen is bi-conical in shape, with a central equatorial ring frame of steel tubing. The pen size is 80 feet wide by 60 feet tall, with a steel cylinder along the vertical axis. This is ballasted by a concrete block anchor, suspended from the central cylinder. The pen can be raised to the surface by injecting air into this central cylinder, and lowered by releasing the air.

The frame is covered with a tight netting of Spectra™ mesh, an extremely strong, UV resistant synthetic material that is used in many marine applications. Divers can access the pen by zippered openings. By installing partitions in the pens, more than one cohort of fish can be reared at any one time.

The submersible net pens will be moored so that the tip of the upper cone protrudes above the ocean surface. This will improve the work safety conditions of divers working inside the pen. In case of gear failure, divers can simply surface directly inside the pen, whereas in a fully submerged pen, a gear failure runs a high risk of diver mortality. Having the tip of the pen break the water surface will also greatly facilitate monitoring of the fish, especially during feeding. This will significantly reduce the risks of overfeeding, or other potential environmental impacts. There is also better wave-driven mixing at the water surface, which results in more rapid dilution of any metabolic wastes of the fish.

The only detriments to having the pen near the surface are the potential risks to navigation, the increased fouling of the mesh by macroalgae, and the possible security risks. The farm area will be marked, as required by U.S. Coast Guard regulations. Security risks will be managed by passive surveillance systems. The exact amount of algal fouling in the oceanic waters off Keahole can only be determined by initial trials. While normal algal growth would be slow in these oligotrophic waters, a certain amount of macroalgal fouling might be enhanced, and might be considered beneficial, as it may help to absorb some of the fish's metabolic wastes.

In case of hurricanes or other severe ocean storm conditions, these net pens could be quickly submerged by releasing the air from the central column. The pen will then sink until the concrete counterweight that ballasts the central column settles onto the substrate. The process can be completed for a single pen in about 15 minutes. Severe weather advisories or storm warnings usually provide at least one day advance notice, which gives ample time for the work crew to sink the submersible pens. These pens may also be submerged for some period of time during the grow-

out period, depending on the work conditions, the level of comfort by management with feeding strategies and monitoring of the fish, and the requirement for divers inside the pen. We intend to moor the submersible net pens so that the tip of the column protrudes about 10 feet above the water surface, and sits about 15 – 20 feet below the surface when the pen is submerged.

Surface net pens will be circular in shape, around 25 meters (82 feet) in diameter, with a volume of about 5,000 cubic meters (180,000 cubic feet). The surface ring is made of HDPE tubing. The net hangs vertically from this rim. The net will be made of white nylon Raschel (knotless) mesh, or similar material. An outer small mesh predator net will provide a barrier to separate any potential predators from fish in the pen, or mortalities near the bottom. An additional net panel is raised around the rim to a height of around 5 feet, to prevent escapement of fish by jumping over the net rim.

Submersible pens can be partitioned to separate nursery-size fish, juveniles and adult fish. If surface pens are used, two additional small nursery pens will need to be deployed. The nursery pens will be smaller - around 8 m in diameter (26 feet) and 500 cubic meters (or 17,700 cubic feet) in volume, with a finer mesh on the net. These will be located adjacent to the larger surface pens, and will be attached to the mooring grid the same as the other pens.

CONSTRUCTION PLAN

The farm will consist of a maximum of six pens, together with two smaller nursery pens. The initial deployment plan is for three of the grow-out pens to be submersible, and for three to be surface net pens. These will all be deployed over the first year. The mooring grid will be laid out and installed first. As needed, pens will be assembled at Kawaihae Harbor, and towed down to the farm site, and deployed by attaching them to the mooring grid.

Each anchor line in the mooring grid will be anchored to the sediment with a concrete block and Danforth anchor. The precise size and weight of anchor, concrete blocks, chain, and mooring lines are yet to be determined. These particulars will be specified by qualified maritime engineers, and will be submitted for review and final approval to the Army Corps of Engineers, as part of the requisite ACOE permit process.

The precise location of the anchors will be predetermined by the engineering design, and anchors will be deployed using GPS to ensure accurate installation. The mooring grid will be established under tension maintained by sub-surface buoys – the taut mooring lines are to ensure that the risk of entanglement of marine mammals is negligible.

At the termination of the lease, all net pens, subsurface lines and other structures will be removed.

OPERATION PLAN

Fish will be reared to 12 months age, including two months of hatchery and nursery rearing on land. Each cohort of fish will then spend 10 months on the farm site.

Fish fingerlings will be produced in the KBWF fish hatchery facilities, based at the Natural Energy Laboratory of Hawaii Authority. A new cohort of fish from one or the other species will be reared each two months, depending on the spawning of broodstock. The fish from the hatchery will be held in a land-based nursery facility until they are ready to be transferred (around 3 inches in size), at which time they will be trucked to Honokohau Harbor, transferred to tanks on the work boat, and ferried out to the farm site. On the site, the fingerlings will be initially stocked into a nursery pen, where they will be held for two months, and then transferred to the grow-out pen for the rest of the grow-out period.

At 10 months age, we will begin to harvest the fish. Each cohort of fish will be harvested over a two month period, resulting in fewer, but larger fish reaching the final age of 12 months. Harvesting will be undertaken by using crowd nets in the surface pens, with fish pumped from the pens into a chilled brine solution in the workboat. Fish will be brought ashore and either sold to wholesalers or shipped overseas, or distributed directly to local markets. All fish will be sold unprocessed ("in the round", head on and ungutted).

Feed systems will vary, depending on the type of net pen. The surface nursery net pens will be fed by hand. For surface net pens, automatic spreader feeders will be used to scatter feed over the water surface. These feeders will be timed to ensure that fish are fed small potions at regular intervals (say, every two hours), to ensure that no feed is wasted, and that the fish achieve maximum assimilation (digestion) of the feed. The amount of feed and the interval between feedings will be regularly adjusted for each net pen. For submersible net pens, feed pellets will be mixed with seawater and pumped through a 4 inch or 6 inch hose, and pumped into the center of the pen. Submersible net pens will be fed up to three times per day. Divers will regularly monitor feeding by the fish in the submerged pens, to ensure that feed is not wasted.

In both submersible and surface net pens, divers will regularly check the pen for damage, and to remove any mortalities. Under inclement conditions, the site will still be monitored visually, from the shore at Keahole Point. Pen maintenance will also include regularly inspecting and repairing, if necessary, the spar, ring, support cables anchor system and net enclosures on a regular basis (biweekly to monthly, depending on component).

The design life of all components, other than the net pen itself, is 15 years. All metal parts will be anodized, and sacrificial zincs will be used to prevent rust. The ropes for the moorings may encounter some abrasion, and may need to be replaced on occasion. The nets themselves are designed to have a maximum working life of around 5 years. Nets will be cleaned regularly, to diminish the drag forces on the mesh. Patching of nets can be accomplished by divers. Nets in surface pens can be changed quickly and easily while fish are inside the pen. For submersible net pens, fish must be removed before the net can be fully replaced. Used pens will be disposed of in the commercial solid waste system.

Nets will be cleaned by divers hand-brushing with stiff bristled scrubbing brushes. No chemicals will be used in the cleaning process. Periodically, nets may need to be replaced and dried out. These nets will be transported to the KBWF facility at NELHA, where they will be washed and

dried, before being returned for re-use. All waste water from net washing on land will be disposed of in an in-ground effluent system, designed for this purpose.

The site will be serviced by a single work vessel, of length 45 ft or smaller, with a crew of two or three personnel. The crew will be on site intermittently, for an average of around 6 hours per day, but will spread their presence on site over all daylight hours to ensure maximum feeding efficiency by the crepuscular (sunrise and sunset) feeders such as mahimahi.

The vessel will work out of Honokohau Harbor, where it will be moored in a commercial fishing slip (if one is available) or will be held overnight on a trailer. There will also be land-based support facilities, including an office, workshop and feed storage area, on land leased from the DOBOR.

PRODUCTION

Total annual production from the farm will be 360 tonnes of fish per year, either kampachi (kahala) or mahimahi. The standing stock of fish at the farm – the maximum biomass of fish that will be held on the farm at any one time - will be around 99 tonnes (218,000 pounds).

The net pens will be stocked every two months. For kampachi, each net pen will be stocked with around 26,000 two month old fish, each weighing around 100 grams (4 oz). Over the 10 months of grow-out, cumulative mortality may total 10%. For mahimahi, a higher mortality rate is anticipated (around 20% throughout grow-out) and so a larger stocking of around 160,000 fingerlings per net pen is required.

Final size at harvest will be around 2.25 kg (almost 5 lbs), with around 24,000 fish harvested from each cohort (both mahimahi and kampachi) at the end of the tank grow-out.

Fish will be harvested three times weekly (depending on market demand and flight schedules for overseas shipments), with an estimated 2,300 kg (5,000 pounds) of fish harvested each time, once the farm reaches steady state.

2. EXISTING CONDITIONS ON PARCEL

Ownership : The offshore waters are owned by the State of Hawaii, and is administered by the Department of Land and Natural Resources.

Resources : The deep water and coarse sand substrate supports very little flora or fauna. A survey of activity showed that here was negligible public use of the immediate area (see Appendices to the attached EA). Commercial dive charter boats and recreational fishing and diving boats anchor along the reef areas inshore of the site (Unualoha Point and Makako Bay), but the proposed operation will not impede access to these areas. The area is not a significant habitat for birds. There is no historical significance to the site.

Presence of Threatened or Endangered Species : The area lies just inside of the Hawaii Island Humpback Whale National Marine Sanctuary, and is frequented by humpback whales in winter. However, no entanglement risk or other adverse interactions are expected, because of the taut mooring lines and taut mesh on the net pens. Similarly, although green sea turtles and monk seals may traverse the area on rare occasions, no adverse interactions are expected. Other endangered species do not frequent the area.

Constraints : None. The area is part of State Marine Waters, but is not subject to heavy surf action because of the water depth. The project intends to use submersible net pens, wherever practical. Surface pens may be needed for some species, or some stages of grow-out. All engineering of net pens and mooring systems will be performed by qualified engineers, with specifications sufficient to withstand 50 year storms.

Existing land uses : There are no existing structures in the proposed lease area. As discussed above, there is some use of the fringing reef area inshore of the lease for diving and fishing, but the proposed use will not impede access to these areas.

Existing Conservation District Use Permits : None.

Access : The deep water offshore lease area can only be reached by boat or other watercraft. The inshore reef area can also be reached by foot across the lava from NELHA or jeep trails through the airport lands.

Soils : The area of the proposed lease slopes seaward from 150 feet to 200 feet deep. The ocean bottom is covered with a thick layer of coarse sand.

3. PROPOSED LAND USES ON PARCEL

Description of proposed Land Use : The pearl farm will occupy the surface, seafloor and water column of the State marine waters and submerged lands classified in the Resource Subzone per section 13-5-13 (5), and section 13-5-24 R-1 AQUACULTURE.

Site Plan : See Figure 1, attached.

Justification : Marine fish farming is aquaculture, and therefore complies with the requirements for the resource subzone, as detailed in section 13-5-24 R-1 AQUACULTURE.

Relationship to other land uses : The area is directly north of NELHA's research corridor. The lands directly inshore from the proposed lease area are owned by State of Hawaii, and administered by NELHA for commercial aquaculture purposes. Cyanotech Corporation currently operates microalgal culture ponds for growing Spirulina pacifica in this area. Further mauka from Cyanotech's ponds is the runway for the Kona International Airport.

Expected timing : The project could expect to obtain the lease by July 1st, 2003. Operations would commence as soon as possible thereafter. A 20 year lease is requested.

Monitoring strategies : A long term water quality monitoring program will be instigated at the farming company's expense, as part of the NPDES requirements, to track impacts from the farm on water quality and benthic habitat. The specific details of parameters, sites and frequency of sampling will be determined in consultation with the State Department of Health Clean Water Branch, as part of the process of obtaining the NPDES permit.

Environmental Assessment : A draft Environmental Assessment is included in the package, and is attached.

Historic Preservation concerns : There are no such concerns for the area, as described in the EA.

4. REPORTING SCHEDULE

Time duration of management plan : The management plan shall remain in effect for the full duration of the lease. A 20 year renewable lease is requested, based on the investment required, and the lead time until the farm reaches commercial production.

Annual reporting schedule : The pearl farm will be subject to annual reporting requirements under the Aquaculture License law. A copy of this annual report will be provided to DLNR, along with the reports from the water quality monitoring program, as appropriate.

Annual reporting requirements : The Aquaculture License law requires details on number of protected animals held on the farm. The water quality monitoring program will provide raw data, analysis and interpretation of the germane parameters, and assessment of the extent and impact of any changes in benthic community or substrate beneath the farm

APPENDIX VII : BIOLOGICAL ASSESSMENT OF THE UNIVERSITY OF NEW HAMPSHIRE OPEN OCEAN AQUACULTURE DEMONSITRATION PROJECT, FINFISH COMPONENT.

(Excerpt, page 42: Risks Associated with Whales coming in contact with (netcage) Gear). Celikkol, B., 1999.

BIOLOGICAL ASSESSMENT

OF THE UNIVERSITY OF NEW HAMPSHIRE

OPEN OCEAN AQUACULTURE DEMONSTRATION PROJECT

FINFISH COMPONENT

JANUARY 29, 1999

PREPARED FOR

US ARMY CORPS OF ENGINEERS
NEW ENGLAND DIVISION
REGULATORY DIVISION
696 VIRGINA ROAD
CONCORD, MASS 01742-2755

Submitted by:
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the proposed site. Since the movements of these two whales are predicated by food supply, they may swim into the area in search of these herring, mackerel, and squid schools. Therefore, there is a finite possibility, although very low, that one or both species may swim into the proposed site.

6.1.2 Risks Associated with Whales Coming in Contact with Gear

If whales do enter the vicinity of the site, there is a low possibility that they may come in contact with the gear. The plan is for one cage to spend most of the time on the surface, while the other remains submerged. Therefore there is little chance of contact for whales that are surface feeding or swimming, as there is only the one cage structure for the whale to make contact with within the site. For the cage that will stay on the surface, the danger of a whale coming into contact with gear will primarily be from the cage on the surface and around the 18 m level where the grid, anchor, and cage bridle lines come together. For the cage that is submerged, the danger of contact will primarily be from the grid level at 18 meters to the base of the submerged cage at 30 meters below the surface.

The most likely section of mooring that may cause confusion for the whales, and therefore possible contact with the mooring structure, are at the grid corners, where one anchor line, two grid lines, and one cage bridle line are connected to the rope connector. A possible outcome of contact between a whale and a grid corner area could be a flipper or tail fluke, especially a humpback with its long flippers, getting temporarily caught between lines. Because all the lines that are connected to the rope connectors are under high tension (minimum of 2000 N) and have no "loose ends", it is unlikely that a line will wrap around a flipper or fluke.

To help the whales avoid coming into contact with the lines, most of the selected lines will have relatively large diameters (48 mm) and be light colored. The grid corner and bridle line buoys will be painted with light colors to enhance their visibility. The anchor lines (Phillystran PSP 130), though they are only 40 mm in diameter, are very stiff due to the "wired laid" construction and braided cover.

Each of the crown lines will be heavy chain for the first 10 m from the anchor. This chain will act as the anchor and tensioning (at least 2000 N) system for the crown lines that lead to the surface buoys. In this way, the crown line buoys will resemble standard oceanographic buoys. The submerged grid corner and bridle buoys will have only short (i.e. 1 m) lengths of chain connecting them to the rope connectors and will have high tensions due to their buoyancy. Therefore, these buoys do not pose an entanglement threat to the whales. Because there are no components of the mooring structure that are known to cause entanglements (i.e. lightly tensioned lobster pot lines, gill nets, cod traps, etc); the chance of whale entanglement should be considered unlikely to very unlikely.

Because the cages are large structures, the whales should be able to see and maneuver around them. Should a whale make contact with a cage, it should be able to rebound off the cage because of the taut netting. The hanging concrete weight imparts a high tension in the pendant, making the possibility of entanglement extremely unlikely. The cages therefore do not pose any known whale entanglement risk.

APPENDIX VIII : TRANSCRIPTS OF VARIOUS PUBLIC MEETINGS HELD IN KONA OVER THE COURSE OF FORMULATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT.

(a) Transcript of Question and Answer Session from Meeting at NELHA on Wednesday, April 10th, 2002, regarding Kona Blue Water Farms' application for an open ocean aquaculture lease off Unualoha Point.

(b) Notes from Core Group Meeting to discuss potential Broader Benefits from KBWF's proposed Hatchery/Offshore farm project, Tuesday, April 23rd, 2002

(c) Transcript of Meeting at NELHA Conference Room on Friday, May 17th, 2002, to review the potential for interaction between Kona Blue Water Farms' proposed open ocean fish farm off Unualoha Point, and dolphins

(d) Transcript of Meeting at NELHA Conference Room on Tuesday, May 21st, 2002, to discuss with Kekaha kupuna the concept of the proposed open ocean fish farm, and obtain input on traditional perspectives and cultural issues.

(e) Transcript of Meeting at Sun Cablevision Conference Room on Tuesday, May 28th, 2002, to discuss with Royal Order of Kamehameha the concept of the proposed open ocean fish farm, and obtain input on traditional perspectives and cultural issues.

(f) Letter from Kumu Pono Associates (8/26/02), detailing discussions with kupuna "all of whom are knowledgeable about the fisheries in the Kekaha region of North Kona".

Transcript of Question and Answer Session from Meeting at NELHA
on Wednesday, April 10th, 2002, regarding Kona Blue Water Farms' application for
an open ocean aquaculture lease off Unualoha Point.

Q. Is there a problem with ammonia or fish waste accumulating on the bottom, or other environmental problems?

A. There is over 1.3 million tons of fish farmed in cages around the world, and it is generally an industry that has minimal environmental impact. In the past, some cage sites were located in protected bays or fjords with little circulation. This sometimes resulted in accumulation of fish feces and uneaten food beneath the pens. As cage engineering technology has improved, however, the cages have been able to move into deeper water, with better circulation. There is a tremendous dilution factor from all of the water that moves through the fish farm area. For the site we have proposed, at maximum production of 360 tonnes per year, presuming a 1 knot current, the total feed input to the environment is equivalent to one pound of fish feed in 274 Olympic swimming pools.

The ammonia from the fish is also quickly broken down by natural bacteria in the water. In the studies of the submerged cage in Oahu, the ammonia was not detectable at a distance of 30 m downcurrent from the cage. Although there was an increase in the numbers of worms and other organisms in the soft sand substrate beneath the Oahu cage, there was no change in the diversity of the animals. The increase in the benthic biomass is to be expected when there is some greater organic input. The overall conclusion, however, was that the organic input was not harmful to the benthic community.

Q. What is mesh size on net pen? What is risk of catching wild fish in mesh?

A. Nursery pens are usually ½" to ¾"; adult pens are up to 1 ½" mesh. It is thick twine, and wild fish do not get entangled.

Q. What is experience with wild fish predation?

A. No problem so far with other cages in Hawaii.

Q. What is potential for marine mammal entanglement?

A. Mooring lines and mesh are kept very taut, and are big diameter – more like a cable. There have been no records to date of entanglement in fish farming gear. Entanglements are almost always the result of slack-line fishing gear such as drift-nets, long-lines, and crab pot lines.

Q. Will this interfere with dolphin movement into Makako Bay?

A. Daily dolphin movements vary, but the usual pattern is for a group to aggregate on the shelf off Mahaiula, and move along the reef drop-off into Makako Bay. The fish pens will be a ¼ mile

offshore, in deeper water, and will not impede this movement. After resting in Makako Bay, the dolphins have a "zig-zag" pattern back and forth – they don't follow a set path out to sea. The fish pens and moorings don't represent a barrier to dolphins. They monitor the interaction of dolphins with the offshore farm operation off Ewa Beach – the dolphins swim over, under and around the submerged cage – but they are neither attracted nor repelled by it. They don't try to get at the fish inside.

Q. Does it interfere with turtles or marlin?

A. There is no history of any problems. It is probably too shallow for marlin.

Q. Could this be a fish aggregation device?

A. Fish are attracted to the Ewa Beach cage. Broomtail file fish (loulu) are present in large numbers, and mullet and palani are also abundant. But it doesn't act the same as a FAD in deep water. There are no pelagic fish – tuna and marlins – around the cage.

Q. How often will dead fish be removed?

A. The farm will usually be checked on a daily basis, but some days the sea or weather may not permit access to the cages. As with most farms – chickens, cows, pigs – you don't want to leave dead animals in the same area as your healthy animals.

Q. What is the potential for caged fish to escape? What will be the impacts of this?

A. As farmers, we would very much try to minimize the risk of escapees. However, as we are going to use just native species – not foreign species – the concerns about escapement are minimal. Most of these escapement concerns stem from the West Coast salmon farming, where they were using introduced Atlantic salmon. We are using Hawaiian species on the farm. There is an ongoing scientific debate about the potential for genetic problems with escaped native fish, but there are no firm conclusions. For mahimahi, they will disperse very quickly. For something like hapu'upu'u, if several thousand were to escape, it would be a field day for local fishermen.

Q. What vehicle will be used for feeding?

A. Current practice is for farmers to go out in a boat to the site and feed 2 or 3 times per day. We would like to eventually develop a feed buoy that would allow us to do remote feeding. This would let us feed on rough days, or from first light to last light, which is better for the fish. The buoy would store 1 or 2 days worth of feed, and would need to be solidly built, to keep the feed dry.

Q. What type of material will the net be made of?

A. We will choose from several types, depending on cost, fouling, etc. Spectra mesh is good, but expensive. Polypropylene is less expensive, but may not stand up to the wear and tear as well.

Q. Can baby dolphins get inside the cage? Is there also potential for whales to get entangled?

A. Dolphins or other animals cannot get inside the cage. There is no history of whales getting entangled in fish farming equipment, as the mesh and lines are very taut.

Q. What sorts of moorings will be used? Will this involve drilling into the ocean bottom?

A. Moorings will be either large concrete mooring blocks, or a combination of concrete and steel anchors. We will rely on engineers' guidance for the type appropriate for our substrate.

Q. It would be good to make this program beneficial for other groups, and for community social and cultural aspects. What is planned along these lines?

A. We hope not to have a stand-alone industry, but one that is viewed as a beneficial development. As in our past projects, with the pearl farm development, we worked with training and extension programs to help develop local skilled workforce. We have two training programs under way at the moment in Majuro, Marshall Islands, to train Marshallese locals as pearl seeding technicians. One is funded by the National Marine Fisheries Service and the other by the local government. Our hatchery in Majuro is also supplying spat (baby oysters) to two other locally-owned farms. We have also worked towards setting up a Hawaiian Pearl Partnership to try to foster close working relationships with traditional pearl shell carvers, trainers, and other community groups for our proposed pearl farm in Oahu. We hope to approach our work in a similar vein, here, with training programs and sale of fingerlings to other partner farmers.

The other major public good to come from this project will be the set-up of the fish hatchery. A commercial fish farm will act as an engine to drive hatchery research into new species. It will also provide industrial-scale hatchery facilities that could be diverted to reef restocking programs for local, overfished species such as opakapaka, ehu, and hapu'u. There is a good chance that Federal funding or public foundations could pay the costs for such restocking programs. Our project would provide the facilities and the hatchery expertise.

Q. I am heartened by these comments, and suggest that we look at ways to also bring in other community groups or schools. What is the expectation of adding fish to the wild stocks?

A. With the farm comes the need for a large hatchery, and this could provide juveniles for research and restocking. We are working closely with the researchers at HIMB (Coconut Island), whose goal is to set up a stock enhancement program. As our project moves forward, we could be providing fry for both restocking and for our farm and other farms. The hatchery technology is the key, and the commercial farm helps to focus the research on this need.

Q. What effect would the farms have on Kawaihae-to-Kona boat traffic?

A. The farm will sit inside the direct line from Keahole to the rocks at Mahaiula. The cages will only represent a minimal obstruction – the pen area would only be 600 feet wide.

Q. How many people would be employed?

A. There would be 5 – 6 immediately employed, and then more for the hatchery operations. When you start to factor in the multiplier effects of post-harvest handling and distribution, marketing, equipment and feed supply. For farm workers, we are going to be primarily looking for those with good experience around boats and the ocean. Bottomfishermen will probably be the best candidates for this work. They know the ocean. In our experience in Cook Islands pearl farming, it was the better pearl shell divers who became the best farmers, because they had the boat and water skills that were needed.

Q. Recent CO2 sequestration experience is instructive; there was a combination of cultural practitioners that came together with other conservation concerns. The EA process denies cultural practitioners' input. We need to talk more, and provide opportunity for the voice of these practitioners to be heard. It would be helpful to go beyond economic issues, and to talk about social and cultural issues.

A. Certainly. Let's find a way to do that. Who should convene this and move it forward? Angel and KBWF will call a round table core group to address these issues.

Q. Will there be a stock enhancement program from the farm?

A. Once the hatchery technology is developed, then this is possible. Its just a question of then finding the money, but there are a lot of Federal and foundation avenues for this sort of support. The enhancement is all conditional on the hatchery – it will be limited to those species that we can do in the hatchery.

Q. The Hawaiian way is to always share some of the harvest – to always give something back, so there will be more for next time.

A. We recognize this tradition, and embrace the principle. With our pearl oyster hatchery work, we always make a point of releasing any excess larval oysters into the ocean, here off Keahole, because we would love to see these oysters becoming re-established here in Hawaii. Also, the natural spawning on a pearl farm helps provide larvae to restock the reef. We are always attracted to projects that can offer both these economic and environmental benefits. With the deep water snappers (onaga, etc), we would need to make sure that releases are done in a sensible way. This will require some research to figure out the best way to do it.

Q. Is there a market for hatchlings?

A. Yes, there is already strong demand. The farm in Oahu is short-stocked because he cannot get enough moi fingerlings. As the industry develops, other farms will also require fingerlings. As with our Majuro pearl oyster hatchery, we would see our Kona fish hatchery as helping the industry expand here, with other farms developing.

Q. Mahimahi are your keystone species, but of all the fish in the ocean, they are the least likely to need recruitment supplementation. What is the timeline with other species, and which ones do you think will be available first?

A. Some snappers have been reared in other countries, but this does not help us here, as we need to address the Hawaiian species. We are bringing in a scientist from Australia who has been the first to rear a valuable snapper species down there. There is also a good chance that we could rear the kahala through – there has been some success elsewhere with this species. We would love to be able to rear hapu'u – the larval rearing for groupers is well-established in Taiwan, but getting hapu'u broodstock will be a challenge.

Q. Are groupers grown in Asia?

A. Yes, the grouper and snapper culture industry is extremely valuable, particularly in Taiwan and China. It feeds into the live reef fish trade, and so reduces the pressures on wild stocks around the Pacific. Usually in Asia they use smaller, surface cages, in more protected bays and lagoons.

Q. Will the food pellets affect the taste of the fish?

A. Yes, farmed fish usually taste better. The farmer can control the ingredients in the food to produce the desired taste. For example, compare wild-caught tilapia with farm-raised tilapia – wild tilapia just taste like mud.

Q. How often will you change the broodstock?

A. Not often, but we wouldn't want to keep them if they get too big.

Q. How many broodstock?

A. 10 – 20 good pairs.

Q. Do you have a list of preferred species?

A. We will use mahimahi as the keystone species, and we will push as hard as we can to get kahala and hapu'upu'u.

Q. In our experience, promises that are made by a developer are not always kept. How can we bind the developer to provide these community benefits? What guarantees are there?

A. The farm will require a lease, and any special conditions are attached and made a binding part of the lease.

Q. We have to find and help businesses like this that are attractive and beneficial to the community. We don't want to just think of the "stick" but also the "carrot". We want to make it attractive for them to come and set up here.

Q. Will boaters be restricted from the 81 acre area.

A. The central 9 acre area, where the submerged pens and surface cages will be, will need to be restricted entry for security, liability and safety concerns. The 72 acre area surrounding this – which has just the mooring lines in it – should probably be "no anchor" because of the risk of getting anchors hooked on the lines, and "no SCUBA-diving" because of liability concerns.

Q. So the 81 acres are off limits to SCUBA diving?

A. There is no diving there now – it is 150 – 200 feet deep, sand bottom and blue water. Any diving will be just to look at our farm, which may expose us to some liability problems. We have concerns about that. If this is a stipulation that the community would insist on, however, then we would be willing to discuss it.

Q. What about a guided SCUBA tour basis? An educational experience, for visitors and local community, public presentations, etc?

A. This would be something that we would consider, but it is dangerous diving … it is deep and there are strong currents.

Q. Have you made provisions for enforcement?

A. Have not yet addressed specifics. We are hoping that an overall sense of community support and goodwill will minimize the security problems. No problem yet with Oahu cages. We may provide some remote surveillance. We will need to take some precautions. Theft of fish from open ocean cages is considered to be "piracy" under the law.

Q. What will be used to delineate the area? What will be the visual effect?

A. Only the central 9 acre area will need to be marked, in accordance with Coast Guard regulations. We will have small floats and lights for night navigation.

Q. The farm will include the offshore site and the hatchery. Will there be anything closer?

A. Most of the materials (food, fry, etc) will move through Honokohau Harbor. We will have a boat and trailer based down there. We may also have a shore-base somewhere along the Cyanotech shoreline, to monitor the site for security, feeding, etc.

Q. Is Mt Cyanotech going to be removed?

A. Don't know. They can't sell the gravel – they must keep it – but we don't know what their expansion plans are.

Meeting ended.

NOTES FROM CORE GROUP MEETING TO DISCUSS POTENTIAL BROADER BENEFITS FROM KBWF'S PROPOSED HATCHERY/OFFSHORE FARM PROJECT

HELD AT : NELHA Conference Room. 5 – 7 pm, Tuesday, April 23rd, 2002

PRESENT : Sue Aronson (Kealakehe Ahupua'a 2020)
Angel Pilago (Kohanaiki Ohana)
Dale Sarver (KBWF)
Neil Sims (KBWF)
Ed Stevens (NELHA Cultural Advisory Board)

INVITED, BUT ABSENT :Daniel Akaka Jnr (Mauna Lani fishpond program)
Hank Fergestrom (NELHA Cultural Advisory Board)
Ernest Kanaehailua (Royal Order of Kamehameha)
Sarah Peck (UH Sea Grant Extension service)
Cynthia Punihaole (Kukio fishpond and cultural program)
Hannah Springer (West Hawaii Fisheries Council)

DISCUSSIONS :

In preliminary discussions, Dale outlined some of the community development aspects that accompanied BPI/KBWF's pearl farm projects in Hawaii (pearl shell carving, reef restocking) and Marshall Islands (training farm workers, seeding technicians, and setting up a hatchery to supply other farms). Dale introduced the wider discussion by pointing out what worked and what didn't, and that, as biologists and business owners, their ability to set up and experience operating such programs is limited. Still, KBWF would like to see some broad benefits flowing back to the community from the fish hatchery and farm project.

Angel asked about KBWF's understanding of ceded lands issues, and how this might impact the project. Neil replied that he understood that the legislation specifies that 20% of the lease payments are to be directed to OHA. Angel pointed out that this usually goes into the General Fund, and that some undetermined proportion eventually goes to OHA. Very little of the OHA funds ever get back to the impacted community. Angel asked what would be some of the benefits that could have a direct impact on the community here in Kona.

Dale reiterated some of the potential benefits that would accrue from this project. In light of the increasing pressure on ocean resources, there are real environmental, economic and health benefits to be gained from developing a sustainable supply of seafood. This also reduces pressures on existing fish stocks. There is also significant potential for reef restocking programs, which must all be hatchery based.

Angel asked about the advantages to local markets, and benefits that could accrue locally. Dale replied that there could be fish made available locally – it is easier to sell fish locally than to ship overseas. At present, few locals can afford to by local fish, because it is so expensive. This would help make fish more available locally. In essence, open ocean aquaculture could be considered just an offshore extension of the traditional Hawaiian fishpond operations.

Angel pointed out that fish ponds were community projects, run on a non-commercial basis. KBWF will be a commercial project. Neil indicated that, as with our pearl farm development work, we would also be looking here for opportunities for community benefits. This has always been the way BPI and KBWF have worked. Our applications for funding for hatchery research always emphasize the broader benefits of reef restocking or other such programs. We see two parallel paths here – one commercial, for the fish

farm, and the other non-commercial for the restocking, education or other non-profit work. Neil stated that they would like guidance on how to set this up and run it. Are there existing agencies that we could work with to do this?

Sue outlined some of the work that her group is proposing for a 200 acre area of DHHL property near Honokohau – a coalition of educational, cultural and agricultural/aquaculture interests are proposing to set up a mixed-use ahupua'a demonstration project. This could involve plant nurseries, OTEC agriculture, and aquaculture, as well as other commercial ventures. All agreed that this sort of operation would be a good vehicle to look at community involvement in reef restocking or educational programs.

Neil described the California model of fish hatchery and nursery operation, where Hubbs Sea World fish hatchery produces white sea-bas fingerlings, at about 1" size. Hatchery productions are paid for out of Federal, State, or foundation funds. These fingerlings are then distributed to Fishermen's Associations up and down the coast of California, who rear the fry in nursery cages in protected bays, or on disused offshore oil rig platforms. When the fish are large enough (4 – 6") they are released into the wild. All the participants in this program are very positive about its benefits. Neil asked if there were suitable vehicles here in whereby we might be able to partner in such a program for omilu, opakapaka, or other fish.

There was general discussion about ways that such nursery operations might be sufficiently incentivized to be self-sustaining, possibly through integration of subsistence uses of some of the products, or use of the nursery for grow-out of ornamental fish for either release, or sale to the aquarium industry. These operations could be set up as demonstration projects, and could work through marketing co-operatives. Possible venues were discussed – as well as Honokohau (Kealakehe), other possible sites mentioned included Punaluu, Honaunau, Milolii, Kealakekua Bay, Keauhou and Kailua Bays, Kukio, the Mauna Lani complex and Kawaihae.

Neil suggested that these subsidiary nurseries could also be supported by some proportion of the lease payments from the open ocean farm lease. While 20% of the lease payments goes to OHA, the other 80% is not dedicated to one use or another. If there was strong local support, then the lease might actually stipulate that some portion is to go to a reef restocking program. We would need community support to get such a provision written into the lease. Neil offered to seek more information on the possibilities (Aside: John Corbin of State Aquaculture Development Program later clarified the status of lease payments. The other 80% actually goes into the Special Land Development Fund for aquaculture purposes. This is administered by the Land Board, and there are no hard rules about how it is disbursed. Stock enhancement would be a valid use of these funds).

Angel indicated that perhaps OHA might also dedicate their share of the lease payments to local community-based programs like the reef stocking, and then both OHA and the State could become partners in the broader nursery / reef restocking program. The point was made that if the program relies on volunteer input, with no incentives for the participants, then it probably won't work well. There needs to be a shared vision where all participants are incentivized.

Angel said that this concept meshes well with some of the work he has been doing lately, with non-profit groups identifying sources for ongoing revenue, such that they are more sustainable. Angel will be receiving an award from Environmental Law Institute in D.C. for developing these concepts with Kohanaiki Ohana, and other groups. Rep. Patsy Mink will be collecting the award on his behalf.

Dale cited a similar example in Washington State where a forestry-focused environmental group bought a large tract of forest, and decided to log some portion of it, in an environmentally-sustainable manner, so that they could then derive enough revenues to support their conservation plans for the rest of the land.

All agreed that there had to be trade-offs in such situations. Ed and Angel both stated that they thought that native Hawaiian groups and other community organizations need to get more actively involved in economic development opportunities, to make sure that it happens in an acceptable manner.

Angel pointed out that while KBWF may not be required to conduct a Cultural Impact Statement, these issues still needed to be addressed. Dale and Neil agreed, and reminded everyone that that was our original purpose for these meetings – to obtain input from the community and the kupuna. We recognize the need to address the cultural and social impacts, and we would like to address these issues within the context of the EA that we are preparing.

There was a consensus that while these ideas should be further discussed and considered, that it was perhaps premature to begin now to set up the reef restocking efforts. KBWF has just started building their hatchery research facility, and it would be a long time before they are in a position to be able to produce large numbers of fry of the desired species. Nevertheless, we should begin to approach community groups and see if there is interest in participating, as the program develops.

Dale and Neil thanked everyone for attending, and for their input. Angel and Ed thanked KBWF for being willing to address these questions in a consultative manner. Neil offered to document these discussions, and to circulate them among the participants, and then, once approved, among the wider group of interested parties.

The meeting then adjourned, with no fixed date for further discussions.

Transcript of Meeting at NELHA Conference Room
on Tuesday, May 21st, 2002, to discuss with Kekaha kupuna the concept of the proposed open ocean fish farm, and obtain input on traditional perspectives and cultural issues.

Present : Valentine K. Ako (Kekaha kupuna, now resident in Kaua'i), Robert Punihaole Sr. (Kekaha kupuna), Annie Coelho (family member), George 'Kino' Kahananui Sr. (Kekaha kupuna), Cynthia Punihaole (Hawaiian fisherwoman and cultural practitioner), Isaac Harp (Hawaiian fisherman and cultural practitioner), E. Kalani Flores (Hawaiian Studies Instructor, HCC Hilo), Neil Anthony Sims and Dr Dale J. Sarver (Black Pearls, Inc.).

Invited, but absent : Sam Keanaaina, Mikahala Roy and David Roy, Kepa Maly, Ed Stevens.

Meeting convened at 10 am. Kino opened the meeting with a prayer, asking for guidance, unity and tolerance. Neil reviewed the main points about the proposed project. In meetings over the past year, with a range of community interests, the need for assessment of the cultural and social impacts of the project has been often raised. Dale and Neil recognize that these impacts need to be considered, and wanted to open a dialogue with the kupuna from the area. We recognize that this is a new innovation, and as such it needs to be put forward in an appropriate way; hence this meeting.

Val pointed out that there is a whole string of 'opelu ko'as right along the shore, near the drop-off of the reef. People used to come from Mahai'ula to fish these ko'a. Each ko'a had a type of fish that was associated with it – the 'opleu mama. These were ulua, kamanu, kaku, kahala, etc.

Val stated that this was also an area of very strong currents. Some discussion ensued about how strong the currents were directly off Keahole – Val indicated that they are over the 2 knots shown in the records. Your fishing line can trail right out behind you like a trolling lure. The strong currents are the source of the name "Ke ahole" – or the swirling. Dale pointed out that some of these fish cages were deployed in currents up to 7 knots.

Val asked what we proposed to do with the fish. With the abalone farm, it will all be exported, and none would be available for local people to eat. Would the mahimahi be sold locally, and if so, for what price? Would it be affordable? Dale replied that around 70,000 lbs of mahimahi are imported into Hawaii each week, already. We would try to substitute for some of this to reduce our reliance on imported fish. He believes that we have to start to take responsibility for being more self-sufficient for our own food.

Val asked what would be the advantage for the local community; what would be gained? Robert talked about the potential conflict with night-fishing for 'opelu on the ko'as, but that the lines were not down deep – only about 20 feet. Val talked more about how strong the currents are, particularly when the tide changes. Sometimes if you are fishing near the 'cliff' and the current changes to the West, it can pull your hook straight in to shore and hook you up.

Neil said that they still see some fishermen using an 'opelu net on the South side of Keahole. He asked if anyone still fishes the 'opelu ko'a to the north of Keahole. Robert replied that no-one still fishes them these days, but that they are hoping to start training some of their children or grand-children. He feels that they have to look towards the future fishermen, and we have to look at the feeding habits of the fish. The old fishermen used to feed the ko'as, and so there would be a risk that the fish cages would create a new ko'a. He said that the ko'as were not only for the 'opelu, but

were also for the aku, kawakawa, o'io, ahi. They all have their separate areas where they congregate.

Isaac asked if there were any plans to compensate the community for the loss of access to the ocean area. Are there any plans for expansion?

Neil replied by describing the plans that have evolved out of earlier community consultations. Under the Ocean Leasing Law, the lease revenues are split with 20% going directly to OHA, and the other 80% goes into a Special Land Development Fund. This is administered by the Land Board, and there are no hard rules about how it is disbursed. In our earlier discussions, we talked about using this for supporting a stock enhancement program. If we can develop hatchery techniques for these overfished bottomfish species, such as opakapaka and ehu, we will build a commercial-scale hatchery to stock the farm. This facility could then also be used for a reef-restocking program. We have talked about getting community groups involved in the restocking program, so that instead of releasing little fish at around 1 inch, we could have people involved in helping to rear these through the nursery to a size of 4 inches or 6 inches, and then releasing these. Their survival would then be a lot better, and we could have community and education aspects involved in the nursery stages.

Val pointed out that opakapaka are too expensive for local people to afford. Would there be some way to make them more accessible to local people?

Isaac expressed concern about the feed, and the potential for use of antibiotics. He pointed out that the state has outlawed feeding of fish in many locations. One of his main concerns had been the potential for pollution, but he had talked to Randy, and Randy had allayed many of his fears. Had we talked to Bill Walsh, the DAR Fisheries Biologist?

Dale replied that he has talked to Bill many times about our project, and that he is waiting to see the complete documentation of our proposal. Dale said that Bill had also been concerned about the potential for water pollution and waste fish feed. However, Dale said, any fish farmer is going to be also very concerned about waste fish feed – its wasted money.

Val said that he didn't mind the idea of the project, so long as there was something comes back to the local community.

Neil then asked if it would be possible to site the cages on top of an 'opelu ko'a, so that the cages helped to keep the 'opelu there. If we knew where the ko'as were, we might be able to locate the cages in a mutually acceptable site. It was generally agreed that the ko'as were located at the dropoff well inside the locations of the cages, but that the cages could still effect the ko'as by drawing the fish away. Val asked for a map to indicate where the ko'a were located. Isaac then asked Val not to show the ko'a location, as this was traditional family knowledge, and he didn't want to see it shared with people outside the family. He said that instead we should hire Kepa Maly to conduct interviews with the kupuna, to find out where there are possible sites for locating cages.

Neil said that they were doing much of the work themselves, and weren't in a position to be hiring outside consultants.

Kino then asked everyone to think about what was going to happen. No matter where the cage is located, the 'opelu will go there, and the surrounding ko'a will be lost. Traditionally people used to

feed the 'opelu before they fished them. Now, the cage will draw all the fish. He asked how deep the net would go down into the water. Dale replied that surface cages would extend down 20 or 30 feet, but that the submersible cages could extend down much deeper.

Dale suggested that the cage might not draw the fish away from the reef, but just add more habitat for fish to live by. The presence of the cage could result in more fish in the are just by providing more places for fish to live.

Kino pointed out a number of other concerns. What about whales in the area? What about boats, and the potential for collision? His main point, he concluded, was what protections would there be for the ko'a. Opihi used to be very plentiful – you could walk on the opihi out here. Now they are gone. There were different foreign fish introduced by the University – like the ta'ape. He eats any of the ta'ape that he catches, and it's a good eating fish. What benefits will there be? he asked.

Kalani said that part of the problem here is that no one is certain what might be the impacts from the cages. He asked what would happen if, after the project started, there were negative impacts. Dale said that there is good evidence as to what the impacts would be – we can base many of our projections on the results form the Ewa Beach cage project. Dale also stated that the terms of the lease would ensure elaborate monitoring of the environment by several State and Federal agencies. If there were any adverse impacts, we would be called on to mitigate any negative effects. If there were serious problems these agencies could force the closure of the farm.

Isaac said that he would like to see more complete documentation. He asked why the presentation was only three pages of text outlining the project, with very few specifics. Neil pointed out that BPI was doing it this way, bit by bit, because we wanted to keep an open mind when we were discussing the project with the community. We wanted to meet with different groups, and engage the community in discussions - to find the community concerns and get the community input. We didn't want to present a complete and final plan and say "Take it or leave it". We realized that it was a new project, a new concept, and that we didn't want to just shove it down the community's throat.

Isaac then said that Kepa may indeed already have much of the information on the 'opelu ko'a locations, from the CO2 study. He thought Kepa may be able to provide that information, or he may volunteer his time to assist in compiling that information.

Cindi pointed out that State Historic Preservation had already described the ko'a as a traditional cultural resource. These ko'a are important for the future generations, as it is their link with the past, with traditional practices. If this does draw fish away from the ko'a, how would we propose to maintain the ko'a?

Neil asked would it be a problem if one of the ko'a was moved – if the farm does result in one 'opelu ko'a shifting further up or down the coast, would this be a problem? Robert replied that it would not really be a problem.

Dale asked for more information on how ko'as work. Are the fish attracted there because people feed them, or do people feed them there because that's where the fish are? Kino explained the principles of triangulation to find the precise spot where the ko'a lies. The fish are usually there. He asked if the 'opelu would get attracted to the cage. Val thought that they would be attracted to the cage. Fish are like people, he said. They will go wherever there is food. He discussed some of the

problems with feeding ko'as these days. Traditionally they would just feed with opae 'ula and ground up vegetable matter, but now people from Hilo are feeding the ko'as with other palu, such as dog food, etc.

Dale thought the fish may be attracted to the cage whether or not they get fed there – as with a FAD in deep water, the cage is just a reference point for the fish to associate with. Val thought that Ewa is different to Kona, and we should be careful when extrapolating the Ewa cage results down to here. Many things in the ocean are inexplicable. When he was long-lining they caught many strange fish that they hadn't ever seen before. It used to be in Mahukona that they could catch abundant malolo (flying fish), but not now.

Val asked if we would consider relocating the project to Kawaihae or Mahukona. Neil replied that we had looked at sites all along West Hawaii, and that this was clearly the preferable site. Any further north would expose the project to the strong trades that blow down through the Waimea saddle.

Cindi said that an important point for her was the fact that they are the stewards for Kekaha. They will perpetuate their culture, or not. The ko'a are not just a spot to feed fish, but they are a place to teach their children. It's not just the waters, but they also need to protect the landmarks that they use to triangulate, so that they can find the ko'a. This is what they have been doing working with Kuki'o.

Cindi asked if something goes wrong on the farm, will BPI clean it up? She said that the Western mindset needs to understand how to take care of properties. They are trying not to dilute their culture. They don't want negative changes as they go forward. They are thinking about the future, and trying to think what is in it for their children.

Robert stated that he thought that this project looked OK, provided that we could help restore the fish stocks along the coastline. O'ama and manini used to abundant, but now there are no more.

Dale said that it would help if people could also consider the positive aspects of the project, as well as just focusing on the potential negatives. This project would help to focus research efforts on fish hatchery and nursery work, which would then give us the tools to grow valuable species such as opakapaka, jacks, groupers and rear them on the farm as well as restock them on the reef.

Val talked about the Hawaiian tradition of just taking enough fish for their immediate needs – no more. Then, when the fisheries were commercialized, they ran into overfishing problems. Cindi also talked about the coral collecting, how that had become big business with little regard for the environment. She said that there used to be a way to put back in the ocean. There should be something put back, like manini or pakuikui produced in the hatchery. She also had concerns about the precedent of privatizing ocean space.

Val said that in the proposed area, they used to catch palani, po'alu, awa, but now they are all no more. Isaac also said that these were good laenihi (nabeta) grounds.

Isaac proposed that perhaps it would be better if there was just one cage deployed first. He also suggested that, as a former commercial fisherman, BPI should look at entering the retail market – that's where the profits were, rather than just selling to a middleman who sets his own price. While there may be lots of fish imported to Hawaii, there are also lots exported – and not just ahi. Some

people are also exporting akule to the West Coast. He felt that opakapaka are not really a local fishery – they are just a commercial fishery, mainly for non-Hawaiians. Most Hawaiians are more interested in the local reef fisheries.

Isaac also asked that if we did a Section 106 consultation, that we deal directly with the community, rather than going through OHA. Val agreed, asking that, in the future, could we please continue to consult with the local kupuna. He paid his way over from Kaua'i for the meeting, because he sees it as very important. If we put cages there on the ko'a, then the ko'a is dead forever. It has never been done before where one group has leased the ocean and deprived people of access. It hurts him to see the changes that are happening. Val recounted how he came over to fight the CO2 project, and now they are coming over to Kauai. He is very disappointed with this. When he had asked one of the CO2 scientists about the risks of an explosion if the CO2 mixes with the sulfur that leaks out at the bottom of the ocean, the scientist had replied "Who knows?! Its an experiment!". The CO2 people didn't do an EIS. He is one of the last fishermen that knows all of these ko'a, all the way up to Kawaihae.

Val stated that he is not against this particular project, if it starts small. He is grateful that we are meeting with the kupuna. There are too many projects that that don't meet with the kupuna. Like Hokulia: originally they had a haole boss, then a young Hawaiian was put in charge, with no idea of the traditions and the burial sites on that ground. Hawaiians of his generation are peaceful, and haven't turned violent yet, but in future, the younger generations might just burst out in anger. He wants to protect his children's future. He concluded by stating that he thought this was a good idea, but he had these concerns.

Cindi asked if it was possible to do a small project first – maybe just one cage. Dale replied that there are certain fixed costs – the hatchery, the boat, and the labor to maintain the cage and tend the fish would all be needed for one cage or for six. This was the smallest possible project that could be run at a profit. It would be difficult to raise the money for a smaller project, as it would be guaranteed to lose money.

Isaac stated that there is similar hatchery work going on at HIMB, and asked if we had considered working with them. Dale replied that yes, we are already involved in a co-operative research arrangement with Dr Chris Kelley's research team. They provide us with opakapaka eggs to do our research. However, they are somewhat hampered, as they are not allowed by Bill Devick to do any aquaculture research. Their hatchery research is all aimed towards research for increasing knowledge of the fish, and maybe doing restocking.

Val told how he was involved with the original ta'ape introduction, conducted by the University in the 1950's. He opposed the idea of introducing the ta'ape, but he was just a research assistant, and he was told that he was not the majority opinion. Robert told how the menpachi (u'u) and weke 'ula used to be abundant, but now were no more. They used to get a kind of 'opelu that would get up to 25 lbs, but not now.

Robert described how the 'opelu ko'a were only fed in the summer months. He said that he thought this was a good project, and that in the future, maybe it can be developed and expanded more. Dale replied that it is already a huge industry in other parts of the world, and it is growing now that people can move the cages out offshore.

Robert expressed the concern that as this project develops, the other fishermen fishing opakapaka are going to lose out. Neil replied that there are currently about 10,000 lbs of bottomfish like opakapaka imported into Hawaii each week, and 70,000 lbs of mahi. The stocks here in Hawaii are so low that most fishermen can't make a living anymore and they have had to take other jobs on land. When BPI first announced their plans over a year ago, three people called about the project. All were former bottomfish fishermen who could no longer make a living fishing, and they were asking if they could get a job on the farm. These are the kinds of people that we would see the fish farm employing, because they know the ocean and they know the boats and the fish.

Isaac again asked if the local fishermen would lose out, because the farm would mass-produce mahimahi, and would flood the market and drive the price down. Neil replied that the converse would probably apply – the farm would produce a steady supply of mahimahi, with a stable price, but when there is a log or a net found floating offshore, then fishermen load up on mahi, and its hard to even give away mahimahi in Kona, let alone sell it. Isaac replied that if there is continued growth in this fish farming offshore, then there would be loss of access to the ocean. Isn't this privatizing public areas? He sees lots of potential negative economic impacts. Isaac asked for the proponents to be transparent in all their dealings. If the fish are destined for export, then please say so, up front. If they will be sold locally, then say so.

Isaac thanked BPI for taking the time to meet with them all, and asked if it would be possible, prior to submitting the Draft EA, for the fishermen to view the draft first. Neil replied that BPI's approach has always been consultative – that we have sought input from various groups all the way along. We intend to continue in this vein, and would be happy to provide working drafts for comments and suggestions, as the documents are compiled.

Val talked about how the fishermen in Kauai are now having a hard time selling their fish. They have to use a fish broker, and then the broker is the one who makes the money. People started selling their fish on the side of the road, but now they are even stopping this.

Val said that the hatchery should be used only for production of local fish. Neil and Dale said that they are only proposing to use Hawaiian fish – that no foreign species will be used.

Cindi asked BPI to please consider the ko'as, and to try to keep them active. Neil asked would it be feasible and an acceptable mitigation of impacts if we were to initiate a program of feeding the ko'as, to keep them active. Robert thought that this was a good idea, and a good way to keep the ko'as working.

Isaac asked if there were any limits in the legislation on the expansion of offshore fish farming. Dale replied that the lease application process is sufficient to control future growth of this concept. Any lease application has to come up before DLNR Board, and if there are concerns about the number of leases, then at some stage the DLNR can simply say no more will be issued.

Isaac thought that it would be a good idea to begin zoning of the ocean. Offshore farming is OK in some areas, and the State should identify the most suitable sites for this. Dale replied that zoning is a logical, practical way to move forward, and that it is practiced worldwide. He was involved in the early freshwater prawn industry in Hawaii, as the State's first aquaculture extension agent, and assisted in the zoning of Oahu for growth in the freshwater prawn farms. Unfortunately, the industry stopped growing, and eventually collapsed.

Kino made general concluding remarks, saying that he felt the meeting was fruitful, and thanking BPI for the invitation to attend. There were some clouds in his mind, and instead of pushing forward on our own, he thought that it had been good for us to get together. He was still concerned that the automatic feeding on the farm could draw 'opelu into the cage. If we can identify the ko'a together, and put the landmarks on a map, then we could agree on where to site the farm so that it has minimal impact. He would like us to get together and discuss the details of siting in relationship to the 'opelu ko'as.

Kino continued that he recognized that BPI was trying to do the best we could. He would like to see us reach an acceptable compromise. He hoped that neither party would walk away from the discussions, but that instead we would "walk away together". This discussion and our working together is not just for today or tomorrow, but also for the future. We all need to put these ideas together, and move forward together.

Val asked that should the project go forward, that he would like to be able to come out and see it. He is not objecting to the project, but he is just wanting to keep the traditional grounds for the younger generation.

Dale then asked Isaac to please clarify his position – did he just have concerns with some aspects of the proposed project, or was he opposed to the whole idea of offshore fish farming. Isaac replied that he just had some concerns, but that he thinks that there is some good potential for this type of project.

Isaac asked if it would be possible to get funding to set up a test cage. He and Cindi both asked how much would such a test project cost. Dale and Neil didn't want to put out a figure, without being able to think of what would be involved. A single cage costs a minimum of $85,000, without anchors and moorings, but the main costs would be in operating the boat and providing the daily feeding. A full test run could cost more than $500,000. Cindi thought that there would be sources of funding for conducting such a test. Dale said that a test cage would be fine, so long as it didn't stop the request for the commercial project.

Cindi asked how much the full project would cost. Dale said that it would be over $2 million to fully finance the project. Cindi and Isaac were both surprised at how inexpensive the project was. Isaac suggested that OHA or other Hawaiian groups might want to invest in the project. Dale replied that BPI's experience with the pearl farm was that OHA had expressed interest in assisting, but that they were limited in participating in a project which involved non-Hawaiians.

Neil concluded the meeting by thanking everyone for their attendance and input. He indicated that BPI would follow up with Kepa, and that he would circulate a written transcript of what was said, so that everyone could have an agreed-upon record of the discussion. He would circulate a draft to everyone who had been present, and if people had any, additions, corrections or changes to the transcript draft, then he would be happy to make these changes.

Kino then concluded the meeting with a prayer.

Transcript of Meeting at Sun Cablevision Conference Room
on Tuesday, May 28th, 2002, to discuss with Royal Order of Kamehameha the concept of the proposed open ocean fish farm, and obtain input on traditional perspectives and cultural issues.

Present : Mahealani Pai, Wayne Iokepa, Paul Chung-Hoon, Edward Nunez, Russell Paio (Royal Order of Kamehameha), Neil Anthony Sims and Dr Dale J. Sarver (Black Pearls, Inc.).

Meeting convened at 6 pm. Mahealani opened the meeting with a prayer.

Neil outlined the status of BPI's proposal, and the process of outreach to concerned community groups. In meetings over the past year or more, with a range of community, ocean recreation and conservation interests, the need for assessment of the cultural and social impacts of the project has been often raised. Dale and Neil said they recognize that these impacts need to be considered, and have begun to address some of the issues.

Neil said that this is a new, and exciting development for Kona. However, Dale and Neil have both spent most of their lives working in aquaculture development, and they recognize that community understanding and acceptance is important to allowing a project such as this to succeed.

Dale reviewed the main points about the proposed project, starting with BPI's background in pearl culture, and our diversification into fish hatchery research. He pointed out the need for more sustainable sources of fish protein in Hawaii, to overcome our present dependence on fish imports. Presently 10,000 lbs of opakapaka and 70,000 lbs of mahi-mahi are imported into Hawaii every week. He believes that we need to begin to accept responsibility for feeding ourselves, and not rely on other islands. Fisheries stocks are being decimated all over the world and we need to take action to solve this problem. He described the new opportunities for offshore fish farming provided by the recent engineering innovations, and how this is an improvement over past practices, such as salmon farming.

Dale then described the process of site selection in Kona, and the advantages of the site BPI has identified. BPI has conducted surveys of recreational activity in this area. Over the course of a couple of months there was only one boat found in the area, he said, and it was just passing through.

Dale also pointed out that in community discussions to date, people had expressed the strong desire to see benefits from this project kept in Kona. This is something that BPI would endorse.

An open discussion then ensued about the experience of the research project and then commercial cage farm off Ewa Beach, in Oahu. The changes in water quality were so slight as to be almost immeasurable. While there was an increase in the number of animals in the sand beneath the Ewa Beach cage, there was not any change in the balance of the community, so this was not considered to be problematic. The cages also acted as a shallow-water FAD, attracting large numbers of fish – particularly palani and loulu. Generally this was considered a benefit. While many fishermen originally opposed Randy Cates' cage application, they are now very

supportive. According to Randy, they keep an eye out over the cage area for him, and have alerted him if there is any suspicious activity around his cage site.

Paul asked if the presence of the cage would have an effect on the Kona crabs, which spawn in this area around Keahole. Dale replied that the data from Ewa indicates that, if anything, the Kona crabs would thrive – there would be more food for them. Neil stated that it was his understanding that while Kona crabs might occur in this area, there was very little fishing for them around the proposed farm site, because the currents were too strong.

Russell asked what sort of surface structures there might be at the farm site, and what it would look like from a distance. Dale and Neil described how the cages would be confined to the central 9 acre area (600 ft x 600 ft). We would generally prefer to use subsurface cages, but we might need to use surface cages for nursery culture or harvesting of some species. As the target fish have not been cultured previously, we don't want to commit to one style of cage, and then have to come back later and ask for changes to the lease to permit other styles of cages. Even for the subsurface cages, there would need to be feeding buoys on the surface, to ensure the fish were fed on days of rough weather.

Mahealani asked what was the chance of a cage breaking free. Dale described the mooring arrays, and indicated that the farm would be even more concerned than the public about breakages, as it would be a loss of the cage and loss of all the fish inside. The specifications have not yet been determined for the anchors, but we would have engineers from the cage company provide specifications. The anchors would be way over-engineered, to meet the most severe storm conditions. These cages are deployed in open waters in the North Sea. There was a trial cage in the Gulf of Mexico that did break free and drifted around for a while, but they had put it out with just a single anchor. We would probably use at least four anchors.

Neil and Dale said that there had been some concerns expressed at earlier meetings about potential impacts from the cages on marine mammals. However, they pointed out that so long as the mooring lines are very taut, there is negligible risk of entanglement by humpback whales or dolphins. Observations on the Ewa cage show that marine mammals are neither attracted nor repelled by the cage; humpbacks swim past unperturbed, and spinner dolphins pass freely through the area, swimming under, over or around the cage. The best scientific information to hand suggests that so long as the cage does not intrude onto the spinner dolphins' resting area in Makako Bay, there will be negligible impacts on the dolphins' daily migration patterns.

Neil stated that there were also some concerns expressed about the loss of public access to the space, because of the lease preventing access to the inner 9 acre area, where the cages would be. He said that BPI would prefer this to be restricted access, for safety and security reasons. BPI recognizes that there is a public cost to our project, and that there must be some commensurate public benefit to be derived. He related some of the earlier discussions with community groups, and described how a possible resolution had been formulated, where some portion of the lease payments could be provided, under the ocean leasing legislation, to a special land fund for aquaculture development. This could support a range of activities, including education, training, nursery rearing of fish or reef restocking work.

The discussion addressed the issues of other impacts on traditional and cultural uses of the area. Neil pointed out that some of the kupuna from Kekaha had expressed reservations about the potential impact on the 'opelu ko'a in the area. Mahealani asked who were our informants on these traditional uses. Neil replied that Robert Punihaole and Val Ako were the principal informants. Mahealani and Wayne agreed that this was appropriate. Neil pointed out that it was BPI's understanding that the cages would not directly block an existing 'opelu ko'a, as we understood these were usually in shallower water, closer to the reef drop-off. We understood that, at night, the 'opelu are more scattered, out towards the "fishing grounds" in deeper water. Nevertheless, BPI was sensitive to any perceived conflict, and was discussing this issue further to try to resolve these concerns in a mutually acceptable manner.

Neil asked if there were other traditional tenure concerns of which BPI should be aware. Mahealani referred him to the Native Hawaiian Rights Handbook, which addressed ahupua'a tenant rights in Makalawena. Most of the information in this section was provided by Tutu Ona and Robert Punihaole.

Mahealani suggested to BPI that it would be a good idea at public meetings to provide video footage of these cages, and the fish in them. He had seen some of the earlier video of the Ewa Beach cage, when the research program was first making the news, and he had been very impressed with the concept. He also indicated that it would be very helpful if BPI or other researchers could make available the water quality monitoring data, so that people could see the results for themselves.

Wayne asked about long term monitoring of water quality and reef health, and Dale described the level of detail that has been required for the Ewa Beach cage.

Mahealani also offered other suggestions on how the project could provide benefits to the local Kona community. He said that the main problem facing local fisheries is the worsening ciguatera problem. He said that it would be very helpful if this project could help support research into what were the root causes of ciguatera, and ways that it might be overcome. Dale replied that ciguatera was very difficult to study, but that the prioritization of the activities that might be supported under the Special Land Development Fund would depend upon public input. At this preliminary stage, BPI is looking to identify non-profit organizations that might be interested in participation in these activities.

Mahealani asked if access to funds from the lease payments would be contingent on the organization supporting the project, and Neil and Dale replied "No." BPI understands that some organizations may have some reservations or concerns about the project, and we want to hear these comments. However, if the project does go ahead, we too would like to see some portion of the lease payments kept here in Kona, and we hope that Kona organizations would be interested in participating, whether or not they support or object to the offshore fish farm proposal.

Dale said that our hope, in holding these meetings over the last year or more, has been to provide a forum for people to express any concerns, and that we would much rather address these issues up front and in advance, before we present a formal proposal to DLNR.

Dale pointed out that in all of BPI's projects, we have never just built a single project for ourselves (whether it be a pearl farm or a fish farm). He said BPI has always tried to act as an industry catalyst, and likes to encourage participation by others in the industries that we are working to set up. In the Marshall Islands, three farm sites are now using spat from the hatchery that BPI established. Dale talked about BPI's hope that others would also see an opportunity for themselves in open ocean fish farming in Kona. BPI had already heard from three displaced bottom-fishermen in Kona who wanted to know about the possibility of jobs on the farm, when it begins operation.

Some general discussion ensued about the overall lease application process, Federal permit requirements and oversight, and the opportunities for public input.

Mahealani indicated that the members would follow up with the moku, and get back to BPI with any further questions of concerns. He said that he appreciated the open approach of BPI, and that their concern as an organization was to strive to leave a legacy for future generations.

Neil concluded the meeting by thanking everyone for their attendance and input. He said that he would follow up by circulating a written transcript of what was said at the meeting, so that everyone could have an agreed-upon record of the discussion. He would circulate a draft by email, and if people had any, additions, corrections or changes to the transcript draft, then he would be happy to make these changes. Wayne thanked Neil for this, and asked that we all keep the lines of communication open.

Mahealani then concluded the meeting with a prayer.

KUMU PONO ASSOCIATES

Kepä Maly, Cultural Historian & Resources Specialist
554 Keonaona Street · Hilo, Hawai'i 96720
(808) 981-0196 (fax available) · e-mail kumupono@hawaii.rr.com / www.kumupono.com

Mr. Neil Sims
Kona Blue Water Farms
P.O. Box 525, Holualoa, HI 96725

August 26, 2002

Dear Mr. Sims,

In follow up to your requests, I have spoken with the kūpuna Punihaole, Kahananui and Ako, and family members (including e-mail communications with Mr. Isaac Harp), all of whom are knowledgeable about the fisheries in the Kekaha region of North Kona, in regards to your proposed fish farm site, lying south-west of Unualoha Point. I have also reviewed historical documents and native accounts in the collection of Kumu Pono Associates for any references to Unualoha, Hāmanamana and Kalaoa (the two lands which meet at Unualoha Point on the seashore), and larger Kekaha region of North Kona. I write the following comments—noting that I am not, nor have I been under contract as a consultant to you—to answer the basic questions you asked of me. My interest in your draft EA (August 16, 2002), and proposed action, is that the history and recollections of elder kama'āina be known and acknowledged.

Presence of a ko'a fronting, or in the Unualoha vicinity?

- None of the kūpuna had specific knowledge of a ko'a fronting Unualoha.

- Neighboring ko'a in the Kalaoa and Ho'onā Point vicinity, and at Hale'ōhi'u and Ka'elehuluhulu are documented in historical texts and oral history interviews.

- Kupuna Ako mapped out ko'a in the region, and specifically noted and discussed no ko'a at Unualoha. The kūpuna agreed that it was likely that in ancient times, a ko'a was probably marked by Unualoha, but that that knowledge has apparently not been handed down (a product of historic impacts on native residency in the area).

- Kupuna Ako further noted (as he expressed to you at the meeting in Kona on May 21st 2002) that he does not believe the Unualoha site (indeed waters in the Kalaoa vicinity) is a safe one for long-term use of the nature proposed. His concern is about the seasonal Kohala, Ka'ū and Westerly currents which are kama'āina to the region. It is his belief that the periodic Westerly current will rip the farm from the sea and carry it to shore.

- I note that historic documents and oral history interviews describe the "supernatural" currents and strong nature of the sea in the Kalaoa vicinity; as well as detailed descriptions of fisheries, storied places, and native practices (see documentation previously translated and compiled by myself in several studies as a part of the State's Historic Preservation Review process).

Reference to Unualoha in Historical Narratives?

- Except in the 1882 field books of Kingdom surveyor, J.S. Emerson (Book 252 and 253 in the collection of the State Survey Division), I did not find specific reference to the place name "Lae o Unualoha" (Field Book 252:127). I note that a reference in the same field book, confirms both earlier narratives, and the oral historical accounts recorded by kūpuna, regarding the presence of a fishpond in the region prior to the 1801 lava flow. Emerson recorded:

> Pohaku o Pelekane: This rock is on the ancient site of the Fishpond "Paaeea" [Pā'aiea], and in the flow that started from "Puhi a Pele" on the slope of Hualalai. It covers the land from "Lae o Keahole" to the village of "Makalawena." Kamehameha had a residence there afterwards. The flow covering about _____ according to Kamaainas. (Emerson, May 19, 1882, 252:127-128)

- J.S. Emerson's Register Map No. 1449 (1888) identifies various locations, including "storied places" on the landscape in this region. It will be noted that one low hill on kula lands above the shore, near the Hāmanamana-Hale'ōhi'u boundary is named "Kuula." There is significance to this place name; the significance includes, but is not limited to — Kū'ula being a fisherman's god; a place of receiving offerings; and a marker of a ko'a.

- While I have not found many specific references to Unualoha, there is a wealth of traditional knowledge pertaining to the lands and fisheries of the Kalaoa-Ka'ūpūlehu region. Including detailed and specific references to place names, fisheries, traditions and practices. I have reported many of these accounts—both historical narratives and in oral history interviews—in several cultural-historical studies.

Comments on Draft EA August 16, 2002

I limit my comments on the EA to the area of my knowledge:

1) It is my opinion that the — cultural historical context of the near shore lands; fisheries; and traditional and customary uses of the fisheries in the Kalaoa-Hāmanamana region is inadequately represented in the EA.

2) While reference was made in the EA to consultations and meetings with various community members, I note that the primary contacts with native Hawaiian elders and practitioners (e.g. Kupuna and practitioners at meeting of May 21, 2002 and follow up conversations) are only referenced as:

> ...A meeting was held with kupuna, cultural representatives and other interested fisheries advocates on 5/21/02. Abridged transcripts from these community meetings are available at BPI's website... (Draft EA page 43)

I believe that a detailed description of the cultural historical context of the project area setting, and acknowledgement of the kūpuna and their knowledge should be an integral part of the EA.

Sincerely,

Kepā Maly
Cultural Historian and Resources Specialist

cc. Valentine K. Ako
Isaac Harp
Kinoulu Kahananui
Robert Punihaole (with C. Hanohano and C. Kalei Punihaole)

APPENDIX IX : DEPARTMENTAL REVIEWS, PUBLIC COMMENTS, AND PROJECT PROPONENT RESPONSES.

44761

LINDA LINGLE
GOVERNOR OF HAWAII

PLD
DAR
LS

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HI, 96813
Telephone: (808) 586-4185
Fax: (808) 586-4186
Email: oeqc@oeqc.state.hi.us

GENEVIEVE SALMONSON
DIRECTOR

RECEIVED
'03 APR -8 A9:47
DEPT OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

March 27, 2003

Mr. Peter Young, Chair
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai'i 96809

Dear Mr. Young:

Subject: Draft Environmental Assessment for the Kona Blue Water Farms Open Ocean Fish Farm, North Kona, Hawai'i

Thank you for the opportunity to review the subject document. We have no comment.

Sincerely,

Genevieve Salmonson
Director

c: Kona Blue Water Farms

EXHIBIT 11

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

April 7, 2003

Mr. Neil Anthony Sims
V.P. Res. Dir.
Kona Blue Water Farms
P. O. Box 525
Holualoa, HI 96725

Dear Mr. Sims:

Open Ocean Fish Farm
Subject: Conservation District Use Application (CDUA)
Unualoha Point, North Kona

This is in response to your letter dated March 28, 2003, regarding your proposed open ocean fish farm to be located approximately 2,000 feet from the shoreline off of Unuahola Point in North Kona.

The proposed development is located within the State Land Use Conservation District and you have informed us that you have filed for a CDUA.

According to Planning Commission Rule 9-4(22), Special Management Area is defined as "the land extending inland from the shoreline as delineated on maps filed with the Authority as of June 8, 1777, or as amended pursuant to Rule 9.19." In this case, Authority is defined as Planning Commission.

Based on the above definition, your proposed development is located outside of the Special Management Area (SMA).

Should you have any questions, please contact Susan Gagorik or Esther Imamura at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

SG:pak
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KEAHOLE POINT TENANTS ASSOCIATION
73-4460 QUEEN KAAHUMANU HWY: [illegible]
BOX 113
KAILUA-KONA, HI 96740

FACSIMILE TRANSMITTAL SHEET

TO: Attn: Dawn Hegger	FROM: Michael Buchal, President
COMPANY: Department of Land and Natural Resources Honolulu, HI	DATE: 3/7/03
FAX NUMBER: 808-587 0455	TOTAL NO. OF PAGES INCLUDING COVER: 2
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE: Kona Blue Water Farms	YOUR REFERENCE NUMBER:

☐ URGENT ☑ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:
Dear Ms Hegger,

Neil Anthony Sims, of Kona Blue Water Farms, has informed me that he has written to you outlining the substance of the two presentations that KBWF has made to KPTA regarding their offshore fish farm proposal. I am in receipt of the pertinent excerpts of this letter ... to wit :

"We also gave a formal presentation to KPTA very early in our project discussion stage. : on July 6th, 2001. At this meeting, there were many strong expressions of support for our plans, and no objections or concerns were raised. Of particular note was the strong endorsement by Pacific Harvest, Inc.'s representatives at that meeting. Pacific Harvest raises the same fish that we are proposing to rear in our offshore cages, and would presumably be the most concerned of any of the KPTA members about potential economic impacts of our proposed project. "

.....

"Similarly, we met with the KPTA members at their February 7th meeting. We gave on update on our project, and asked for questions or comments. There were none voiced in

Exhibit 12

the meeting, or in discussions afterward. We also indicated that we would like to have KPTA express a formal opinion – an endorsement or otherwise – on either our project, or the concept of open ocean aquaculture. The KPTA members were to be given sufficient time to review the draft Environmental Assessment on our web site (www.blackpearlsinc.com) and then a vote was to be taken. It is our understanding that this has, as yet, not been put to a vote. "

The 2001 meeting was conducted by former Association President, Phil Wilson. He recalls this meeting and reported to me that: at this meeting information materials were distributed for review by tenants. These materials were collected from tenants at the end of the meeting as the exact project location and information was still evolving. Tenants attending the meeting expressed support and no concerns. At the February 7th, 2003 meeting there was some discussion of the more detailed KBWF proposal. Although tenants had not had adequate time from the date of KBMR request to review the KBWF EA, several tenants familiar with the project and its evolution voiced positive sentiments and a willingness to endorse. Only one tenant openly expressed the following qualitative concerns:

-the proposed KBWF project might create potentially negative public opinion and this might bleed over onto NELHA and NELHA tenants.
-the proposed KBWF might draw attention to or somehow result in increased environmental monitoring costs for NELHA tenants.

KBWF staff attempted to address these concerns, however the nature of the concerns appear to be outside the scope of an EA. I can see no way for KBWF to further address these types of concerns. There did not appear to be any concerns about economic impacts that Mr. Simm's references relative to the 2001 meeting. KPTA tenants have now had time to review the EA and the matter will be put to a vote to determine if a majority of tenants are willing to officially endorse the KBWF proposal.

I hope this clarifies the current situation.

Sincerely,

44767

LINDA LINGLE
GOVERNOR OF HAWAII

PP
DAE
LD

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
[redacted]

GENEVIEVE SALMONSON
DIRECTOR

RECEIVED
'03 APR -8 A9:47
DEPT. OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

March 27, 2003

Mr. Peter Young, Chair
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai'i 96809

Dear Mr. Young:

Subject: Draft Environmental Assessment for the Kona Blue Water Farms Open Ocean Fish Farm, North Kona, Hawai'i

Thank you for the opportunity to review the subject document. We have no comment.

Sincerely,

Genevieve Salmonson
Director

c: Kona Blue Water Farms

EXHIBIT 9

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

REPLY TO
ATTENTION OF:

March 18, 2003

Regulatory Branch

Ms. Dierdre S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Mamiya:

This letter responds to your request for comments on the Conservation District Use Application for the Kona Blue Water Farms, Pen and Cage Aquaculture Facility, dated March 10, 2003. We have consulted with the applicants and advised them that a Department of the Army (DA) permit will be required for this project. They have not yet applied for the DA permit

If you have any questions concerning this matter, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200300322.

Sincerely,

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

EXHIBIT 10

NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA)

An Agency of the State of Hawaii

May 05, 2003

Dale Sarver, Ph.D.
President
Black Pearls, Inc.
P.O. Box 525
Holualoa, HI 96725

Dear Dr. Sarver,

SUBJECT: Open Ocean Fish Farm Project Endorsement

Thank you for your letter dated February 14, 2003. Per your request, the Natural Energy Laboratory of Hawaii Authority (NELHA), by action of its Board of Directors on March 25, 2003, hereby endorses the Kona Blue Water Farms' (KBWF) open ocean fish farm project goals, approach, and management plan for the waters off Unualoha Point, with the caveat that KBWF obtain all necessary State, Federal and County permits, comply with and adhere to all requirements thereof, and furthermore, adhere to environmental monitoring and other requirements as specified in Hawaii's Ocean and Submerged Lands Leasing laws, Chapter 190D, Hawaii Revised Statutes.

NELHA notes that KBWF is a division of NELHA tenant company Black Pearls, Inc., and has proposed the open ocean fish farm project in an area well outside of the NELHA ocean use corridor as defined in its Conservation District Use Permit HA-1862 and HA-1862A.

Sincerely,

Jeff L. Smith
Executive Director

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division

MAR 10 2003

REF:PB:DH

FILE NO.: CDUA HA-3118

Acceptance Date: March 3, 2003
180-Day Exp. Date: August 30, 2003
Suspense Date: 21 Days from stamped date

MEMORANDUM

TO: Division of Aquatic Resources, Division of Forestry and Wildlife, Division of Conservation and Resource Enforcement, Historic Preservation Division, Division of Boating and Ocean Recreation, and Hawaii District Land Agent

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA)
[Board Permit]

APPLICANT: Kona Blue Water Farms

FILE NO.: HA-3118

REQUEST: Permit and Lease State Marine Waters for Aquaculture Facility

LOCATION: North Kona, Hawaii

PUBLIC HEARING: YES X NO __

Attached please find a copy of the subject CDUA, and our Department's Notice of Acceptance. We would appreciate your review and comment on this CDUA by the suspense date noted above. We are including a copy of the Draft Environmental Assessment with this correspondence.

Should you require additional information, please call Dawn Hegger of our Planning Branch at 587-0380. If no response is received by the suspense date, we will assume there are no

(X) We have no comments.
( ) Comments attached.

Signed: _____
Michael G. Buck
DOFAW Administrator

Date: MAR 11 2003

EXHIBIT 8

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
Planning Branch
Honolulu, Hawaii

DIVISION OF AQUATIC RESOURCES
03-16
2/20

FEB 6 2003

In reply, please refer to:
File No.: HA-3118
Suspense Date: Two weeks

MEMORANDUM

TO: Division of Aquatic Resources ~~Division~~; Hawaii District Land Office; Division of Boating and Ocean Recreation; and Engineering Division

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Request for Authorization from the Department to Process a Conservation District Use Application Located on State-owned Lands

All Conservation District Use Applications (CDUA) must be signed by the landowner prior to the submission of the application to the Department. Applications involving the use of State lands require the signature of the Chairperson on behalf of the Board of Land and Natural Resources.

Please review the attached application and comment with respect to your division's present and future programs. Your comments will then be forwarded to the Chairperson for consideration on whether to sign as landowner on this CDUA. (Note: the Chairperson's signature on the application does not constitute the Department's endorsement of the proposed use).

General information regarding the attached application is provided below:

APPLICANT: Kona Blue Water Farms

AGENT: Neil Sims, Kona Blue Water Farms

LANDOWNER: STATE OF HAWAII

PROPOSED USE: Fish Farm

Comments attached.

2/19/03

RECEIVED
FEB 5

LOCATION: Submerged Lands (offshore of the Natural Energy Laboratory of Hawaii Authority, near Unualoha Point)

Thank you for your cooperation in this matter. PLEASE RETURN ALL ATTACHMENTS. If no response is received by the suspense date, we will assume there are no comments. Should you have any questions, or need additional time, please contact Dawn Hegger at 587-0380.

Attachment(s)

Suspense Date: February 20, 2003

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii

MEMORANDUM

To: William Devick, Administrator
From: Richard Sixberry, Aquatic Biologist
Subject: Comments on Conservation District Use Permit HA-3118

Comments Requested By: Dierdre Mamiya, Land Division

Date of Request: 2/6/03 Date Received: 2/6/03

Summary of Project

Title: Fish Farm (Offshore)

Proj. Kona Blue Water Farms (Niel Sims)

Location: N. Kona, Hawai

Brief Description;

The applicant intends to raise hatchery-reared fish in an open ocean fish farm offshore of the Natural Energy Laboratory near Unualoha Point, Hawaii. Hatchery technology and techniques are being developed for various species of high value fish.

Comments:

The proposed project is supported by the Division of Aquatic Resources since it will spur the economic development of the aquaculture industry in Hawaii. Additionally, it may relieve some of the pressure on local species depletion from over harvesting, entanglement from lost or discarded fishing equipment, and accidental taking of animals or fish other than the targeted species.

The activities proposed are not expected to have significant adverse effects on aquatic resource values or the ocean environment (FONSI).

The mitigation measures proposed for the project are adequate, including a long-term water quality monitoring program, which would limit or prevent excessive impact to aquatic resource values. We suggest that conditions similar or identical to the Ewa offshore Moi fish farm be incorporated into the permit process since the activities are essentially the same.

DIVISION OF AQUATIC RESOURCES
DIRECTOR
REF. PROJECTS
OFFICE SERVICES
Suspense Date
Comments
Information
Comp Act & File
03-MAR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division

MAR 10 2003

FILE NO.: CDUA HA-3118

Acceptance Date: March 3, 2003
180-Day Exp. Date: August 30, 2003
Suspense Date: 21 Days from stamped date

MEMORANDUM

TO: Division of Aquatic Resources, Division of Forestry and Wildlife, Division of Conservation and Resource Enforcement, Historic Preservation Division, Division of Boating and Ocean Recreation, and Hawaii District Land Agent

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA)
[Board Permit]

APPLICANT: Kona Blue Water Farms

FILE NO.: HA-3118

REQUEST: Permit and Lease State Marine Waters for Aquaculture Facility

LOCATION: North Kona, Hawaii

PUBLIC HEARING: YES X NO __

RECEIVED
MAR 11 2003
AQUATIC RESOURCES

Attached please find a copy of the subject CDUA, and our Department's Notice of Acceptance. We would appreciate your review and comment on this CDUA by the suspense date noted above. We are including a copy of the Draft Environmental Assessment with this correspondence.

Should you require additional information, please call Dawn Hegger of our Planning Branch at 587-0380. If no response is received by the suspense date, we will assume there are no comments.

Attachment(s) Comments Attached - Revised 4-8-03

3/12/03

William S. Devick
Administrator

EXHIBIT 6

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL ST.
HONOLULU, HI 96813

April 8, 2003

MEMORANDUM

To: Dierdre S. Mamiya, Administrator
Land Division

From: William S. Devick, Administrator
Division of Aquatic Resources

Subject: Request for comments on CDUA HA-3118, Kona Blue Water Farms aquaculture project

Regarding the above-referenced CDUA, in general, the Division supports activities such as the proposed aquaculture project that promise to reduce fishing pressure on wild fish stocks and develop alternative income sources from fishery resources. Upon careful consideration however, we believe that the draft Environmental Assessment (DEA) for the proposed activity does not adequately examine potential impacts to humpback whales and the proposed mitigation measures do not adequately address these potential impacts.

In summary, we recommend that the DEA be revised to more thoroughly review existing information relevant to humpback whale entanglement, collision and/or abandonment of humpback breeding, calving and nursing habitat that might be caused by the installation or operation of the proposed floating cages. We also recommend that a humpback whale monitoring program be added to the proposed mitigation measures. A more detailed discussion of these and other recommendations is presented below.

The DEA for the proposed activity indicates that the fish cages and mooring lines would occupy approximately 81 acres within an area frequented by humpback whales during their breeding, calving and nursing season. While the DEA reviews scientific studies in an effort to examine the likelihood of humpback whale entanglement resulting from the proposed activity, the applicability of the cited studies is not clear. To better evaluate the applicability of the cited studies, we believe the draft DEA should address the following questions: Regarding the findings of Celikkol, 1999, what is the prevalence and spatial distribution of floating fish cages in the study area relative to the fishing gear discussed? Regarding any of the research concerning entanglement cited in the DEA, were any of the marine areas examined known to be breeding, calving and nursing grounds for large whales? Do any of the cited studies examine collisions (as opposed to actual entanglements) between whales and gear that resulted in injury to the whale and/or damage to the gear?

In addition, the DEA should thoroughly examine the possibility that humpback whales would be displaced and/or abandon the area as a result of the proposed activity. This analysis is important considering the fact that any activity that causes humpback whales to abandon a

EXHIBIT 6

previously frequented area could be found in violation of the Endangered Species Act (50 CFR Part 224.103(a)(4), excerpt attached). We believe that simply stating in the draft EA that the whales can swim around the structures does not appear to represent a sufficiently thorough analysis of this significant concern. Any research related to impacts of large, moored floating structures on large whales should be cited and discussed in relation to potential impacts of the proposed activity.

Regarding the proposed mitigation measures, unless a more thorough review of relevant scientific information (as suggested above) indicates that humpback entanglement, collision and/or habitat abandonment are unlikely impacts, the Division believes that the proposed mitigation measures should be revised to include monitoring of humpback whale abundance, distribution and behavior in the general vicinity of the proposed project site. We remain open to any and all relevant information that may be brought forth, but considering the information available at present and the apparent unprecedented nature of the proposed activity, we believe scientific monitoring for changes in humpback whale abundance, distribution and behavior is essential to ensure that the proposed use remains consistent with the purpose of a conservation district, as well as the provisions of state and federal endangered species law. We would be happy to discuss the characteristics of the monitoring program in more detail at your convenience.

To further mitigate against disturbing humpback whales, we also suggest that any ocean-based construction associated with the proposed activity be limited to the months of June through September, during which very few, if any humpback whales would be in the area.

Thank you for the opportunity to offer these comments. Please feel free to contact me anytime regarding this matter at 587-0100.

Attachment

UNITED STATES CODE OF FEDERAL REGULATIONS (50 CFR)

SUBPART A (Introduction and General Provisions)

222.101 Purpose and scope of regulations

(a) The regulations of parts 222, 223, and 224 of this chapter implement the Endangered Species Act (Act), and govern the taking, possession, transportation, sale, purchase, barter, exportation, importation of, and other requirements pertaining to wildlife and plants under the jurisdiction of the Secretary of Commerce and determined to be threatened or endangered pursuant to section 4(a) of the Act. These regulations are implemented by the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, This part pertains to general provisions and definitions. Specifically, parts 223 and 224 pertain to provisions to threatened species and endangered [[Page 78]] species, respectively. Part 226 enumerates designated critical habitat for endangered and threatened species. Certain of the endangered and threatened marine species enumerated in Secs. 224.102 and 223.102 are included in Appendix I or II to the Convention on International Trade of Endangered Species of Wild Fauna and Flora. The importation, exportation, and re-exportation of such species are subject to additional regulations set forth at 50 CFR part 23, chapter I.

(b) For rules and procedures relating to species determined to be threatened or endangered under the jurisdiction of the Secretary of the Interior, see 50 CFR parts 10 through 17. For rules and procedures relating to the general implementation of the Act jointly by the Departments of the Interior and Commerce and for certain species under the joint jurisdiction of both the Secretaries of the Interior and Commerce, see 50 CFR Chapter IV. Marine mammals listed as endangered or threatened and subject to these regulations may also be subject to additional requirements pursuant to the Marine Mammal Protection Act (for regulations implementing that act, see 50 CFR part 216).

(c) No statute or regulation of any state shall be construed to relieve a person from the restrictions, conditions, and requirements contained in parts 222, 223, and 224 of this chapter. In addition, nothing in parts 222, 223, and 224 of this chapter, including any permit issued pursuant thereto, shall be construed to relieve a person from any other requirements imposed by a statute or regulation of any state or of the United States, including any applicable health, quarantine, agricultural, or customs laws or regulations, or any other National Marine Fisheries Service enforced statutes or regulations.

PART 224 - ENDANGERED MARINE AND ANADROMOUS SPECIES

224.103 Special prohibitions for endangered marine mammals

(a) Approaching humpback whales in Hawai'i. Except as provided in part 222, subpart C, of this chapter (General Permit Procedures) it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or to cause to be committed, within 200 nautical miles (370.4km) of the islands of Hawai'i, any of the following acts with respect to humpback whales (*Megaptera novaeangliae*):

(1) Operate any aircraft within 1,000 feet (300 m) of any humpback whale;

(2) Approach by any means, within 100 yards (90 m) of any humpback whale;

(3) Cause a vessel or other object to approach within 100 yards (90 m) of a humpback whale; or

(4) Disrupt the normal behavior or prior activity of a whale by any other act or omission. A disruption of normal behavior may be manifested by, among other actions on the part of the whale, a rapid change in direction or speed; escape tactics such as prolonged diving, underwater course changes, underwater exhalation or evasive swimming patterns; interruptions of breeding, nursing, or resting activities; attempts by a whale to shield a calf from a vessel or human observer by tail swishing or by other protective movement; or the abandonment of a previously frequented area.

Kona Blue Water Farms

A Division of Black Pearls, Inc.

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June 18, 2003
KBWF/William Devick 1C

William Devick
Administrator, Division of Aquatic Resources
DLNR, 1151 Punchbowl St
Honolulu, HI 96813

Aloha, Bill,

We are in receipt of your two responses to Dierdre Mamiya, Lands Division Administrator, dated firstly February 6th, and secondly April 8th, 2003, regarding our proposed open ocean fish farm project off Unualoha Point, in Kona. Before we address your comments, we would like to inform you of several modifications that we are making to our proposed project, to accommodate some of the concerns that have been shared with us over the course of our draft EA review process.

One of the most significant changes we are proposing is to make all of our six main cages submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages, which will be used for nursery rearing and for harvesting of fish from the submersible cages.

Furthermore, in discussions with David Mattila and Jeffrey Walters from the Hawaii Islands Humpback Whale National Marine Sanctuary Scientific Advisory Committee, they indicated that an appropriate mitigative measure would be to move our cages as far as possible offshore. This would also provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha Point. Consequently, we are now proposing to move our project a further 600 ft, directly to the west (offshore). This now puts our project in water between 200 ft and 220 ft deep, around 2,600 ft from the shoreline. To accommodate this greater depth, we will now need some wider area to spread our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres).

David and Jeffrey also suggested that we should always strive to keep to a minimum the number of mooring lines that we use in our cage design. We have therefore taken this request to the project engineers at Net Systems, Inc. (manufacturers of the Sea Station™), and we hope to include an improved mooring design in the final Environmental Assessment.

We hope that these changes will go some way towards further ameliorating your concerns about our proposed activities.

In addressing your comments in you letters, please allow me to respond to your primary concerns in pointwise manner, for clarity:

From your comments of February 6th :

1. You suggest that "conditions similar to, or identical to, the Ewa offshore moi fish farm be incorporated into the permit process since the activities are essentially the same".

There is one significant difference between our proposed site and the site off Ewa Beach, in terms of monitoring, and that is the depth of the site. We understand that the Ewa Beach site is in water around 130 ft deep. While this represents dangerous diving depths, it does not preclude the benthic survey work by professional SCUBA divers.

Our proposed site was originally between 150 – 200 ft deep, and we expected to have a similar benthic monitoring program requirement in our lease. However, our recent modification to move our lease site a further 600 feet offshore further exacerbates the dangers to divers. As our cages will now be located in waters between 200 – 220 ft deep, we would ask that some changes be set up in the benthic sampling program such that we are not required to send divers to these depths for survey work. For example, a reasonable sampling of the soft substrates might still be obtained by grab samples, corers, or other such sediment samplers.

We would also ask that, in accordance with our gentlemen's agreement with local Kona environmental groups, the DAR office in Kona be designated as a local repository for sampling protocols and reports, so that this data is readily available to the public.

From your comments of April 8th :

1 Inadequate assessment of the impacts on humpback whales from KBWF's proposed project, and potential mitigation measures / monitoring program:

As we have stated in the draft Environmental Assessment, we believe that there will be no significant impacts on the humpback whales. There is no evidence to suggest otherwise. We would disagree with your assessment that "the impacts of this type of aquaculture on humpback whales are uncertain". There have been no negative marine mammal interactions reported with Sea Station cages. To date, Sea Station™ cages have been deployed for a total of over 580 cage-months (or 48.5 cage-years), in Washington state, the Philippines, Cyprus, Spain, Portugal, New Hampshire, New York, Puerto Rico, Oahu, China and the Gulf of Mexico without a single encounter between a whale and a cage or mooring.

David Mattila and Jeffrey Walters indicated that the work of Lien in Newfoundland was important to consider when assessing the likely risks of humpback whale entanglement. They

kindly forwarded us a copy of Clapham, et al., (2002, Report of the intersessional working group on large whale entanglements, presented to the IWC Scientific Committee), which reported much of Lien's findings. However, this still largely found passive fishing gear - traps and gillnets - to be the major source of entanglement. Although the report states that "fixed or anchored gear of almost any type represents the major entanglement threat", this is for fishing gear that is designed to corral, enmesh or otherwise capture swimming fish. Passive fishing gear is, by its nature, difficult to see. It floats or hangs freely in the water, and is located, shaped or aligned to entrap or funnel animals into netted areas.

By contrast, our submersible cages are designed to keep our fish enclosed within the cage. There are no flat walls, funnels or bottlenecks in the cage designs. The cage surface is primarily taut mesh, more akin to a vessel hull than to a transparent gill-net. To visually-orienting marine mammals such as humpbacks, this mesh would probably appear to present almost a solid surface. The more appropriate analogy would therefore be the interaction between anchored ships and humpback whales, rather than fishing gear and whales. The impacts of 'this type of aquaculture' would therefore probably be about the same as the impacts of mooring six 80 ft vessels in these waters.

Similarly, our cages are streamlined, to reduce drag through the water, and they are strutted to maintain very high tension on the net material. The cages present a hard, rounded surface to an approaching animal, which would naturally tend to deflect the animal in one direction or the other, rather than halt their progress, as might a flat wall or funnel net.

We will also indicate in the Final Environmental Assessment the appropriate response in the unlikely event of any entanglement, which would be to immediately call the NOAA Marine Mammal Stranding Hotline (1 888 256 9840). In discussions with David and Jeffrey, we also mentioned that we would be very eager to have some of our staff trained in appropriate first-response measures. They indicated that this could be an excellent step, but that there were some concerns about liability, or establishment of appropriate certification standards for such training. We recognize the complexity of these issues, because of Sanctuary protocols and ESA considerations, but please rest assured that we stand willing to assist you and your staff in any such manner that is deemed appropriate.

There is, to our knowledge, no existing information relevant to humpback whale entanglement, collision and/or abandonment of humpback breeding, calving and nursing habitat that might be caused by the installation or operation of the proposed floating cages. Neither David nor Jeffrey could recall seeing or hearing of any such data.

Please note again that all of our main cages will now be submerged, and we are only intending to use two small surface cages for nursery and harvest work. However, if you have evidence of other possible negative impacts that could affect the humpback whales, other than that which we discuss here and in our Final Environmental Assessment, then we would ask you to please make this available to us as soon as possible.

2. "Regarding the findings of Celikkol, 1999, what is the prevalence and spatial distribution of floating fish cages in the study area relative to the fishing gear discussed?"

As noted above, our cages will now all be submersible Sea Stations. There will only be two small surface cages, for nursery culture and for harvesting.

Celikkol, 1999, discusses the various components of the very same Sea Stations™ that we are proposing to deploy here in Kona, in an almost identical mooring array off New Hampshire, and concludes: "Because there are no components of the mooring structure that are known to cause whale entanglements (i.e. lightly tensioned lobster pot lines, gill nets, cod traps, etc) the chance of whale entanglement should be considered unlikely to very unlikely", and then "The cages ... do not impose any known whale entanglement risk."

The analysis by Celikkol (page 42) may be helpful in future mooring or cage design considerations, and we have therefore appended this excerpt to our Final Environmental Assessment. We will also adopt the recommendation by Celikkol to paint any of the bridle line buoys light colors, to improve visibility. We have included this in our mitigative measures in the Final Environmental Assessment.

3. "... were any of the marine areas examined known to be breeding, calving or nursing grounds for large whales? ...do (the cited studies) examine collisions (as opposed to entanglements) ... ?"

As the NOAA reports present all marine mammal data from U.S. waters, this would include the waters surrounding the Hawaiian Islands, which are known breeding, calving and nursing grounds. The NOAA reports also review collisions with marine mammals.

4. "... the (Environmental Assessment) should thoroughly examine the possibility that humpback whales would be displaced and/or abandon the area as a result of the proposed activity".

There is no possibility that the whales would be displaced or abandon the area because of the fish farm cages. Humpback whales have been observed in close proximity to the fish farm cages off Ewa Beach (Randy Cates, pers. comm.), and have shown no adverse reaction. Some of the scientists on the HIHWNMS SAC believe that a greater concern is the attractant power of the cages, as whales may use the moorings or cages to scratch or slough off old skin.

The mooring lines do not appear to represent an exclusion from the habitat, any more than an anchor line from a boat. The only real loss of habitat for the whales is therefore the waters within the submerged cage from which they are excluded.

The percentage of habitat loss from the entire Sanctuary is difficult to determine, as the total available habitat in the Sanctuary cannot readily be calculated. However, we can estimate the percentage of habitat lost from, say, one kilometer of Sanctuary waters. Our six submersible cages will each occupy a volume of 2,600 m^3, for a total of 15,600 m^3. One kilometer of Sanctuary waters (measured along the coastline), of an average depth of, say, 50 fathoms (around 100 m), and of a width (from coastline to 100 fathoms) in this area of around 5 km equates to a total volume of 500 million m^3. The loss of habitat from the presence of the cages is therefore 0.0031% of the available habitat in this 1 km of the Sanctuary Coastline. The loss of habitat is equivalent in volume to the loss of habitat from the displacement of a 15,000 tonne vessel.

We have included this calculation in the Final Environmental Assessment.

5. "... monitoring of whale abundance, distribution and behaviour in the general vicinity of the proposed site"

Please note that this activity is not "unprecedented". As stated above (Point 1), there are Sea Station™ fish farm cages installed in Oahu, New Hampshire, Mississippi, and Puerto Rico. Nevertheless, we do recognize the need for ongoing monitoring, and we look forward to working with your staff and the HIHWNMS staff in developing the most meaningful, practical monitoring system possible. Indeed, we presumed that this would be automatically required of us.

David Mattila and Jeffrey Walters indicated to us in our phone call that detailed measures of abundance or spatial distribution were not needed, but that basic records of interactions would suffice (e.g., close approach of a whale, such as within 50 m, or whales rubbing against mooring lines or running into the cages). We have modified the Final Environmental Assessment to reflect this.

6. "any ocean based construction ... be limited to the months of June through September, during which few, if any humpback whales would be in the area"

We believe that this comment reflects some misapprehension about the degree of 'construction' that will be associated with the project. There are two main steps in installing our project cages: firstly, deployment of the mooring array, and secondly, deployment of the cages. The mooring array will consist of a series of anchors (Danforth anchors, chain, and concrete blocks) which will be lowered to the seabed floor, and then affixed into the horizontal array that will hold the cages. This is, then, equivalent to several boats setting their anchors in the area over the course of several days. This will obviously represent no significant disturbance of any whales that might be in the area.

The cages will be deployed from Keahole Point or Honokohau Harbor, and will be towed out to the site at a recommended speed of 1 – 1.5 kts. Once on the site the cages will be set up within a day, and then they will be lowered into position. Again, this will represent no greater potential for disturbance of the whales than when the cages are in place already.

We hope that the changes to our project proposal, and the above-listed changes to our Environmental Assessment alleviate most of your concerns regarding our project. Please let us know if we can be of more assistance.

Aloha, sincerely,

Neil Anthony Sims
V.P. / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF BOATING AND OCEAN RECREATION
333 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
March 19, 2003

BOR-H 0503.03

MEMORANDUM

TO: Dierdre S. Mamiya, Administrator
Land Division

FROM: W. Mason Young, Acting Administrator
Division of Boating and Ocean Recreation

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA)
(Board Permit)

APPLICANT: Kona Blue Water Farms

FILE NO.: HA 3118

REQUEST: Permit and Lease State Marine Waters for
Aquaculture Facility

LOCATION: North Kona, Hawaii

As requested in your March 10, 2003, correspondence, thank you for allowing us the opportunity to comment on the above referenced:

1. Good location; near navigation aid, good current.
2. The area of exclusivity should be addressed further. Exclusive lease of 81 acres may present a problem.
3. Kona Blue Water needs to be more clear on the feed and handling of waste products.
4. Need to check with local fishermen for any feedback.

Kona Blue Water Farms
Kona, Hawai'i
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KBWF/Mason Young 1.doc
June 13, 2003

Mason Young
DOBOR / DLNR
333 Queen St, Suite 300
Honolulu, HI 96813

Aloha, Mason,

Thank you for your comments of March 19th, 2003, on our proposed Unualoha offshore fish farm lease. In addressing you concerns pointwise :

1. Good location: most of the public input has concurred with this assessment.

2. Exclusivity: We are now changing our plan from a mixed array of surface and submersible cages to all of the submersible kind. These will be submerged beneath the surface for most of the time, and will usually only be raised to at or near the surface for fish transfers or cage cleaning. This therefore alleviates the concerns that drove us to request exclusive use of the central area surrounding the cages. Consequently, we are now only asking for the wider lease area to be no anchoring, no SCUBA-diving and slow low-wake speed by boats. We are trusting that Kona's fishermen and divers will respect the fish cages, and that we will not encounter any pilfering, vandalism, or reckless endangerment of property, health or safety. If we do encounter any such problems, we may need to reconsider the level of exclusivity. In such a situation, we would need to go back to the Land Board for redefinition of our lease exclusivity status. We believe, however, that this will not be necessary.

3. Handling of waste products: We will be harvesting our fish into an ice-brine slurry, and bringing them in to shore in the round. No bleeding, gutting or other processing will occur on the site. There will therefore be no waste products for disposal at sea.

4. We have consulted extensively with local fishermen and conservation groups. There have been some occasional objections voiced about the displacement of traditional fishing grounds for Kona crab, weke 'ula and nabeta. However, as we have pointed out in the EA, we believe that this is not a valid comment, as there is actually very little fishing done in this precise area. Our more reliable informants state unequivocally that no-one fishes this close to Keahole because of the strong currents in this area.

Thank you again for your comments. We hope that the above clarifies the issues in your letter.

Yours sincerely,

Neil Anthony Sims
V.P. / Res. Dir.

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

March 19, 2003

Ms. Dierdre S. Mamiya
Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

SUBJECT: CDUA AND DRAFT ENVIRONMNETAL ASSESSMENT – REQUEST FOR COMMENT

Dear Ms. Mamiya:

That you for the opportunity to review the Kona Blue Water Farms CDUA and DEA which involves a lease of State marine waters for the proposed open ocean fish farm in offshore waters near the State's Natural Energy Laboratory.

The Office of Hawaiian Affairs (OHA) has the following comments.

Cultural Resources and Practices (Page 30)

The proposed lease area is too deep for free-diving and for any significant Scuba diving activity.

- According to the local and native Hawaiian community, the location of the proposed cages is in the immediate vicinity of the traditional gathering area of the well known Kona crab. The CDUA mentions this, but lessens the impact by suggesting that the currents are too strong for significant fishing. Several members of the community state that they do fish, dive and gather crabs in the area.

'Opelu Ko'a

- The CDUA mentions the 'opelu ko'a for the general region and acknowledges that the specific locations are part of "marine lore" and is considered inappropriate for publication. This has no bearing that the area is, in fact, used as a traditional fishing ground for opelu. The ko'a does exist - actually a number of them in the specific area designated for the project. The proposed

EXHIBIT 11

fish cages will negatively impact the 'opelu ko'a and adversely affect Native Hawaiian fishing at Keahole.

- The DEA points out that the Kekaha kupuna stated that the "'opelu ko'a along the north of Keahole Point are not currently fed or fished by either commercial or recreational/artisanal fisherman." This implies that the ka'o is not being kept up and is longer in use. That is not true. Native Hawaiian fishermen take care of the ko'a. Commercial fisherman and recreational users have no use for, or knowledge of 'opelu ko'a in Kona. They would not be a reliable source of information in this instance.

Cultural Practices and Traditional Resources (Page 43)

- Examples cited in the DEA are taken from the Ewa Project on Oahu. None of the examples are from the Keahole fishing area. Abridged transcripts pulled from the Kona Blue Water website (http://www.blackpearlsinc..com/3_4shtml) identify some of the Hawaiians who attended the public meetings to discuss this project. Only two, Mahealani Pai and Paul Chung-Hoon, are from this specific Kona area. All other Hawaiians identified are from the greater Kekaha area, specifically Ka'upulehu and Waimea and would not have specific lineal knowledge of the Keahole area. We suggest the knowledgeable Native Hawaiian practitioners like Jr. Kanuha, Alena Kaiokekoa and Josephine Kamoku be contacted. Ms. Geraldine Bell, Director of Kaloko-Honokohau Federal Park should also be contacted for input. She would be able to provide names of specific families directly linked to the Keahole area as well as contacts for the aforementioned individuals.

Land Use and Environmental Compatibility (Page 31)

- The ceded land trust is addressed in the DEA in this section with two sentences. HRS 190D is mentioned by stating that 20% of lease revenue should go to OHA. This is not adequate. There is no set formula or criteria on what the lease should be. The proposed lease is for 81 acres of submerged land. However the formula used by the DLNR in determining the lease amount is based on the Department of Agriculture standards. Submerged lands are entirely different than "land based" land and therefore other options should be considered.

- There is the question of biodiversity and bioprospecting – where does this fit in this proposed project? The applicant proposes to lease an 81 acre area of surface, seafloor, and water column of State marine waters and submerged lands. There is no policy or precedent yet set on the ownership of sea surface, seafloor, or water columns. Native Hawaiians do have a partial claim to the submerged lands since, by law, they are considered to be ceded land. However, if this application is approved as is, precedent will be set on the ownership and/or leasing of water columns, seafloors and the ocean surfaces. There has not been enough time and research

dedicated to the study of biodiversity in the ocean in regards to Native Hawaiian rights and claims.

Potential Impacts and Mitigation (Page 33)

- The CDUA uses the Ewa Fish Farm project on Oahu as the best example of likely impacts on water quality. The Kona Coast is very different from Oahu in a number of ways. The seabed drops off dramatically, while in Oahu the drop off is gradual. This, in part, results in a different type of ocean current. The ocean around Kona is more "oceanic" in the sense there is less impact from run off and pollution since Kona is not as "land developed" as Oahu. The ocean setting in Kona is more of a natural setting than you find around Oahu. It is our recommendation that consideration be given for a separate study regarding the projects potential impact on water quality

- A FONSI is anticipated for this project. OHA has reservations for the following reasons:

  1. OHA has not received a copy of the Environmental Assessment or the comments of OEQC which have an anticipated publication date in the March 23, 2003 OEQC Environmental Notice. Pursuant to Act 50, a Cultural Impact Assessment must be included in the EA outlining the Native Hawaiian community consultation and the methodology of that consultation.

  2. The CDUA does not identify Native Hawaiian consultants except to quote that "Kekaha kupuna" have given opinions. Kekaha is a very large district and does not necessarily include the project area. It is clear that there was not adequate consultation with the hawaiian and Native Hawaiian community to provide information for a cultural impact statement. It is recommended the further consultation take place to provide input into the Environmental Assessment.

  3. The CDUA lists consultation with OHA (Colin Kippen, Ruby McDonald, and Donald Cataluna) but does not state what OHA's position or concerns were. For the record, a presentation was made before the OHA Committee on Land but a position was not taken. A least one of the individuals identified had reservations about the proposed project.

If you have any questions, please contact Jerry B. Norris at 594-1847 or email him at jerryn@oha.org

Sincerely,

Peter L. Yee
Director
Nationhood & Native Rights

Kona Blue Water Farms

A Division of Black Pearls, Inc.

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June 24, 2003
Peter Yee - OHA response 2

Mr Peter L. Yee
Director, Nationhood and Native Rights
Office of Hawaiian Affairs
711 Kapiolani Blvd, Suite 500
Honolulu, HI 96809

Dear Mr Yee,

We are in receipt of your response to Dierdre Mamiya, Lands Division Administrator, dated March 19th, 2003, regarding our proposed open ocean fish farm project off Unualoha Point, in Kona. We initially replied to this comment letter to Jerry Norris (by email, dated April 23rd, 2003), with a number of questions and requests for clarification, so that we might be better able to address your concerns, but we have since had no response. At this stage, therefore, we feel that we have no option but to respond as best we can.

This is somewhat unfortunate, as we have taken quite some pride in the close, consultative relationship that we have fostered with the Kona community over the course of the last two years, as we have moved our proposal forward. We believe that we have paid particularly close attention to areas that may have impacted Native Hawaiian issues or concerns. As I indicated in my earlier letter to Jerry Norris, we have posted transcripts of many of these meetings on our web site, to further these discussions, engender greater awareness of our project and obtain maximum input from the community into our proposal. We have now appended these transcripts to our Final Environmental Assessment, and I would refer you to this document for a more thorough description of our contact and consultations with the Native Hawaiian community in Kona, with particular focus on Kala'oa.

Before we address your comments in any more detail, we would like to inform you of several modifications that we are making to our proposed project, to accommodate some of the concerns that have been shared with us over the course of our Environmental Assessment review process.

One of the most significant changes we are proposing is to make all of our six main cages submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages (less than 50 ft diameter), which will be used for nursery rearing and for harvesting of fish from the submersible cages. We are therefore no longer so concerned about exclusive use of the lease area surrounding the cages. Consequently, we are now only asking for the lease area to be designated as no anchoring, no SCUBA-diving, no swimming, and slow low-wake speed by boats, rather than for any exclusive use.

Furthermore, to provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha Point, we are now proposing to move our project a further 600 ft, directly to the west (offshore). This now puts our project in water between 200 ft and 220 ft deep, around 2,600 ft from the shoreline. To accommodate this greater depth, we will now need some wider area to spread our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres). We hope that these changes will go some way towards further ameliorating your concerns about our proposed activities.

In addressing your comments in your letter, I would first refer you to our letter to Jerry Norris. The following comments are in addition to these earlier questions. Please allow me to respond to your primary concerns in pointwise manner, for clarity. Comments from your letter are *in italics*. Follow-up questions or responses from our email to Jerry Norris are underlined, and our additional comments here are in normal font :

1. *"Several members of the community state that they do fish, dive and gather crabs in the area".* This comment directly contradicts all of the evidence that we have gathered from kupuna in the area, and other highly knowledgeable fishermen. Perhaps your sources fish and dive on the reef area that lies shoreward of our proposed farm site? Perhaps they gather a'ama crabs along the shore, rather than Kona crabs in the proposed lease area? As our site ranges from 150 – 200 ft deep, over bare sand bottom, we would be very surprised if anyone was diving in this area.
As indicated above, the newly-proposed site is now in waters from 200 – 220 ft deep. We can state categorically that there is no diving in this depth of water in this area.

2. *"Native Hawaiian fishermen take care of the ('opelu) ko'a".* Again, all of the evidence that we have gathered from our observations, our discussions with the community and the kupuna, and from Kepa Maly's extensive investigation with the Kala'oa kupuna, indicate that there is currently no feeding, fishing, or maintenance of the 'opelu ko'a in this area.
We are not disputing the existence of the 'opelu ko'a – we have always acknowledged that they occur in the general area. However, we were relying on information from Kepa Maly's enqiries with the Kala'oa kupuna when we made this statement. To support this, we have appended to the Final Environmental Assessment Kepa's letter to us on this matter (dated August 26, 2003). Here, Kepa states "None of the kupuna had specific knowledge of a ko'a fronting Unualoha" and "Kupuna Ako (i.e. Val Ako) mapped out ko'a in the region, and specifically noted and discussed no ko'a at Unualoha".

In light of your comments on this issue, we have made further enquiries, but we are still unable to identify any individuals who still maintain these ko'a by regular feeding. Please note that our

consultations in this regard have not just been with commercial or recreational fishermen, but have been with the kupuna from this ahupua'a.

3. *"None of the examples are from the Keahole fishing area ... Only two (Hawaiians), Mahealani Pai and Paul Chung-Hoon, are from this specific Kona area"* ... and later *"It is clear that there was not adequate consultation with the hawaiian and Native Hawaiian community to provide information for a cultural impact assessment"*. It appears that there is some confusion among your sources as to which families are from the Kala'oa area of Kekaha. We do not claim to know these lineages ourselves, but we have relied on our Hawaiian sources to direct us to those individuals who have direct tenant links to the Kala'oa ahupua'a, and specific knowledge of the location and status of the 'opelu ko'a. In all cases, our sources have told us that we had met with the appropriate kupuna. We repeatedly asked for any other contacts who might be able to provide information in this area, and we were given no names beyond those we had contacted.

Our meeting with Kala'oa kupuna included Valentine K. Ako, Robert Punihaole Sr., George 'Kino' Kahananui Sr. We had also approached Sam Keanaaina by telephone, but he was unable to attend the meeting. Ruby McDonald, OHA's Community Resource Co-ordinator in West Hawaii has confirmed for us that these kupuna are not from Waimea, but are among the main kupuna from the Kala'oa area. Are your sources claiming that these individuals are not from this ahupua'a, but are from elsewhere? If so, then is there some means by which we can resolve this apparent discrepancy between our various sources?

We have also met with David Roy's kupuna group, and a number of other fishing experts or cultural practitioners from the area, including Karen Haleamau, Aka Mahi, Angel Pilago, Ed Stevens, Daniel Akaka Jnr and Hank Fergestrom. In addition, Hannah Springer, Dickie Nelson, Lunakanawai Hauanio (Alena Kaiokekoa's son) and Josephine Kamoku were also all in attendance at the West Hawaii Fisheries Council Meeting at which we gave a presentation on our project. In addition, Kepa Maly has provided us with an assessment of the cultural significance of the waters offshore of Keahole that was prepared for the earlier CO2 dumping study.

We followed up on your suggestion to contact both Junior Kanuha and Josephine Kamoku. I discussed our project by phone with Junior. Junior did not indicate any immediate conflict between our proposed project and fishing methods that were known to him. He stated that he would visit our hatchery facility for more discussions, and to obtain a written outline of our project, but he has not yet dropped by. I also spoke with Josephine Kamoku by phone. Josephine thought that it would be very helpful for us to address Lily Kong's kupuna group about our project. We made an approach to Mrs Kong with this intent, but we were not invited to a meeting. Our correspondence with Mrs Kong in this regard is included in our Final Environmental Assessment.

We are now including in our Final Environmental Assessment the transcripts of the various meetings that we held with community, conservation or kupuna groups, so that you can see the extent to which our discussions ranged, and the detailed information that we were able to compile.

Further, could you also please provide us with more information on your concerns r.e. biodiversity and bioprospecting. We have not addressed these concepts in the draft EA because we did not think them relevant. It appears to us that these two concepts, while of concern to Native Hawaiians in their assertion of rights and claims over the ocean, will not have any direct impact on, or be impacted by, our proposed activities. Could you please provide us with some specific guidance on the areas where your concerns lie?

Further, your letter states that *"There is no policy or precedent yet set on the ownership of sea surface, seafloor, or water columns"*. However, Chapter 190D HRS, is very clear about the legal issues involved here, and the precedent has already been established through the open ocean lease provided to Cates International, Inc., for their farm off Ewa Beach.

It would appear to us that OHA's policies are also accepting of this legislation, and this precedent. It is our understanding that OHA has declared as its policy "to encourage Native Hawaiians to become involved to the fullest and highest extent possible in offshore fish farming" (Action Item PP-26, At Committee on Policy and Planning, October 15, 2002). We would like to commend OHA on their vision in taking this action, and to offer our services for advice or guidance, if we could be helpful in your endeavors.

You also comment in your letter that *"the Kona coast is very different from Oahu ... the seabed drops off dramatically ..."*. This is generally true for most of the Kona coast, but we have located our proposed farm in an area where there is some extensive shelving, beyond the initial reef drop-off. This area, from Keahole Point up to Kiholo, would all appear to offer suitable topography for farm sites.

Please also be assured, as we have stated in the draft Environmental Assessment, that we are fully committed to conducting a comprehensive water quality monitoring program, as required under State and Federal law. We have also publicly committed to increase local input, transparency and independence of the monitoring program, and to provide full access by the community to our environmental monitoring data.

In response to your specific reservations about our anticipated FONSI :

1. *"OHA has not received a copy of the Environmental Assessment ...(and) ... Cultural Impact Assessment must be included in the Environmental Assessment"*
   We trust that by now you have received a copy of the draft Environmental Assessment, which was to have been distributed through DLNR Lands Division. We believe that, pursuant to Act 50, we have indeed fully reviewed, discussed and disclosed all of the effects of this proposed action "on the cultural practices of the community and State". The full transcripts that we have now appended to the final Environmental Assessment should assure you of the thorough and careful consultations that we have made in this regard over the last two years.

2. *"The CDUA does not identify Native Hawaiian consultants..."*

Our final Environmental Assessment includes lists of those with whom we have consulted. These are fully detailed in the appended meeting transcripts. Of these, only Kepa Maly is a professional 'consultant'. Kepa provided his services to us *pro bono*.

3. *"The CDUA ... does not state what OHA's position or concerns were".*
As we had no formal response from Mr Cataluna's committee, we were not able to state unequivocally in our draft Environmental Assessment what OHA's position was. Although there were no strong concerns or questions arising from our meeting with Mr Cataluna's committee, we would not presume to know their position, or OHA's position. Subsequently, we understand that OHA has indeed adopted the policy discussed above which encourages Native Hawaiian involvement in open ocean fish farming.

We thank you again for your input. We hope that with such assistance we have been able to strengthen our proposal, and our project, for the betterment of our oceans, Kona's community, Hawaiians and Hawaii.

Mahalo, and aloha,

Neil Anthony Sims
Vice-President / Research Director

April 23, 2003
Jerry Norris - OHA response 1

By email to jerryn@oha.org
Subject : Questions r.e. OHA's comments on KBWF draft EA

Aloha, Jerry,

We have received Mr Peter Yee's comments on our draft EA for our proposed open ocean fish farm off Unualoha Point, in Kona. We thank OHA for their input, and hope that we can adequately resolve your agency's questions and concerns.

A number of the statements made by Mr Yee assert that our draft EA is inaccurate or just plain wrong in several important cultural areas. Therefore, before we provide a formal response to OHA's comments, we would like to clarify or resolve any apparent differences between the information provided to us during our community and kupuna consultations, and the information that has been provided to OHA. We would therefore like to obtain the names and contact information for Mr Yee's sources. If you have no objections, we will approach these people, to try to ascertain the basis for any misunderstandings or miscommunications.

We would specifically like to resolve the discrepancies between information in our draft EA, with the following statements made in Mr Yee's letter :

1. *"Several members of the community state that they do fish, dive and gather crabs in the area".*
This comment directly contradicts all of the evidence that we have gathered from kupuna in the area, and other highly knowledgeable fishermen. Perhaps your sources fish and dive on the reef area that lies shoreward of our proposed farm site? Perhaps they gather a'ama crabs along the shore, rather than Kona crabs in the proposed lease area? As our site ranges from 150 – 200 ft deep, over bare sand bottom, we would be very surprised if anyone was diving in this area.

2. *"Native Hawaiian fishermen take care of the ('opelu) ko'a".* Again, all of the evidence that we have gathered from our observations, our discussions with the community and the kupuna, and from Kepa Maly's extensive investigation with the Kala'oa kupuna, indicate that there is currently no feeding, fishing, or maintenance of the 'opelu ko'a in this area.

3. *"None of the examples are from the Keahole fishing area ... Only two (Hawaiians), Mahealani Pai and Paul Chung-Hoon, are from this specific Kona area"* ... and later *"It is clear that there was not adequate consultation with the hawaiian and Native Hawaiian community to provide information for a cultural impact assessment".* It appears that there is some confusion among your sources as to which families are from the Kala'oa area of Kekaha. We do not claim to know these lineages ourselves, but we have relied on our Hawaiian sources to direct us to those individuals who have direct tenant links to the Kala'oa ahupua'a, and specific knowledge of the location and status of the 'opelu ko'a. In all cases, our sources have told us that we had met with the appropriate kupuna. We repeatedly asked for any other contacts who might be able to provide information in this area, and we were given no names beyond those we had contacted.

Our meeting with Kala'oa kupuna included Valentine K. Ako, Robert Punihaole Sr., George 'Kino' Kahananui Sr. We had also approached Sam Keananaina by telephone, but he was unable to attend

the meeting. Ruby McDonald, OHA's Community Resource Co-ordinator in West Hawaii has confirmed for us that these kupuna are not from Waimea, but are among the main kupuna from the Kala'oa area. Are your sources claiming that these individuals are not from this ahupua'a, but are from elsewhere? If so, then is there some means by which we can resolve this apparent discrepancy between our various sources?

We have also met with David Roy's kupuna group, and a number of other fishing experts or cultural practitioners from the area, including Karen Haleamau, Aka Mahi, Angel Pilago, Ed Stevens, Daniel Akaka Jnr and Hank Fergestrom. In addition, Hannah Springer, Dickie Nelson, Lunakanawai Hauanio (Alena Kaiokekoa's son) and Josephine Kamoku were also all in attendance at the West Hawaii Fisheries Council Meeting at which we gave a presentation on our project. In addition, Kepa Maly has provided us with an assessment of the cultural significance of the waters offshore of Keahole that was prepared for the earlier CO2 dumping study.

We are following up on your suggestion to contact both Junior Kanuha and Josephine Kamoku. However, it seems that perhaps you or your sources have perhaps only accessed one of the several meeting transcripts that we have provided on our website – i.e. our meeting with the Royal Order of Kamehameha. We have also provided transcripts for several other meetings. Perhaps you might wish to review our web site in more detail, particularly the following : 1. Informational Meeting at NELHA (18 KB), 2. Local Community Interest Core Group Meeting (11KB), and 3. Local Kupuna Group (24 KB). Our feeling from all of these meetings was that, while there might still be some concerns, the Native Hawaiians with whom we consulted were not opposed to our proposal, nor were there areas of cultural impact that they thought that we should address further. After further reviewing this information on our web site, could you please provide more specifics on how you think we should extend these discussions, if we have no indication of any potential cultural impacts?

Further, could you also please provide us with more information on your concerns r.e. biodiversity and bioprospecting. We have not addressed these concepts in the draft EA because we did not think them relevant. It appears to us that these two concepts, while of concern to Native Hawaiians in their assertion of rights and claims over the ocean, will not have any direct impact on, or be impacted by, our proposed activities. Could you please provide us with some specific guidance on the areas where your concerns lie?

We thank you again for your input. We hope that with such assistance we can strengthen our proposal, and our project, for the betterment of our oceans, Kona's community, Hawaiians and Hawaii.

Mahalo, and aloha,

Neil Anthony Sims
Black Pearls, Inc. / Kona Blue Water Farms
P.O. Box 525, Holualoa, HI 96725
Phone : (808) 331 1188
Fax : (808) 331 8689

Office of Hawaiian Affairs
ACTION ITEM

Action Item Code: PP-26

Meeting: Committee on Policy and Planning

Date: Tuesday, October 15, 2002

Prepared by: Rua Alu 10/8/02
Rua Alu Date

Reviewed by: NOT AVAILABLE FOR SIGNATURE
Jalna Keala, Acting Director, HRD Date

Reviewed by: OCT - 9 2002
Clyde Namuo, ADM Date

Reviewed by: 10-8
Trustee John Waihe'e, IV, Chair Date
Committee on Policy and Planning

I. Action

To declare it to be OHA policy to encourage Native Hawaiians to become involved to the fullest and highest extent possible in off-shore fish farming.

II. Issue

Whether to issue a policy statement supporting Native Hawaiian involvement in off-shore fish farming.

III. Discussion

In September 2002, the State signed its first lease of submerged lands for fish farming purposes to Cates International which leases 28 acres off-shore of Ewa to raise *moi* (pacific threadfin). Today, they raise about 5,000 fish a week for local, mainland and international markets (see attached article).

At its September 2002 meeting, the Land Committee heard two additional proposals for fish cage projects in Kona and Kohala. One project will raise yellow-fin and big-eye tuna off of Kawaihae, and the other will experiment with fish hatchery technology off of Keahole.

Fish farming is a potentially lucrative business encouraged by the state. As submerged lands are ceded lands, OHA is entitled to a pro-rata portion of the lease revenues generated by fish farming activities (§190D-33). However, the much broader question is, "How much of the resources of the ocean are Hawaiians entitled to?" This question has never been answered. Part of the policy proposed here will be to work toward a resolution of this question to the satisfaction of OHA beneficiaries.

Actions as a result of this policy.

Institution of this policy will require follow-up at several levels on the part of OHA administration and staff. Follow up should include:

1. The Administrator should contact the chair of the Board of Land and Natural Resources. Together they should work out a) the total acreage the State intends to lease for fish farming, b) the number of fish farms that should be set aside for Native Hawaiians, or for fish farms with a substantial Native Hawaiian interest, c) proportion of lease rent owed to OHA.
   Timeline: Initial steps should be accomplished no later than February 28, 2003.
   OHA Strategic Plan: Culture, Goal 2, Strategy 1

2. Development of an in-house entrepreneurial program targeted toward involving Native Hawaiians in the development of fish farms.
   Timeline: Initial steps should be accomplished no later than March 30, 2003
   OHA Strategic Plan: Economic Development, Goal 3, Strategy 1.

3. Development of Legislation promoting Native Hawaiian interest in off-shore fish farming.
   Timeline: Evaluate for necessity for 2003 Legislature
   OHA Strategic Plan: Goal 1, Strategy 1.

4. Administrative Staff should seek Federal grants to complement the entrepeneurship programs in number (2) above. Community partnerships to implement the grants should also be sought.
   Timeline: A grant should be submitted within two years of the passing of this policy.
   OHA Strategic Plan: Goal 3, Strategy 2.

5. Creation of an ad-hoc committee to address the issue of Native Hawaiian rights to ocean resources.
   Timeline: Committee should be formed within 6 months of this policy passing.
   OHA Strategic Plan: Goal 3, Strategy 1.

6. Other actions as necessary.

Strategic Plan

By its approval of the Strategic Plan for the Office of Hawaiian Affairs, the OHA Board of Trustees has listed as a priority goal, Economic Development (Goal 3), to protect, re-establish and enhance Hawaiian cultural assets by the year 2007. Strategy 1 specifically States that OHA will

> Create substantive policies and institutional support to assure economic solvency for native Hawaiians, and OHA Economic Development Programs and the Native Hawaiian Revolving Loan Fund.

Individual actions may also encompass other goals and strategies.

IV. Alternatives

1. Support an OHA policy to encourage Native Hawaiians to become involved to the fullest and highest extent possible in off-shore fish farming.
2. Support a policy to oppose fish farming.
3. Take no action.

V. Recommendation

Support an OHA policy to encourage Native Hawaiians to become involved to the fullest and highest extent possible in off-shore fish farming.

VI. Funding

No funding is attached to this policy statement. However, individual actions may require funding and should be presented to the appropriate committees.

VII. Timeframe

See discussion section above. Most activities will be ongoing. Staff should provide an annual report of activities undertaken to further this policy.

VIII. Attachments

Honolulu Advertiser Article, "Ocean fish farm thriving."
HRS §190D-21 Leasing of state marine waters and submerged lands for private uses
HRS §171-53 Reclamation and disposition of submerged or reclaimed public land.
HRS §190D-33 Revenues
HRS 190D-23 Lease Provisions

Post-it® Fax Note 7671 | Date | # of pages ▶
To Neil Simms | From Dawn Hegger
Co./Dept. | Co.
Phone # | Phone #
Fax # 331-8689 | Fax #

May 27, 2003

Ms. Diedre Mamiya
Administrator, Land Division
Department of Land and Natural Resources
1151 Punchbowl St.
Honolulu, HI 96813

Dear Ms. Mamiya:

The National Oceanic and Atmospheric Administration's Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) has reviewed the Draft Environmental Assessment (EA) entitled "An Offshore Open Ocean Fish Farm Project" prepared by Kona Blue Water Farms. Please note that our comments are based on the fact that the area of proposed use is within the boundaries of the HIHWNMS. The HIHWNMS is managed under the authority of the National Marine Sanctuaries Act (NMSA; 16 U.S.C. 1431 *et seq.*) and our comments reflect our statutory and regulatory mandate to protect the area for the endangered humpback whale.

We respectfully submit the following comments on the EA:

- The HIHWNMS notes the draft EA does not fully examine the impacts of the proposal on humpback whales and their habitat and does not fully address adequate mitigation measures to minimize potential risks. Because the impacts of this type of aquaculture on humpback whales are uncertain, the draft EA should be revised to include a better assessment of potential risks to humpback whales and propose a monitoring program be added to mitigate the threat of entanglement.

- The draft EA should also consider the effect of the potential loss of habitat for humpback whales in the area that is being proposed to be occupied by both the submerged and surface fish cages and mooring lines.

- The draft EA should consider more alternatives to the proposal as well, including additional sites outside the boundaries of the HIHWNMS. The EA must discuss why all alternative sites outside the HIHWNMS, cannot fulfill the purposes and objectives of the project, if possible.

- Further, because national marine sanctuaries are designated for their special national and international significance, a precautionary approach in this matter would dictate that sensitive marine sites such as HIHWNMS not be subject to the uncertain impacts of aquaculture operations.

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NATIONAL MARINE SANCTUARIES

NOAA

Hawaiian Islands Humpback Whale National Marine Sanctuary

- The draft EA (pg. 29) states that humpback whales occur frequently over the winter months in the Kona Coast area, and may traverse through the project site. The HIHWNMS believes that humpback whales traverse and inhabit areas within the project site.

- The draft EA (pg. 38) discusses the use and construction of polypropylene traps for spinner dolphins and their use as a significant visual barrier and potentially an echolocation barrier to mitigate the animals being trapped in net pens. It was unclear from this section if this method is being referenced as a possible mitigation measure for spinner dolphins; there needs to be further clarification on its use. Humpback whales do not have echolocation capability and this method does not address potential risks to humpback whales and may even become an entanglement threat to whales.

- The draft EA (pg. 41) also discusses the movement of whales through the area, the draft EA states that "the whales move throughout the general area, usually following a long-shore track (N-S)". The draft EA should identify a citation for this information.

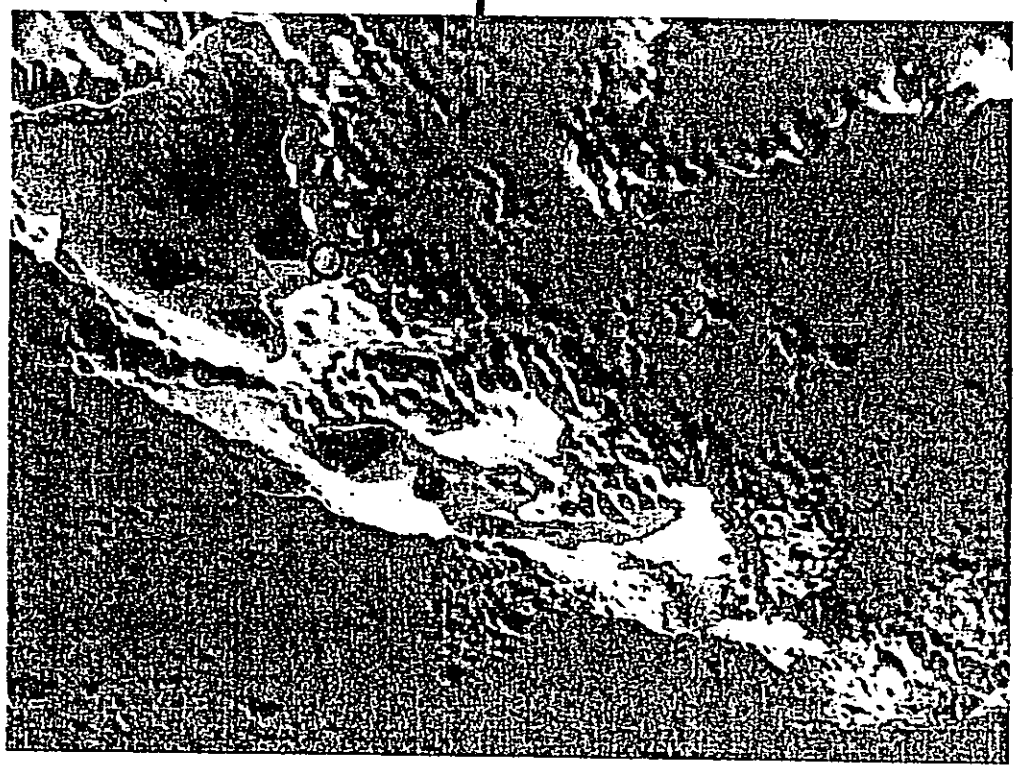
- The draft EA should include a more detailed plan coordinated with NOAA Fisheries that would address response needs for potential entanglement incidents. NOAA Fisheries may provide additional comments in addressing this draft EA.

Based on our comments above, the HIHWNMS therefore respectfully requests that the Department of Land and Natural Resources postpone any decision on the applicant's request for a Conservation District Use Permit until the draft EA is revised to address these issues. Thank you for the opportunity to review the draft EA and for taking the time to consider our comments. If you have any questions, please do not hesitate to contact me at 397-2651.

Sincerely,

Paul Wog
for
Naomi McIntosh
Acting Sanctuary Manager

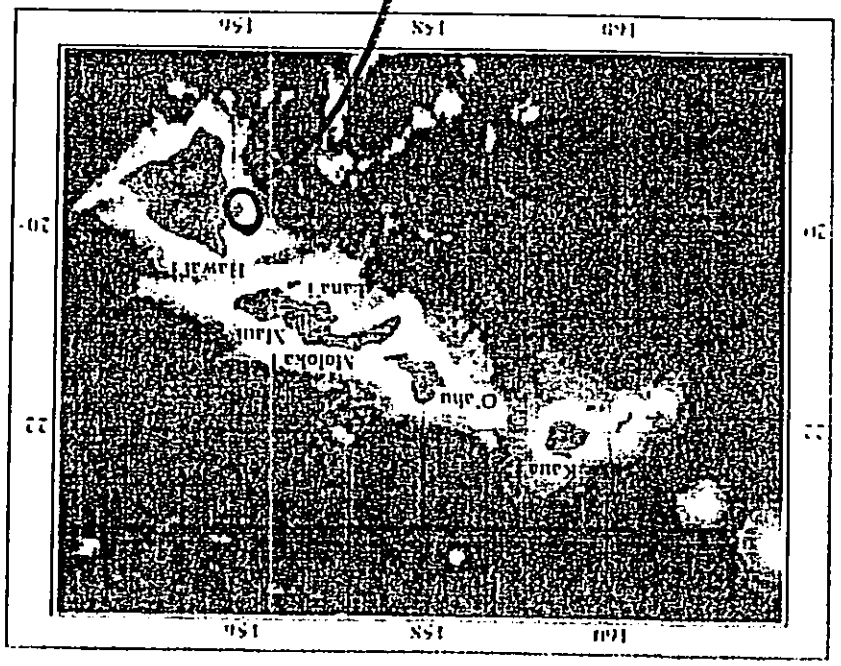
cc. Army Corps of Engineers
NOAA Fisheries Service, Pacific Island Area Office
Department of Land and Natural Resources
Department of Health
Department of Business Economic Development and Tourism, Coastal Zone Management Program



Hawaiian Islands Humpback Whale National Marine Sanctuary in 3D Perspective

Proposed Project Site
Kona Blue Water Farms

Exhibit 13



Proposed Project Site
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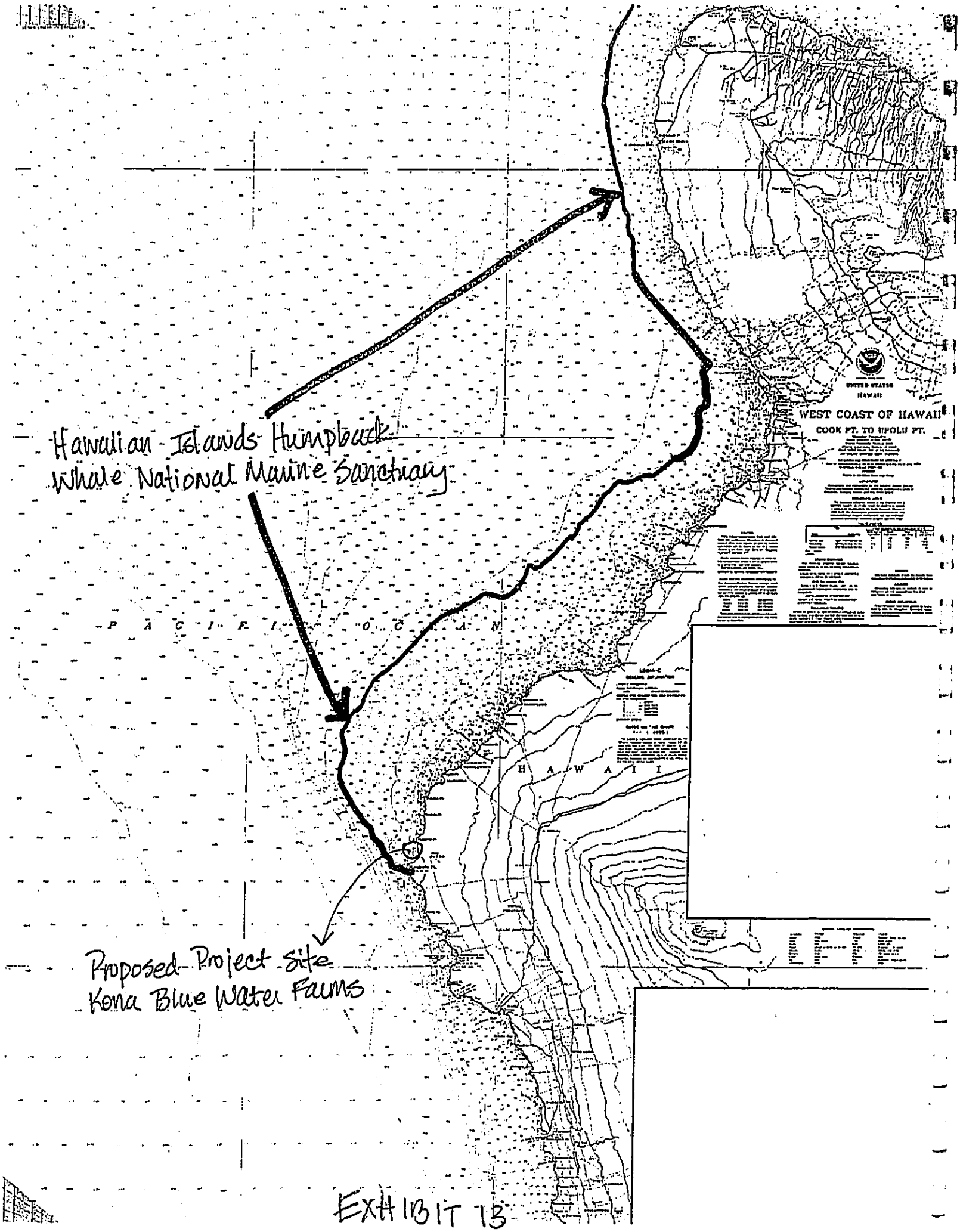
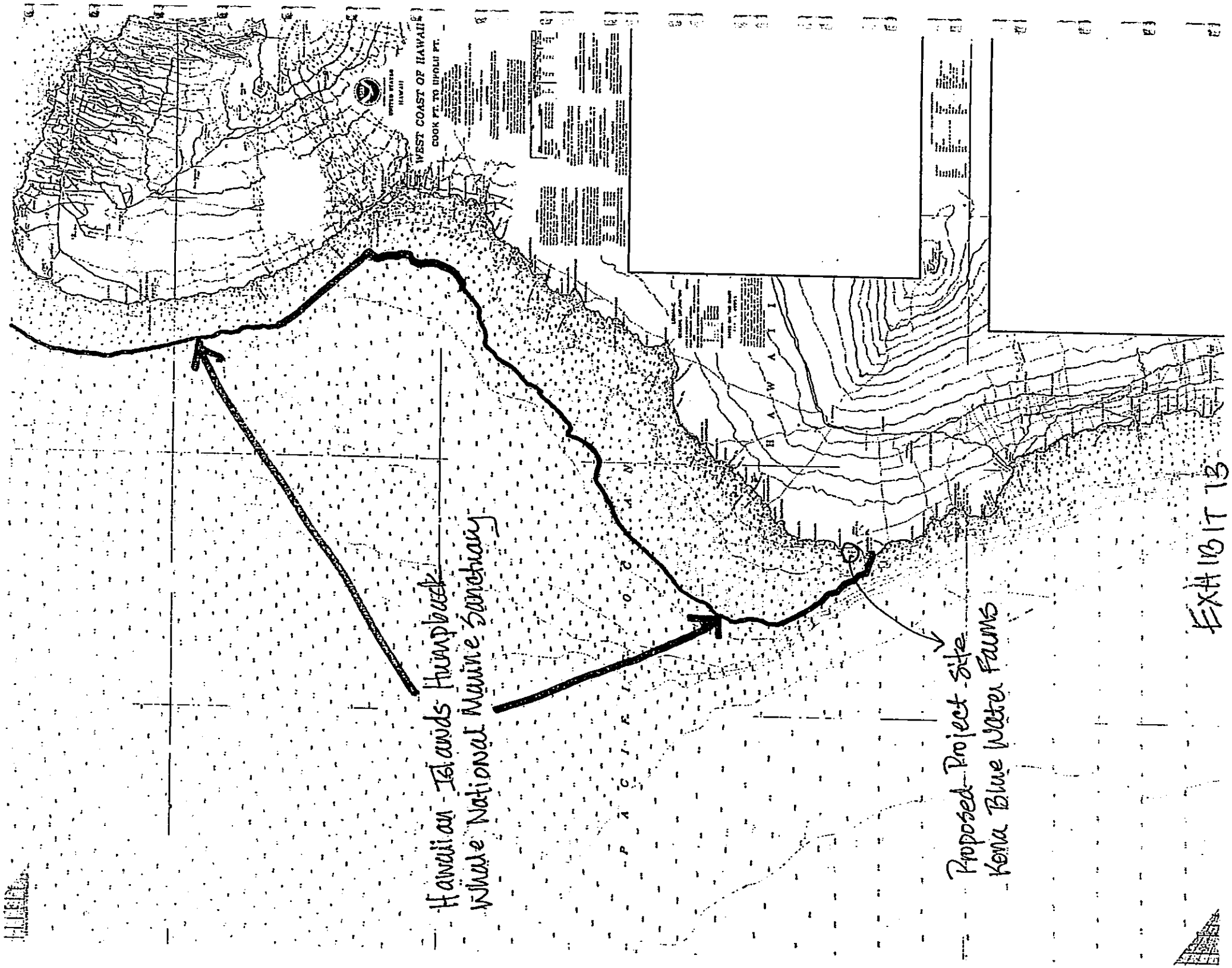


EXHIBIT 13



Kona Blue Water Farms

A Division of Black Pearls, Inc.

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June 18, 2003
KBWF/Naomi McIntosh 1

Naomi McIntosh
Acting Sanctuary Manager
Hawaii Islands Humpback Whale National Marine Sanctuary
726 Sth Kihei Rd
Kihei, HI 96753

Aloha, Naomi,

We are in receipt of your letter to Diedre Mamiya, Lands Division Administrator, dated May 27th, 2003, regarding our proposed open ocean fish farm project off Unualoha Point, in Kona. Before we address your comments, we would like to inform you of several modifications that we are making to our proposed project, to accommodate some of the concerns that have been shared with us over the course of our draft EA review process.

One of the most significant changes we are proposing is to make all of our six main cages submersible Sea Stations™, rather than a mixed array of surface and submersible cages. These cages will be submerged 20 – 30 feet beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. We will request permission for only two small surface cages, which will be used for nursery rearing and for harvesting of fish from the submersible cages.

Furthermore, in discussions with David Mattila and Jeffrey Walters from the Hawaii Islands Humpback Whale National Marine Sanctuary Scientific Advisory Committee, they indicated that an appropriate mitigative measure would be to move our cages as far as possible offshore. Consequently, we are now proposing to move our project a further 600 ft, directly to the west (offshore). This now puts our project in water between 200 ft and 220 ft deep, around 2,600 ft from the shoreline. To accommodate this greater depth, we will now need some wider area to spread our anchors, and so we are asking for our lease area to be expanded to around 90 acres (from 81 acres).

David and Jeffrey also suggested that we should always strive to keep to a minimum the number of mooring lines that we use in our cage design. We have therefore taken this request to the project engineers at Net Systems, Inc. (manufacturers of the Sea Station™), and we hope to include an improved mooring design in the final Environmental Assessment.

We hope that these changes will go some way towards further ameliorating your concerns about our proposed activities. In addressing your specific comments in your letter, please allow me to respond in pointwise manner to your bulleted comments:

1. Inadequate assessment of the impacts on humpback whales from KBWF's proposed project, and potential mitigation measures / monitoring program:

As we have stated in the draft Environmental Assessment, we believe that there will be no significant impacts on the humpback whales. There is no evidence to suggest otherwise. We would disagree with your assessment that "the impacts of this type of aquaculture on humpback whales are uncertain". There have been no negative marine mammal interactions reported with Sea Station cages. To date, Sea Station™ cages have been deployed for a total of over 580 cage-months (or 48.5 cage-years), in Washington state, the Philippines, Cyprus, Spain, Portugal, New Hampshire, New York, Puerto Rico, Oahu, China and the Gulf of Mexico without a single encounter between a whale and a cage or mooring. This would indicate that there are no impacts, rather than that they are uncertain.

David Mattila and Jeffrey Walters indicated that the work of Lien in Newfoundland was important to consider when assessing the likely risks of humpback whale entanglement. They kindly forwarded us a copy of Clapham, et al., (2002, Report of the intersessional working group on large whale entanglements, presented to the IWC Scientific Committee), which reported much of Lien's findings. However, this still largely found passive fishing gear - traps and gillnets - to be the major source of entanglement. Although the report states that "fixed or anchored gear of almost any type represents the major entanglement threat", this is for fishing gear that is designed to corral, enmesh or otherwise capture swimming fish. Passive fishing gear is, by its nature, difficult to see. It floats or hangs freely in the water, and is located, shaped or aligned to entrap or funnel animals into netted areas.

By contrast, our submersible cages are designed to keep our fish enclosed within the cage. There are no flat walls, funnels or bottlenecks in the cage designs. The cage surface is primarily taut mesh, more akin to a vessel hull than to a transparent, yielding gill-net. The cages are streamlined, to reduce drag through the water, and they are strutted to maintain very high tension on the net material. The cages present a hard, rounded surface to an approaching animal, which would naturally tend to deflect the animal in one direction or the other, rather than halt their progress, as might a flat wall or funnel net. To visually-orienting marine mammals such as humpbacks, this mesh would probably appear to present almost a solid surface. The more appropriate comparison would therefore be the interaction between anchored ships and humpback whales, rather than fishing gear and whales. The impacts of 'this type of aquaculture' would therefore probably be about the same as the impacts of mooring six 80 ft vessels in these waters.

If you have evidence of other possible negative impacts that could occur on the humpback whales, other than that which we discuss here and in our Final Environmental Assessment, then we would ask for you to please make this available to us as soon as possible, so that we can incorporate this into our existing monitoring or mitigative steps.

We will certainly be pleased to instigate a monitoring plan for any marine mammals – indeed, we presumed that this would be automatically required of us. We were hoping that the

Sanctuary staff or NMFS experts could assist us in designing such a program, to ensure that we obtained as much meaningful information as is practical. David and Jeffrey indicated to us in our discussion that detailed measures of abundance or spatial distribution were not needed, but that basic records of interactions would suffice (e.g., close approach of a whale, such as within 50 m, or whales rubbing against mooring lines or running into the cages). We have modified the Final Environmental Assessment to reflect this.

We will also indicate in the Final Environmental Assessment the appropriate response in the unlikely event of any entanglement, which would be to immediately call the NOAA Marine Mammal Stranding Hotline (1 888 256 9840). In discussions with David and Jeffrey, we also mentioned that we would be very eager to have some of our staff trained in appropriate first-response measures. They indicated that this could be an excellent step, but that there were some concerns about liability, or establishment of appropriate certification standards for such training. We recognize the complexity of these issues, with Sanctuary protocols and ESA considerations, but please rest assured that we stand willing to assist you and your staff in any such manner that is deemed appropriate.

2. Potential loss of habitat from cages and moorings:

The mooring lines do not appear to represent an exclusion from the habitat, any more than an anchor line from a boat. The only real loss of habitat for the whales is therefore the waters within the submerged cage from which they are excluded.

The percentage of habitat loss from the entire Sanctuary is difficult to determine, as the total available habitat in the Sanctuary cannot readily be calculated. However, we can estimate the percentage of habitat lost from, say, one kilometer of Sanctuary waters. Our six submersible cages will each occupy a volume of 2,600 m^3, for a total of 15,600 m^3. One kilometer of Sanctuary waters (measured along the coastline), of an average depth of, say, 50 fathoms (around 100 m), and of a width (from coastline to 100 fathoms) in this area of around 5 km equates to a total volume of 500 million m^3. The loss of habitat from the presence of the cages is therefore 0.0031% of the available habitat in this 1 km of the Sanctuary Coastline. The loss of habitat is equivalent in volume to the loss of habitat from the displacement of a 15,000 tonne vessel.

We have included this calculation in the Final Environmental Assessment.

3. Alternative project sites, outside of the HIHWNMS:

The draft EA has already considered several alternative sites both inside and outside of the Sanctuary. The advantages and disadvantages of each are addressed on pages 23 – 24 of the draft EA. We examined several alternative sites outside the HIHWNMS, but these were all determined to be impractical, or they presented unacceptable conflict with existing user groups.

4. Uncertain impacts of aquaculture operations:

The environmental risks associated with aquaculture operations are very well documented (e.g. Tommasso, J.R. (Ed.), 2002. Aquaculture and the Environment in the United States. U.S. Aquaculture Society, A Chapter of the World Aquaculture Society, Baton Rouge, Louisiana, U.S.A. 280 p.). These risks are lessened by moving the operation from protected fjords and bays out into the open ocean, where the water is deeper and currents are stronger.

The impacts of the Sea Station type of cage on water quality, benthos, and marine mammals have been well documented by the Hawaii Offshore Aquaculture Research Project, Phases I and II, conducted off Ewa Beach by University of Hawaii Seagrant and Oceanic Institute. There is ongoing collection of data from the Phase III research, as well as ongoing monitoring required of Cates International, Inc., as part of their permit conditions, The findings from these studies are available from UH or OI. Professor Emeritus Chuck Helsely also reported on these findings in the March issue of Hawaii Fishing News, providing detailed information on the lack of significant environmental impact from these cages. Indeed, there were virtually no measurable impacts on water quality from the moi cage farm operation. Similar results are being found for the cages deployed off Puerto Rico, being monitored by University of Miami and University of Puerto Rico scientists.

While we understand the inclination towards the precautionary principle, at some point the accumulation of such evidence must provide sufficient assurance of little or no risk, such that a project must be allowed to move forward. We believe that this is the case here.

5. The claim that whales traverse *and inhabit* the project site:

This seems to imply that whales take up residence in this specific area. Dr Sarver and I have both worked here at Keahole Point for the last 12 years. As marine biologists, we pay careful attention to whales and other activity on the ocean in this area. We have made note of whale movements on a regular basis. Whales never appear to remain in the same area for more than about a half hour. They certainly do not take up residence in specific, defined areas.

6. The reference to "Hukilau" dolphin traps as a mitigation measure (p 38 of our EA):

There was no intention in the document to imply that dolphin hukilau nets might be used as a mitigation measure. The intent here was to simply point out what sorts of structures are needed to corral dolphins, and then to draw the distinction between these floating barriers and our mooring lines. This section only concerned dolphins, and did not discuss whales.

On p 41 of the draft EA we point out that any potential use of streamers on the mooring lines, to increase their visibility to humpbacks, may actually make them more of an entanglement risk, and so we suggest that this is not a good mitigation measure.

7. Citation for the description of whales "usually following a longshore track".

This is a personal observation by Sarver and Sims, drawn from our 12 years of working at Keahole Point and watching the whales each winter. We have cited this in the Final Environmental Assessment as (Sarver, D.J. and Sims, N.A., pers. obs.).

8. NOAA Fisheries entanglement response plan

As outlined above (Point 1), we always presumed that there was a pro forma plan for entanglement response, which would be made available to us. We would, of course, abide by any established procedures. We state this clearly in the Final Environmental Assessment.

We hope that the changes to our project proposal, and the above-listed changes to our Environmental Assessment alleviate most of your concerns regarding our project. Please let us know if we can be of more assistance.

We would also like to thank David Mattila and Jeffrey Walters for their advice, assistance and guidance through this review process.

Aloha, sincerely,

Neil Anthony Sims
V.P. / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL ST.
HONOLULU, HI 96813

June 5, 2003

Dale J. Sarver
Kona Blue Water Farms
P.O. Box 525
Holualoa, HI 96725

Dear Dr. Sarver:

Enclosed is a paper (Clapham, et al., 2002) that might be useful in revising the draft environmental assessment (EA) for your proposed fish farm project. I believe the references by Lien and others cited at the end of the paper would also be quite relevant.

David Mattila and I wish to thank you and Neil Sims for taking the time on June 2, 2003 to discuss our comments regarding the EA. Please feel free to contact David or me anytime, should there be any questions or concerns. I can be reached at 808-587-0106. David can be reached at the Maui office of the Hawaiian Islands Humpback Whale National Marine Sanctuary at 1-800-831-4888.

Aloha,

Jeffrey S. Walters, Ph.D.
Co-Manager, HIHWNMS

cc: Dawn Hegger, DLNR Land Division
Naomi McIntosh, Acting Manager, HIHWNMS

UNIVERSITY OF HAWAI'I AT MĀNOA
Hawai'i Institute of Marine Biology

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To : Mr Peter Young
Chairperson, DLNR
1151 Punchbowl St. Rm 220, Honolulu, HI 96813

cc: Dawn Hegger
DLNR Land Division
1151 Punchbowl St. Rm 220, Honolulu, HI 96813

FYI → Kona Blue Water Farms
Box 525, Holualoa, HI 96725

Dear Chairperson Young,

I write to express my unqualified support, as a Kona / Big Island / Hawaii resident in favor of the open ocean fish farm venture that has been proposed by Kona Blue Water Farms.

As to my professional competence to render an informed opinion, I offer several points of information:

- I have extensive professional experience in the area of tropical marine science and aquaculture, having reared both marine phytoplankton (microalgae) and zooplankton almost continuously over the past 12 years.
- In the area of fish culture, I have had the opportunity to critically observe a number of salmon farms in Norway, the largest aquaculture operations in the world, and therefore believe I have a basis for evaluating the KBWF's proposal in relevant context;
- I have served as an appointed US delegate to the International Council for the Exploration of the Sea (ICES), the international body that provides scientific guidance to the North Atlantic Fisheries Organization (NAFO), which is responsible for regulating fisheries activities throughout the North Atlantic Ocean.

I have sincere concerns about the impact of human activities on the health of the oceans. I do not offer my unqualified support to activities such as KBWF without careful consideration. In support of these statements, please consider that I served for a decade on the Executive Committee and the Steering Committee for the Global Ocean Ecosystem Dynamics (GLOBEC) program, the only component of the U.S. Global Climate Change Program (US-GCRP) that is concerned with the impact of climate change on living marine resources.

I have read with great interest the exhaustive and comprehensive draft Environmental Assessment, and other background information that KBWF has made available on their website. I think their new advances in fish cage technology, and the exciting new hatchery techniques for marine fish open up tremendous opportunities for Hawaii. KBWF, in my opinion, has been exceptionally considerate and careful. We should encourage, not discourage, such ventures.

Certainly, the industry has to be developed in an appropriate manner. I think that the KBWF proposal meets all of the following criteria that one could expect of fish farm developers in Hawaii :

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- they are a small, local company, rather than foreign-owned, or a mainland agribusiness or investment group,
- they are proposing to locate their farm in deep water, where strong currents can disperse the effluents away from the reef,
- there is little or no present use of this area, and so there is little conflict with fishing, or customary practices or traditional gathering rights of Native Hawaiians,
- the area around Keahole is already committed to aquaculture development (at NELHA) and other light industrial uses such as the Kona Airport,
- they are only proposing to culture fish species that are native to Hawaii,
- the principals in this company live here in Kona, and therefore have a vested interest in ensuring that the farm is environmentally sustainable in the long term, and
- they have engaged in a long, patient consulting and educational process with the local community.

I believe that KBWF should be commended for their exemplary efforts over the last two years in their discussions with the community, kupuna from the area, shoreline interests and other conservation groups. This grass roots consultation, particularly with their web-accessible EA, is a model that any future CDUA applicants – whether for fishfarms or otherwise - would do well to emulate.

The company is also obviously committed to an ongoing environmental monitoring program, which ensures that they will meet or exceed the compliance requirements for water quality and other environmental parameters.

If Kona – and Hawaii - are to diversify their economic base beyond tourism, this is the type of environmentally-friendly industry we must encourage.

Unfortunately, I will not be present in Kona over the next month, when, I understand, there will be a public hearing to discuss this proposal. I would like you to therefore please accept this letter as testimony at this hearing, or any such meeting that may consider this proposal.

Sincerely,

Mark Huntley, Ph.D.
Researcher

UNIVERSITY OF HAWAI'I
HILO

May 25, 2003

Ms. Dawn Hegger
DLNR Land Division
1151 Punchbowl St.
Rm 220
Honolulu, HI 96813

Dear Ms. Hegger:

I would like to submit written testimony in support of the open-ocean fish farming operation off Unualoha Point on the Island of Hawaii proposed by Kona Blue Water Farms. I am a biologist and aquaculture researcher with a doctorate in the field working at the University of Hawaii-Hilo, and have work for 20 years in the fields of aquaculture development and environmental management of aquaculture operations.

Open-ocean aquaculture farming has tremendous potential to significantly benefit the local and regional economies here in Hawaii through the creation of employment, diversification and by helping replace imported seafood with locally produced products. At this time of economic hardship, I believe that the State should support and facilitate the development of open-ocean farming, particularly in cases such as this where environmental and social impacts should be minimal.

The first open-ocean fish cage operation conducted in Hawaii was extensively monitored and studied by the University of Hawaii Sea Grant, Center for Tropical and Subtropical Aquaculture and the State of Hawaii. Results demonstrated that when conducted in an appropriate manner, open-ocean fish farming produces few deleterious impacts on the environment. Since the proposed project will be carefully regulated by the State, and because monitoring of environmental parameters such as water quality and surrounding benthic fauna will be conducted, it appears that sufficient safeguards are in place to assure that this project does not adversely affect the environment. After carefully reviewing the draft EA, it is clear that KBWF plans to take appropriate precautions to maximize the potential benefits of the operation while minimizing any potential problems.

Pacific Aquaculture & Coastal Resources Center

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Much of the public opposition to open ocean aquaculture is based on inaccurate and outdated information or simply misinformation regarding the real and potential impacts of this form of aquaculture. I urge the State to carefully review and weigh the factual evidence, the plans put in place by KBWF to monitor the cages and take steps to protect the environment, and the enormous economic benefits offered by the proposed project.

Please do not hesitate to contact me if I can be of further assistance in this matter.

Best regards,

Maria Haws, Ph.D.
Director
Pearl Research and Training Program
University of Hawaii Hilo
Hilo, HI 96720

May 19, 2003

Peter Young
Chairman
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96713 USA

In the Matter of Conservation District Use Application for

Kona Blue Water Farms

AN OFFSHORE OPEN OCEAN FISH FARM PROJECT

DIRECT TESTIMONY OF CLYDE TAMARU

1. My name is Clyde Tamaru. I reside and live in Honolulu, Hawaii. I am employed by the University of Hawaii, Sea Grant Extension Service, that is located at 2525 Correa Road, HIG 205, Honolulu, Hawaii 96822.

2. In my current position I am expected to serve as a bridge between researchers involved in developing technologies to improve production capabilities, hatchery operations, husbandry practices, identification of new species and aquaculture farmers in Hawaii by transferring to them the developed technologies. In addition, my extension activities serve as a feedback mechanism for researchers and provide a means to address concerns raised by the private sector. Community outreach and public education are also important components of my duties with the focus on establishing the aquaculture industry in Hawaii as a significant contributor to the State economy. Part of my duties is to provide information based upon empirical results to administrators/decision makers to assist in making policy decisions. When there is no information available I must solicit funding to conduct research activities that address constraints that face the aquaculture industry in Hawaii. I am currently the principal investigator for the following aquaculture projects:

- Aquaculture Extension Project, Sea Grant Extension Service, Aquaculture Development Program, State of Hawaii Department of Agriculture, Aug. 2002 - Sept. 2003.

- Transitioning Hawaii's Freshwater Ornamental Fish Industry - Year 3, USDA Center for Tropical and Subtropical Aquaculture, Sea Grant Extension Service, Oct. 2002 - Sept. 2003.

- Development of culture methods for marine invertebrates for the marine ornamental trade. Year 1. USDA Center for Tropical and Subtropical Aquaculture, Sea Grant Extension Service, October 2002 – Sept. 2003.

3. The training requirement for the Specialist position at the University of Hawaii at Manoa (i.e., Ph.D. in field of discipline) was met in 1988 when I received my doctorate from the University of Tokyo, Faculty of Agriculture, Department of Fisheries. This was obtained seven years prior to my accepting a position with Sea Grant Extension Service where I have served two years at the rank of S3 and three years at the rank of S4. I also possess a Master of Science degree in Zoology (obtained in 1981) as well as a Bachelor of Science degree in Biology (obtained in 1976), both from the University of Hawaii at Manoa.

In addition to academic training, I have been engaged in research and development in aquaculture technologies for 27 years. Likewise, I have been engaged in extension activities either as an employee of a private company or as a private consultant for 13 years. Research and extension activities have provided me with opportunities to work within the United States as well as overseas (e.g., Taiwan, Japan, Philippines, Indonesia, Guam, Palau, Egypt).

4. [describe person's special area of knowledge that is related to this project]

Although my current duties is one of technology transfer, prior to accepting the position with the University of Hawaii I was employed by The Oceanic Institute as the program manager and co-principal investigator for the following projects:

- "The Technology of Fish Fry Production." The United States Agency for International Development, DAN-4161-00-0009-00 January, 1988 - May 1994.

- "Development of Mullet Aquaculture in Guam: A Feasibility Study", Guam Department of Commerce and the United States Department of Interior, Office of International and Territorial Affairs, Contract Number CO-1400-009, Grant# MOU-G50. January, 1989 - May 1993

- "Studies on the Maturation and Spawning of Milkfish in Captivity - Phase I". The United States Agency for International Development DAN-4161-A-00-4055. August 1984 - January 1988.

During these projects I managed a staff of 28 research scientists, technicians and administrative assistants in the development of hatchery technologies for the artificial propagation of the striped mullet, *Mugil cephalus* and the milkfish, *Chanos chanos*. During my tenure these culture technologies would be used to develop the hatchery techniques currently being employed to produce Pacific threadfin (moi) fry that are used to stock the sea cage being used in the current testing of open ocean aquaculture techniques in Hawaiian waters (Anon. 1994). In addition, the hatchery technologies that were developed also form the basis for conducting trials to determine the feasibility of stock enhancement activities currently

being investigated on the striped mullet (Sterritt et al., 1993) and moi (Cantrell et al., 1998; Zeiman, 1999) by The Oceanic Institute and the Division of Aquatic Resources, Department of Land and Natural Resources.

During the latter stages of my undergraduate study and part of my graduate studies (Master's degree) I was engaged in the technologies and research used to assess fish stocks and speciation of fishes in Hawaiian waters (see Shaklee et al., 1982; Shaklee and Tamaru, 1981).

As part of my current extension duties I am active in providing technical assistance to programs throughout the state involved in the revitilization of Hawaiian fishponds particularly in the area of the use of these fishponds in the education of students K - 12. I have also obtained funding to characterize water quality in Hawaiin fishponds and serve on the board of directors of the Waiakalua Fishpond Preservation Society. Fishpond grants:

- "Water Quality of Hawaiian Fishponds - Year 1", National Oceanographic and Atmospheric Administration, National Sea Grant College Program, Year 30. 6/97 - 5/98.
- "Water Quality of Hawaiian Fishponds - Year 2", National Oceanographic and Atmospheric Administration, National Sea Grant College Program, Year 31, 3/99 - 12/99.

5. [briefly describe background of involvement in this project. If paid consultant, say so; if not being paid, say so]

I am providing comment on the deployment of an offshore ocean fish farm project off Unualoha Point, Kailua-Kona, Hawaii by Kona Blue Water Farms located in Kailua-Kona, Hawaii, as an expert in finfish hatchery technologies and general aquaculture growout technologies for land based as well as ocean based systems. I am not being paid for the preparation and presentation of my testimony but is being conducted as part of my aquaculture extension duties.

I am already involved with a separate open ocean sea cage project and have been since its conception by Dr. Charles Helsley while he was the director of the University of Hawaii Sea Grant College Program. As part of my extension duties I was asked to review the economic feasibility of the concept and provide input into the development of the proposal that led to the current open ocean sea farm operating off of Ewa Beach. I have been requested to assist Dr. Helsley in interpreting the water quality data being gathered at the open ocean aquaculture test site and comparing it with the water quality parameters being produced by the Sand Island sewage outfall. Likewise, I have provided testimony for the deployment of a mooring system and aquaculture net cages in the ocean off of Ewa Beach, Oahu in the matter of a Conservation District Use Application, CDUA-0A-2989 for Cates International.

6. [describe research, special work, or results of analysis related to this project]

Part of my extension duties is to provide information to administrators and decision makers in order for them to make informed decisions. To begin, there is a little known piece of legislation known as the National Aquaculture Act of 1980 that has been reauthorized by congress. The law is very simple and directly states, "to encourage aquaculture development in the United States." The development of open ocean aquaculture technology in Hawaiian waters is consistent with current national policies. The basis for this legislation is that it has long been know that the fishery resources of the seas are under immense pressure to keep up with the demand for seafood. This demand, however, has also resulted in depletion of many of the prized species already by as much as 90% according to a recent investigation highlighted in an article in the Honolulu Star Bulletin dated May 14, 2003. This trend is expected to continue as the world population continues to grow resulting in a continued search for resources for food. The depletion of the fisheries is as acute in Hawaiian waters as it is with the oceans of the world. One need only examine the temporal changes in landing of a number of fish species from the Department of Land and Natural Resources own fish catch statistics to realize that we in Hawaii are faced with this problem as well. To offset these problems or challenges, twentieth century agriculture and aquaculture is being tasked with meeting those demands and farming of the seas is already being undertaken in response to those challenges.

From my investigations concerning Hawaiian fishponds I would like to add an analogy of the sea cage and offshore aquaculture and that of the fishponds before presenting the rest of my testimony that may bring things into proper perspective. It has long been recognized that one of the earliest forms of aquaculture had its roots in Hawaii. The rock walls laid upon reef flats of the *loko kuapa* style of fishpond had its beginning some 800 years ago and were at that time the "state of the art" in producing fish for human consumption (Kikuchi, 1976; Tamaru and Carlstrom-Trick, 1998). It should be pointed out that these practices were being undertaken before the existence of 20th century Biological or Fishery Sciences, before there was even a United States of America. In today's culture, modern high-strength materials such as stainless steel and Spectra netting replace the rocks and sticks of the ancient fishponds. Thus the modern "fishpond" becomes a net-enclosed structure supported by a steel frame. These modern materials permit the use of water's that are offshore as the ancient fishponds allowed the creation of bodies of water that could be used for production of fish along the shore. At issue appears to be whether today's society has the foresight as those of our ancestors (Tamaru et al., 1997).

Summary of artificial propagation.

The current hatchery technology utilized by The Oceanic Institute for the production of moi fry for stocking into land-based or sea cage culture facilities has been described by Ostrowski and Molnar, (1998). From the hatchery there is a nursery phase that has also been documented by Ostrowski et al., 1995. The development of the culture technologies has been modeled after the research and development activities that led to the hatchery technologies for

the striped mullet and milkfish (Anon. 1995) that also have been documented (Tamaru et al., 1995). While the documentation of the hatchery procedure for the moi is relatively recent the technologies have been actively researched since 1960's. Currently The Oceanic Institute produces moi fry on a regular basis but the activity is funded through federal funding (mainly through the USDA Center for Tropical and Subtropical Aquaculture) as well as federal grants to conduct stock enhancement work. There is one commercial farm that is in the early stages of producing moi fry for growout in land based systems located on the island of Hawaii at the Natural Energy Laboratory in Kona. That same technology has been modified in order to accommodate the larval and juvenile stages of additional species and at present the commercial production of kahala, *Seriola dumerili* has been achieved. More recently, researchers at the Hawaii Institute of Marine Biology and Kona Blue Water Farms have successfully spawned and raised opakapaka, *Pristipomoides filamentosus*, in captivity marking the opportunity for diversification of cage culture operations in Hawaii. For shortness, I will comment on the technologies for artificially propagating the moi and one should keep in mind that the other species are similar.

The hatchery process begins with the acquisition of wild stocks that can be either done when the moi are under a year of age and aggregate in large schools along the coastline of the main Hawaiian Islands. At this stage they are known as moiili and can be easily collected by seine or hook and line. Likewise, adult moi can be collected by hook and line or by throw net and brought into the artificial conditions where they have been shown to adapt readily. Artificial diets for the broodstock have been developed and described in the manual previously described. Moi can also be grown completely in captivity and have been found to attain sexually maturity within 18 months post-hatching. For both the wild and cultured moi, all individuals mature as functional males and change into functional females when they attain a body length of approximately 40 cm or 2- 3 years of age. Studies on the effects of sex ratio on egg production show that a higher ratio of females to males (e.g., 2:1 F:M) results in significantly higher production of spawned eggs. Egg production has reported to be as high as 306×10^4 eggs during a single year. These results are consistent with a large number of marine species that typically produce tremendous number of gametes during their life time.

The constraint in handling the large number of spawned eggs occurs during the production of the live food (i.e., rotifers and phytoplankton) needed for the successful rearing of the moi larvae. However, live food technologies continue to improve and has resulted in an ever increasing ability to accommodate the large number of eggs that are produced (Tamaru et al., 1998). One of the most significant achievements in aquaculture has been to recognize the consequences of failing to provide the essential nutritional components to developing marine fish larvae. Tremendous strides have been made in not only understanding the nutritional deficiencies (particularly in the essential fatty acids) but in the development of methods to insure that the proper nutritional requirements are met in the culture process. Enrichment technology for the live food used in culturing marine finfish in general has led to an explosion in the hatchery production of fish species throughout the aquaculture community worldwide which can utilize the rotifer as their first food.

The combination of understanding how to spawn moi broodstock and how to rear the resulting larvae in mass provides for the opportunity to develop culture technologies that are commercially feasible. If the process took place on land based facilities there would probably be of little concern as the potential for escape of cultured fish would be non-existent and at a production of 100,000 lbs per year the commercial enterprise would be exempt from current NPDES permit as the production output of waste products would be too low to be considered point sources of pollution. However, land based culture operations are constrained by the amount of water that can be provided, economically, to a culture facility (e.g., tank, raceway) as their will be an associated cost to pump the water through the facility. Likewise, with an increased flow of water the amount of fish that can be grown per unit area can be increased until the next limiting factor is encountered and that would be the amount of dissolved oxygen. This again can be circumvented to some degree, however, at a cost. In contrast, culture operations in a net cage out in the open ocean are not impacted by these two major constraints and has resulted in a serious examination of the feasibility of utilizing the open ocean for culturing fish commercially in net cages (Helsley, 1999).

A major concern that has been raised is that these cages would pollute the waters in which they are deployed. This is a concern for all who are engaged in the emerging enterprise and the University of Hawaii Sea Grant College Program has been actively engaged in the monitoring of the outputs of the cages for this specie reason. After two years of operation and at an elevated production level of 200,000 pounds of moi per year, the conclusion from the operations to date is that it is technically and commercially feasible to conduct the enterprise with almost no detectable impact to the surrounding environment. On the days that water quality parameters are detectable they are limited to areas just adjacent to the cage and are again undetectable within the established zone of mixing allowed around the cages. That there is now a private open ocean farm that produces 200,000 pounds of moi annually clearly demonstrate that this type of enterprise is feasible. Undoubtedly, a similar result would be found with the deployment of cages being proposed by Kona Blue Water Farms in the Kailua-Kona area.

One specific issue that I have been requested to provide comment on previously was to the possible impact that a potential escape of cultured fish would have on the native fish populations. No doubt this concern has come about from some of the previous experiences learned from salmonid culture practices. There are three main concerns that need to be addressed with the release of fish into the wild.

- First is the interaction of the cultured stock with the population or subpopulations of wild moi. This concern would be more critical if there existed multiple stocks of wild moi populations in Hawaiian waters as each discrete stock represents a distinct gene pool. However, based upon the latest in biochemical markers (microsatellite DNA) the moi population appears to be one continuous population throughout the Hawaiian Islands (Ziemann, 1999). This is consistent with other studies on other organisms found in Hawaiian waters (a damselfish: *Stegastes fasciolatus*, a snapper:

Pristipomoides filamentosus and a lobster: *Panulirus marginatus*) where only one population can be detected for each species throughout the Hawaiian islands (Shaklee 1983). It should be noted that the accidental release of fish from the cage would be of a very limited occurrence otherwise the culture enterprise will cease to exist. With the indication that the wild moi population is actually a homogenous population the survivors of the released moi would simply be incorporated into the wild stocks with little impact as the implications of the findings of a single homogenous population is that there is adequate gene mixing occurring. The impact would be even less if the fish being cultured would be F1 generation as these individuals, even with the little selection that goes on in the hatchery during the production of the first generation, are still genetically very much like their wild type parents. The same argument could also be said even if the released fish would be F2.

- Hatchery produced fry usually involves small breeding populations (broodstock) and if offspring are used as broodstock for succeeding generations the overall result can be inbreeding (Kincaid, 1976). This occurs if the broodstock are continuously chosen by selecting offspring from successive generations with a lineage to the same parents. Again the "chance" release of fish from a cage would be a sporadic event otherwise the enterprise would cease to exist. To circumvent the inbreeding issue, broodstock used in the production of fry should be from the wild or at most the F1 generation. This actually is quite practical as there is always a continual need to replace males from a breeding population. As the males grow they change sex into females and therefore the male individual needs to be continually replaced.

- Another affect of the small number of individuals used in the production of offspring is the loss or change in overall genetic variability that is due to genetic drift and/or artificial selection (Allendorf and Phelps, 1980; Ryman and Stahl, 1980). Again this occurs if the progeny from the broodstock is used to establish the successive breeding populations and likewise can easily be remedied by a continuous influx of wild or at most F1 individuals to make up the broodstock for use in producing fry.

7. [draw all conclusions necessary]

The ocean aquaculture activity being proposed represents an opportunity to diversify the state's economy as it attempts to take advantage of its greatest resource, the surrounding ocean. There are several concerns that are valid and I have attempted to address these and demonstrate that they are the result of concerns raised under very different circumstances than what is being proposed for the current enterprise. The activities being proposed are consistent with not only local but national mandates and strives to conduct the activities with minimal impact to the environment.

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Tamaru, C.S., C. Carlstrom-Trick and C. Helsley. 1997. Aquaculture in Hawaii, Past Present and Future. In: C. Helsely (Editor), Open Ocean Aquaculture '97, *Charting the Future of Ocean Farming*. Proceedings of an International Conference, April 23-25, 1997, Maui, Hawaii. University of Hawaii Sea Grant College Program #CP-98-08. pp. 257-278.

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Ziemann, D.A. 1999. Stock enhancment of Pacific threadfin *Polydactylus sexfilis* in Hawaii. Goals and Strategies for Breeding in Fisheries. Proceedings of the 27th UJNR Aquaculture Panel Symposium, Ise, Mie Japan. November 11-12, 1998. Bull. Natl. Res. Inst. Aquacult., Suppl. 1.

Dated: Honolulu, Hawai i, May 19, 2003.

CLYDE TAMARU

May 23, 2003

Dale Sarver/Neil Sims
Kona Blue Water Farms
Fax: 1-808-331-[illegible] 8689

Dear Dale and Neil:

Please forward this message on to Peter Young as an addendum to the written testimony I sent previously. I attended the sessions on Open Ocean Aquaculture during the World Aquaculture Society Meeting here in Brazil and thought I should include the latest findings on the water quality impacts of the sea cages that are being conducted in Hawaii and Puerto Rico.

Point 1: Enterprises using the ocean, both open and near shore are relatively new for the United States and for that reason general policies regarding those activities are still in the formulative stages. The status of that process was presented by :

Alston, D.E, A. Cabreas-Nunez, C. Bridger, C.E. Helsely, D.D. Benetti and P. Zajicek. 2003. Standardized environmental monitoring of open ocean cage sites – basic considerations. World Aquaculture 2003, Salvador, Brazil, May 19-23, 2003.

The basic message here was that there is a great need to have opportunities to monitor projects like what you are proposing as it provides the much needed data that would be needed to establish guidelines and best management practices.

Point 2: Two papers presented water quality data of Ocean Spar type sea cages being operated both in Hawaii and Puerto Rico. Emphasis of both projects is to establish water quality parameters of operating sea cages because of the environmetnal concerns that have been raised. In both investigations, water quality data for all but TAN (total ammonia nitrogen) and ammonia were found to be the same as controls or in other words no detectable impacts could be found. For the Hawaii project this is at a current production rate of 5000 pounds/week or roughly 200,000 pounds annually for the pacific threadfin. As mentioned only ammonia (either unionized or TAN) can be detected and these can only be done during periods of slack tide and only directly in the cage or at the edge of the cage. If you were to go out 30 meters from the cage it already has dropped to background levels. Over a year of continuous sampling only 5 times was it a reportable event and all during periods of no tidal flux. The same results were being obtained in Puerto Rico, although with that cage the stocking density is much lower than what is being achieved with the Hawaii cages. The two presentations were:

Helsley, C. 2003. Open-ocean aquaculture in Hawaii: Summary of past and present development activities.

DE : MARAZUL HOTEL FAX :0712648153 23 MAI. 2003 08:10 Pág.1

Carbacas-Nunez, A. et. Al., 2003. Environmental monitoring of two seastation cages stocked with cobia and mutton snapper off Culebra island, Puerto Rico.

Only two kind of impacts that can be detected and the first is that both cages in Hawaii and Puerto Rico clearly act as fish aggregating devices and clearly increase the biodiversity of fishes in the area. The second is that there is a detectable change in the biofauna and biodiversity of the sediment immediately under the cages and these were reported in Helsley's presentation and a poster by Julie Brock. That citation is:

Bailey-Brock, J.H., M.M. McGurr, D. Bybee and H.W. Lee. 2003. Impacts of open ocean mariculture of Pacific threadfin, Polydactylus sexfilis on the benthos off Oahu, Hawaii.

The implications are that excess feed or organic load is resulting in a change in the diversity just beneath the cage. A more complete analysis describing these changes is coming out very soon as I saw the draft of the proceedings on an open ocean conference held previously. The manuscript entitled:

Bybee, D.R. and J.H. Baily-Brock. 2003. Effect of a Hawaiian open-ocean fish culture system on the benthos community. In: C.J. Bridges and B.A. Costa Pierce (Editors): Open Ocean Aquaculture From Research to Commercial Reality. The World Aquaculture Society, Baton Rouge Louisiana U.S.A.

In this manuscript the changes under the cages change with the activity of the cage. During times of inactivity in the cages the biocommunity in bottom sediments beneath the cages quickly return to those observed for control sites suggesting that the impacts are also reversable.

It appears that from the latest information that I can obtain it appears that the environmental impacts that result from cage culture activities in the ocean are minimal.

Hope this information is useful for the decision makers and if there are any questions I will be back in the office after June 11.

Clyde S. Tamaru
Aquaculture Specialist

Letter of testimony 26th May 2003

Re. Kona Blue Water Farms sea cage proposal

I am a marine biologist who has worked in the field of aquaculture research for over ten years. My main expertise has been in the area of sea cage aquaculture (Australia, Scandinavia, Hawaii). I am fully aware of the problems of this type of venture and have participated in environmental monitoring of sea life in and around sea cage structures.

I personally believe that any negative interaction between marine mammals and the planned Kona Blue Water Farms sea cages could be kept to a minimal. In all my experience with sea cage aquaculture, I am yet to observe any negative associations between well managed sea cages and cetaceans. However, I agree that a good monitoring program should be established.

I have worked with many aquaculture companies/ project proposals, and have seen many questionable companies come and go. However, not often enough do I see companies like Kona Blue Water Farms (Black Pearls Inc.). The integrity, training, and scientific professionalism of their staff is second to none. Rather than being a company that would compromise the environmental to reach any financial ends, I believe that this company has the integrity and ability to conduct business that would minimize any negative impact to any marine species. This has been shown in the Marshall Islands and else where in the Pacific where they have their operations.

Further to this, I would commend this company's attempts to keep everything "open Book" by approaching all interest groups and scientists for their input.

I am convinced that with appropriate monitoring, and due diligence, the proposed sea farm could be conducted with minimal impact to the marine environment.

Responsible, well researched aquaculture is the direction we must be pursuing to relieve growing pressures on our ocean resources.

Sincerely

Andrew West
Marine biologist
75-5863 Kuakini Hwy
Kailua Kona, Hawaii 96740

Michael J. Wilder Company, LLC
P.O. Box 428
Laupahoehoe, Hawaii 96764

Phone: (808) 962-9747
Fax: (808) 972-9750
Email: michael_wilder@hotmail.com

May 16, 2003

To: Department of Land and Natural Resources
Subject: Testimony
Project: Kona Blue Water Farms

Ladies and Gentlemen:

Before you this evening is a rare opportunity, an opportunity to help get Hawaii back in the business of seafood production. This is an opportunity you just can't pass up. The proposal before you, to permit a deep water fish farm, is unique but oceanic fish farming is as close to Hawaii as is "fish and poi". We all know that historically, Hawaiians modified the near shore environment into fish ponds where they cultivated their harvest. This project, while further offshore, is the same concept. What could be more acceptable in Hawaii's natural environment than fish farming in deep water pens?

I had the pleasure of reading and commenting on the Draft EA before it was laid into your hands and I believe that the authors have done an exemplary job. Environmental consulting firms who do this work for a living, like my firm, are impressed with the depth and quality of this document.

These developers should be applauded for the manner in which they have brought this project into the community. In my 40 years in this field, it is rare to find a developer so open with their concept. These developers here have sat in the presence of hundreds of interested people, at dozens of meetings discussing even the minutest detail of this project. It is clear to me that anyone in the public or private sector, with an interest in this project, has a clear idea of what it is and what it can do for the community.

What is also clear to me about this project is the lack of any significant environmental impact. Yes, there are issues about this project that are somewhat less than desirable, no project is perfect. In my professional opinion, none of these issues are show stoppers.

I have known these developers for many years now and even worked with them on one of their development plans. These are not only intelligent, trained scientists they are businessmen of the highest caliber. From my point of view you can have confidence in this group that they will take care of the important resource you would be permitting them to work in.

I hope you have the courage to take the bold step that is required of you at this time and say yes to this project. I hope you will give this group the opportunity to put into place a business that is as natural to Hawaii as fish and poi. Let them grow the fish we require to eat with our poi.

Aloha,

Michael J. Wilder, President
Michael J. Wilder Company
Certified Environmental Professional, NAEP No. 87032237

CC Neil Anthony Sims Black Pearls, Inc.

May 24, 2003

Ms. Dierdre Mamiya
Administrator
Land Division
Division of Land and Natural Resources
Post Office Box 621
Honolulu, Hi. 96809

Re: Kona Blue Water Fish Farm

Dear Ms. Mamiya:

I ask that this letter be entered into the public record in regard to the proposed Kona Blue Water aquaculture project presently under consideration. Recently I have had the opportunity to review the documents relating to this project and how it relates to impact upon the environment and the local culture. In every respect this project seems to be well planned and researched. Additionally, the District of Kona would be well served by the establishment of a commercial project such as this, bringing along with it many positive impacts to the local economy. These impacts include employment opportunities for local residents, economic growth for the community generated through the sales of fish products both locally and outside of the state, and recognition of Kona as a technology "site" that will encourage more investment of this kind.

Following my review of the proposal presented by Kona Blue Water Farms, the environmental impact assessment, and the subsequent correspondence by various individuals and groups in regard to the proposal, it seems clear that all good caution and diligence has been take by KBWF to date, and that each scientific and cultural issue is been well addressed.

As a longtime participant in the Northern Pacific commercial fishing industry the central issue regarding this proposal seems clear. The inexorable demand for marine based protein sources will continue to irresistibly increase, and the wild oceans are unable to withstand this harvest. In addition, the worlds' peoples demand for food will, in the end, overwhelm any and all regulatory attempts to limit the wild harvest unless alternate protein sources are made available. So it is clear that the only way to preserve many natural stocks of marine organisms will be to employ methods that supply protein independent of the wild stocks. And what better place to do this than in Hawaii, where environmental laws are strong and awareness high. The alternative will be that, if these new industries are not hosted by strong and capable regulatory environments such as Hawaii, these projects will then locate in areas of weak regulation and awareness as in many third world countries. This does not spare Hawaii any impact from poorly conceived or executed projects, it simply delays, and at the same time heightens the impact.

So please find this letter as an endorsement of the KBWF proposal.

Best regards,

David Knight
Kona Premium Coffee Company
Holualoa, Hawaii

Cc. Kona Blue Water Farms

73-4914 Anini St.
Kailua-Kona, HI 96740
May 7, 2003

Dawn Hegger
DLNR Land Division
1151 Punch bowl St, Rm 220
Honolulu, HI

Dear Ms. Hegger,

I had hoped to be able to speak at the public hearing in Kona on May 27. Unfortunately I will be out of town at that time. I am therefore submitting this written testimony.

I'm writing in support of the application of Kona Blue Water Farms to establish an open ocean fish farm on the Kona coast near Keahole airport. I have two major reasons for wishing for the success of their endeavor: I believe that the long-term health of the ocean environment, both here in Hawaii and world-wide, is critically dependent on the development of open ocean aquaculture; and I believe that Hawaii is uniquely positioned to profit greatly from this inevitable development. I will say more about these points, but first I want to say that I have followed with interest for several years the public discussions surrounding this proposal. I have noted various environmental concerns, and I have been impressed by the thoroughness with which these concerns have been addressed in the Environmental Assessment report which I've downloaded from the Kona Blue Water Farms web site.

Let me discuss now the health of the world's oceans, or perhaps I should say, the declining health, and the role aquaculture must play in reversing the decline. I'm a lifelong sport fisherman so I have a particular interest in this, but anyone who has been reading the news over the past half-century must be dismayed as, one after another, so many of the world's most productive fisheries have collapsed utterly. The Grand Banks cod fishery, arguably the world's most productive fishing ground for at least half a millennium, has, since World War II, been fished to virtual extinction, and the great New England fishing fleets are no more. A similar fate is overtaking fishermen along western North America, with the exception of Alaska. Hawaii has seen dramatic drops in the productivity of bottom fishing, and I have recently seen an estimate that worldwide, pelagic fishes are being taken at two and half time sustainable rates.

The world's human population continues to grow at the same time fish stocks everywhere plummet. The demand for protein from the ocean will only increase, and already wild fish stocks cannot meet the demand. The pressure on these stocks threatens to destroy not only the fish species themselves, but the ecologies which surround them, for which the Grand Banks example can be taken as an object lesson.

But I believe that fifty years from now there will still be a wild ocean. This will come to pass not because fishermen have seen the light, but because open ocean aquaculture will have replaced fishing as the primary source of ocean protein. This, it appears to me, is an economic certainty, an inevitable consequence of increasing demand and the impossibility of finding adequate wild supplies at a reasonable cost. As aquaculture expands, demand for wild fish will decline. Eventually an economic balance will be struck between fishing and aquaculture; fishing will only make sense when wild fish are present in sufficient numbers that they can be caught nearly as cheaply as their tame brothers can be farmed.

The world is on the cusp of an era of explosive growth in aquaculture. The economic opportunity offered to Hawaii by this fact is almost too obvious to need description. Hawaii is uniquely positioned to serve both Asia, where the demand for fish is traditional and enormous, and the North American market, where in recent decades fish consumption has increased almost in lock step with waning stocks. Aquaculture is destined to play a large role in Hawaii's future. I believe that if it wishes to realize fully the potential benefits of aquaculture, the state government must support the efforts exemplified by Kona Blue Water Farms, which is developing not only a business, but also a technology which may well form the foundation of an entire Hawaiian industry. It is very important to recognize that the technology for tropical open ocean aquaculture *will* be developed somewhere; if Hawaii is the place where the development occurs, it will enjoy an advantage comparable to that seen by California following the creation of the microelectronics industry there in the 1960's.

It seems to me the specific virtues of the Kona Blue Water Farms proposal are these: The company has a strong scientific foundation; its principals are ocean scientists with impressive research records. The proposal has been thought through and presented in remarkable detail. The proposed farm site has been chosen with great care to minimize impact on the local environment and on ocean usage. The principals have met and consulted with numerous local groups and with interested individuals, and have responded to concerns directly and seriously, as evidenced by the details of their Environmental Assessment report. No substantial objection to the establishment of the proposed farm has survived the careful arguments presented there.

It appears to me, therefore, that the Kona coast, the State of Hawaii, and in the long run perhaps the entire ocean environment stand only to gain if the application is granted.

Thank you for your attention.

Sincerely,

Richard Stauduhar, PhD

cc: Peter Young, Chairman, DLNR
Neil Anthony Sims, Kona Blue Water Farms

May 29, 2003

Chairperson
DLNR
1151 Punchbowl St, Rm 220
Honolulu, HI 96813

Attn: Dawn Hegger, Lands Division

Regarding: **Testimony on the EA for Kona Blue Water Farms**

I testified at the DLNR public hearing at NELHA, 5/27/03 5pm, but did not submit written comments. I would like to do so now. My name is Syd Kraul. I am an aquaculture consultant and owner of Pacific Planktonics. I have previously testified in a federal court case as a recognized aquaculture expert.

GENERAL STATEMENTS:

1.MY EXPERIENCE: 30 years doing aquaculture research and commercial fish farming. I've raised mahimahi, kahala, moi, and lots of other fish. My University of Hawaii experience as a researcher at Waikiki Aquarium led to some well respected scientific publications. My most recent work has been commercial farming of moi and kahala at a NELHA land based fish farm (Pacific Harvest, Inc.). Thus my testimony is based on facts that I know to be true, rather than rumors or internet myths.

2. FISH PELLETS: they contain about 10% water, 50% protein, 15-20% fat, can be made to float or sink so they don't pollute the bottom. Fish feed is made mostly from dried anchovies and other small fish that are harvested in huge quantities off Peru and elsewhere. This dried fish meal is mainly used in chicken, dog and cat feed. Aquaculture will not change the harvested amounts because it is already being harvested with little restriction. Our society would rather eat 1 pound of mahimahi or kahala (etc) than 2 or 3 pounds of anchovies (or 1 pound of dog biscuits).

3. FEED CONVERSION: mahimahi and kahala need less than 1.5lbs of feed to gain 1 lb of fish weight. Mahi actually put on 1 lb of wet weight after eating less than one pound of dry feed. This is because pellets are measured dry and fish are measured wet (70% water). Because they convert the feed to fish flesh so efficiently, they excrete very little waste (feces).

4. EXCRETIONS: mahi excrete 1/4th as much ammonia as salmon. There will not be any smell or anything we can see. Fish cages can not be compared fairly to "industrial feed lots," or "floating pig farms." Cages will not have smoke stacks or flies buzzing around. It is far more useful to compare Kona sea cages to the Oahu cages owned by Cates International. Thus far, those cages have not generated adverse pollution. I assume that deficiencies in any NDPES monitoring can be supplemented by DLNR lease conditions. Although problems could arise, and have arisen through mismanagement, there is no reason to presume that this project will be mismanaged. To save money, fish feed will not be fed excessively, and high quality feeds will be used. As long as ocean currents are strong enough, feed control will be enough to prevent pollution. My work at Pacific Harvest shows that 10 to 20 volumes of water exchanged per day is enough to keep water quality excellent, with undetectable waste (ammonia nitrogen). Thus for cages to stay that clean, the currents will need to average 1 cage width in 1/20th of a day. If the cages are 3 cages 80 feet in diameter, the current would only need to flow at 240 feet in about 1 hour. By my calculations, that is about 1/25th of a knot. That's enough to keep the cage and surrounding water at undetectable ammonia levels. To keep particles from accumulating, and occasional faster current is needed. In commercial fish tanks, this current is less than 15 meters per minute, ie, about 0.9 kilometers per hour, or less than 0.5 knot.

5. Fish Diseases: In my many years of experience, drugs and hormones have decreased in their value for disease control, and I almost never use them. No drugs are used at Pacific Harvest because they are too expensive, and because preventive care (keeping water clean, etc.) is far more effective. The only treatment we use is an occasional dip in fresh water (county water) to remove external parasites. This treatment does not harm anything except the parasites.

6. Location: Based on my observations of spinner dolphins at Honokohau harbor, I don't think (but am not an expert) that heavy boat traffic deters these dolphins. Perhaps those dolphins will like having that cage nearby to help shelter them. I don't think we'll know the dolphins' reactions until we put in a cage and monitor it.

7. THIS IS GOOD FOR HAWAII (OUR OCEAN): ocean pens will be environmentally friendly and provide Kona with a dependable supply of high quality fish for our restaurants and fish lovers. Pollution is not likely to happen, fishermen will not be hurt, spinner dolphins will probably treat cages the same way they treat all the boats at Honokaa (no problem). Cages will be less dependent on electricity production than land based aquaculture systems. I don't think further EIS studies will have value unless they are tied to having a cage in the water. This is our chance to try a small system (6 cages in 9 acres of relatively unused ocean) to see if there is any impact. If we don't allow any cages, we'll never know their effect. If there are harmful effects detected by these cages, corrective measures can be taken. If that doesn't work, the lease can be cancelled. I think we should give it a try.

Sincerely,

Syd Kraul, private citizen

73-998 Ahikawa St.

Kailua-Kona, HI 96740

Tel (808)325-1761

Email kraul@konacoast.com

May 30, 2003

DAWN HEGGER, Planner
State of Hawaii
Department of Land and natural Resources
Office of Conservation and Coastal Lands
Kalanimoku Building
1151 Punchbowl St., Room 220
P.O. Box 621
Honolulu, Hawaii 96809-0621

Regarding: Conservation District Use Application (CDUA) for HA-3118 (Board Permit)
for Kona Blue Water Farms Open Ocean Fish Farm

To Whom It May Concern:

After attending the Public Hearing at NELHA on May 27, 2003, I thought it my duty to write to you with my opinion on the proposed fish farm endeavor.

Look at the statistics. Over-fishing of the oceans is rampant and results of studies taken over the past 50 years indicate there are sometimes less than 10% of the fish stocks today than there were in 1950.

What should we do? Nothing? No. We have to limit the fish taken from wild stock. We have to place Fish Replenishment Areas off-limits to all fishermen, worldwide.

What else can we do? Use Aquaculture in a safe, well-monitored condition to grow desired fish for human consumption. This effort is going on and has been going on for decades around the world. Some have not been beneficial – and we've learned from those mistakes.

The area off Keahole Point that is in question here is a special place for many reasons and should be protected from encroachment. However, it may well be the perfect place to use for the purposes outlined if KBWF follows restricted, highly monitored, environmentally correct methods to supply a possible solution to over-fishing. Kona Blue Water Farms is taking every precaution to insure a successful operation – and have taken every viable step to insure the public is aware of what they are doing and how they are doing it. I commend them for that. Yes, we are taking a chance with this, but we have to take chances to succeed. I do recommend you accept their application – with the stipulation that if the monitoring finds any problems the operation will be immediately shutdown until those problems are completely resolved.

Thank you for the opportunity to comment.

Respectfully,

Dick Dresie

Dick Dresie
Resident
75-5822 Neke Place
Kailua-Kona, Hawaii 96740

Cc: Peter Young
Kona Blue Water Farms

FRED A. YECK
75-670 Halewili Place
Kailua-Kona, HI 96740
Phone: (808) 334-0261
Fax: (808) 334-0845

March 16, 2003

Land Division
Department of Land and Natural Resources
Kalanimoku Building, Room 220
1151 Punchbowl Street
Honolulu, HI 96809

RE: Public Comment on Conservation District Use Application HA-3118, Open Ocean Fish Farm, North Kona, Hawaii

Dear Friends:

As a life-long fisherman, I strongly object to the proposed exclusive use of our ocean resources for the proposed Open Ocean Fish Farm in North Kona, Hawaii.

Reasons in support of my opposition include the following:

1. To allow exclusive use of an area of our open ocean is contrary to traditions and practice as it relates to the use of the oceans which has always been open to all in common with each other. To grant one individual or one corporation the exclusive use sets a dangerous precedent where, if the State of Hawaii is to be even handed, many other permits would possibly be required to be issued in the future for other fish farms.

2. If fish farms are to have exclusive use of areas of our ocean up to 80 acres, why not fishermen? As a fisherman I would like nothing better than to have an exclusive 80 acre parcel in the open ocean with a permit to allow the setting of a fish attracting device (FAD). If a system of exclusive use is to be established it should include not just fish farmers but, also, fishermen as to the opportunities for exclusive use.

3. Fish farms have a significant risk of damaging the environment. It is well documented that there is a significant risk of disease being transferred to wild species outside the farm by farm fish escaping their enclosure. In addition, waste from the operation is likely to create adverse consequences to Hawaii's beautiful waters. There is no justification for allowing these risks to be incurred.

4. It is also been the experience in other areas of the United States, especially in Alaska, where fish farms have been destructive to the economies of existing commercial fishermen and

fish processors. As a result, the legislature in the State of Alaska has an outright prohibition on fish farms and for good cause.

I would also like to register my objection to the fact that the information relating to this application is only available in Honolulu when the fish farm is proposed for the Island of Hawaii. At a minimum, all information relating to this application should be available in Kona as well as in Hilo so that those persons most impacted can have reasonable access.

In any event, please consider this my public comment and objection to the issuance of the proposed use application HA-3118 Open Ocean Fish Farm, North Kona, Hawaii.

Sincerely,

Fred A. Yeck

Kona Blue Water Farms

A Division of Black Pearls, Inc.

P.O. Box 525 Holualoa, HI 96725 U.S.A.
Phone (808) 331-1188 Fax (808) 331-8689
www.blackpearlsinc.com

June 13th, 2003
KBWF/Fred Yeck 1b

Mr Fred Yeck
75-670 Halewili Place
Kailua-Kona, HI 96740

Aloha, Mr Yeck,

We are hereby responding to your letter of March 16th to the Land Division, concerning our application for an open ocean fish farm near Unualoha Point, off the Kona International Airport, in Kala'oa, Kona.

We will address each of your stated reasons for objecting to our proposal, in similar pointwise format :

1. "To allow exclusive use of an area of our open oceans is contrary to the traditions and practice..."

Exclusive ocean use is certainly part of Hawaiian traditions. In pre-contact Hawaiian culture, traditional marine tenure reserved areas of ocean or reef, or specific 'konohiki' fisheries for exclusive use of individuals, families or clans. Ali'i often reserved entire species, such as moi, for their own use. The konohiki fisheries even persisted into the 20th Century.

This is not "a dangerous precedent", but a carefully considered step by the State legislature to open up the potential for open ocean aquaculture. In the drafting of the legislation for HRS 190D, the wording was kept deliberately flexible, to allow for exclusive use where the Board considered it appropriate.

Nevertheless, we have made several changes to our proposed farm layout and management plan. One of these changes involves now making all six cages of the submersible spar buoy kind. We believe that this will allow us to now withdraw our request for exclusive use of the central area surrounding the cages. We can only do this so long as fishermen and divers respect the cages, and keep well clear of them. We may need to reconsider the level of exclusivity if we encounter problems of pilfering, vandalism, or reckless endangerment of property, health or safety. In such a situation, we would need to go back to the Land Board for redefinition of our lease exclusivity status.

Because of safety and liability issues, we would still request no anchoring, no SCUBA-diving and slow low-wake speed by boats within the proposed lease area.

2. "If fish farms are to have exclusive use of areas of our ocean up to 80 acres, why not fishermen?"

This is indeed a good question, Mr Yeck. Whilst we are now no longer asking for exclusive use of our central 9 acre area around the cages, I still see there may be some need for this in the future. I envisage that fishermen might be allowed to develop some areas where they are given exclusive use of the ocean, in exchange for some rental payment, so long as it doesn't unduly interfere with fishing traditions or established practices. I would encourage you to think of ways that you could use these opportunities to develop more sustainable means of harvesting or culturing fishery resources.

We also hope that fish farming will lead to more gainful, stable employment for former fishermen. There are virtually no full-time commercial bottom-fishermen left in Kona any more – only part-time or retired folk. Since first airing our proposal, we have had several bottom-fishermen approach us and ask if there is a possibility for them getting jobs on the fish farm. At the moment, these fishermen have been forced to take other full-time jobs to support their families. We hope that some of these Kona fishermen will get a chance to get back to work on the ocean.

3. "... significant risk of damaging the environment ... well documented that there is a significant risk of disease being transferred to wild ...."

One of the beauties of this innovation to start fish farming in the open ocean is that the strong currents dissipate any suspended solids or dissolved nutrients in the effluent. There will be an extensive environmental monitoring program that will track water quality around the farm, and will monitor the abundance of corals and fish on the adjacent reef, to ensure that there is no long term detriment.

We will only be farming native Hawaiian species, so the disease risks are minimal. The main species that we will farm - kahala – is currently considered a trash fish by Kona fishermen. They do not eat kahala because of the parasitic worms and the risk of ciguatera. Farming allows us to avoid these risks.

4. "....in Alaska .... fish farms have been destructive to the economies of existing commercial fishermen and fish processors."

Certainly, fish farms do offer a more sustainable, economically viable industry than wild stock fishing. This is part of the attraction to processors, wholesalers, restaurateurs and consumers. The prohibition against fish farms in Alaska has not helped Alaskan fishermen – the farms have just developed instead in Norway, British Columbia and Chile. In most situations, commercial fishing is not sustainable in the long run. We have to give back something ... we can't just keep taking. The Alaska salmon fishery also depends on aquaculture (salmon hatcheries) to sustain its "wild" stocks.

Hawaii also likes to tout itself as being receptive to new, innovative ideas. Our state is desperately trying to attract new industries for economic diversification. Is it going to help Hawaii in these efforts if we prohibit a new, environmentally friendly form of aquaculture? Or will we just be left in the dust, like the Alaskan fishermen?

5. You further object to "the fact that the information relating to this application is only available in Honolulu". This is not the case. We have made every possible attempt at outreach, and engaging the public in discussions on our proposed project. We have been holding public meetings and discussions with local conservation, shoreline, community and kupuna groups for over two years, now. We have had our draft Environmental Assessment posted on our web site (www.blackpearlsinc.com) for over six months. You will also find there transcripts of the various public meetings, and excerpts of other background information. We believe that the more educated that people are on this issue, the more they are able to make a rational, informed decision, rather than a judgment based on hearsay evidence or misrepresentations about salmon farms or other aquaculture operations in other parts of the world.

I have been told by the Land Division officer that the official copies of the draft Environmental Assessment were delivered to both Kona and Hilo public libraries, as mandated by law. We were only notified of the "official acceptance" of our draft EA (the point at which it becomes available for public review) by letter dated March 3rd, so the copies were probably still in the mail to the library when you wrote your letter on March 16th. In any case, please contact us directly if you need more information on our proposal, and we would be happy to provide it for you.

Thank you again for your comments. I hope that this letter, and the proposed changes we have made to our project, help to persuade you that our project is worthy of support, or at least should be allowed to proceed.

Aloha, sincerely,

Neil Anthony Sims
Vice-President / Research Director

c.c. Lands Division, DLNR, 1151 Punchbowl St, Rm 220, Honolulu HI 96809

DAR
AD

Gwen F. Ilaban
76-6182 Alii Drive
Kailua-Kona, HI 96740
Phone: 808.329.1912
email: gfilaban@aol.com

April 16, 2003

sent via FAX: 1.808.587.0390
Peter Young, Chairperson
Land Division
Department of Land and Natural Resources
Kalanimoku Building, Room 220
1151 Punchbowl Street
Honolulu, HI 96809

Re: CDUA HA3118 Open Ocean Fish Farm, North Kona, Hawaii

Dear Chairman Young:

The public notice which was published in West Hawaii Today (WHT) on March 13, 14 & 16, 2003 failed to indicate the availability of the project's Environmental Assessment at the local libraries and a website that the public could access the pertinent information. Also, it did not mention when the public comment ended. There is no date as to when your department would stop taking public comments. Is it fair to assume that it is indefinite? Will a public hearing also take place for this CDUA?

Since I only have the WHT public notice available to me, I'm requesting that you reconsider issuing a permit to Kona Blue Water Farms.

This type of commercial marine industry could possibly damage the fragile ecosystems that we have in Hawai'i. The proper management of the resources is critical for the sustainability of Hawai'i's fisheries. I am very interested in keeping the aquatic resources and habitat conserved and not have it exploited. Aquaculture/mariculture/open-pen farming/fish farming and fish ranching maximizes the potential for any negative impact on the environment. The idea of promoting this type of new industry for Hawaii would be a display of irresponsibly. Therefore, an environmental impact statement should be prepared under chapter 343 HRS.

I urge you to consider the comments that I have addressed and would like to know when a public hearing will occur for this application.

Mahalo nui loa me ka aloha,

Gwen F. Ilaban

EXHIBIT 1

Kona Blue Water Farms
Kona, Hawai'i
A Division of Black Pearls, Inc.
P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-8888 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

Gwen Ilaban 2.doc
May 29, 2003

Gwen F. Ilaban
76-6182 Alii Dr
Kailua-Kona, HI 96740

Aloha, Gwen,

Thank you for your letter of April 16th, 2003, addressed to the Lands Division of DLNR.

In response to questions over the phone from Dawn Hegger of the Lands Division, I was able to confirm that there were indeed copies of our draft Environmental Assessment available at the Kailua-Kona Public Library. Ms Hegger sent a second set of documents to Hilo and Kona, just to be sure it was available.

We also confirmed for Ms Hegger by phone that our draft Environmental Assessment, and extensive background documentation was available on our web site, at www.blackpearlsinc.com. This is the first time, to our knowledge, that a project proponent has made their entire draft Environmental Assessment available on the web. We did so because we believed that most community concerns that we were hearing about our project were based on a lack of information, or misinformation. We would like for our project to be a precedent that other prospective fish farm applications – or, indeed, any other development proposer – should have to follow.

Many in our community were very appreciative of the open and consultative way that we have approached this process. We hope that we can continue in this vein, as our project develops further, and eventually, we hope, comes to fruition.

Thanks, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

May 26, 2003

Ms. Dawn Hegger
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Sent Via FAX: 1.808.587.0455

Subject: CDUA HA-3118 Kona Blue Water Farms (KBWF)

Dear Ms. Hegger:

I'm requesting that you withhold the above application. The applicant has failed to address HRS Chapter 205, the Hawaii Coastal Zone Management (CZM) Program in their DEA. It was not noted on the bulletin from the Office of Environmental Quality Control (OEQC), dated March 23, 2003.

As you are very much aware, Ahi Nui Tuna Farming LLC was required to file the following permits with OEQC: CDUP, Army, NPDES, ZOM, CZM. The permits required for KBWF are: CPUA, NPDES, ACOE. It appears there is a disparity in the number of permit requirements for the two entities. Should I conclude that KBWF is receiving preferential treatment in this permitting process? I would like your opinion on that..

I truly hope that open ocean fish farms, pen and cage aquaculture will have a positive affect on our state and local economy. However, this new industry for the state has potential impacts on Hawaii's pristine marine ecosystem, the water quality and view planes.

Your reconsideration will be greatly appreciated.

Mahalo nui loa,
Gwen F. Ilaban
76-6182 Alii Drive
Kailua-Kona, HI 96740
email: gfilaban@aol.com

cc: Mr. Peter Young, Chairman, Land Division, DLNR
(sent via FAX: 1.808.587.0390)
Neil Sims, Kona Blue Water Farms
(sent via email: neil@blackpearlsinc.com)
Office of Environmental Quality Control

Kona Blue Water Farms
Kona, Hawai'i
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P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

Gwen Ilaban I doc
May 29, 2003

Gwen F. Ilaban
76-6182 Alii Dr
Kailua-Kona, HI 96740

Aloha, Gwen,

Thank you for your letter of May 26th, 2003. I just want to reassure you that we are not (at least, not to our knowledge) receiving any preferential treatment from the State, in their consideration of our offshore fish farming proposal.

Yes, we will have to apply for a CZM permit. This is a separate process from the CDUA EA. In our earlier discussions with the CZM staff, they recommended that we wait until our CDUA proposal had moved some distance down the track before we began the application process with them. This was to prevent them from expending a lot of energy on our proposal, when it might still have changed as we received further public input.

Over the next few weeks we will contact CZM again, and see if they think that this is now an appropriate time to begin the process with them.

For clarification, it is also my understanding that the ZOM is part of the NPDES permit, to be issued from State DOH CWB. I do not think that it is a separate permit.

Thanks, and aloha,

Neil Anthony Sims
Vice-President / Research Director

cc. Land Division, Rm 220, 1151 Punchbowl St, Honolulu, HI 96813

H 5028

PW
DARE
BD

KA OHANA O NA KUPUNA O KONA

78-6797 Mamalahoa Hwy., Holualoa, Hawai'i 96725
Telephone (808)324-4020
Konakupuna@aol.com

RECEIVED
'03 MAY -5 A8 :44
DEPT OF LAND & NATURAL RESOURCES STATE OF HAWAII

April 30, 2003

Mr. Neil Anthony Sims
Vice-President/Research Director
Kona Blue Water Farms
PO Box 525
Holualoa, HI 96725

Aloha Mr. Sims:

Our organization, Ka Ohana O Na Kupuna O Kona, cannot endorse your plan to establish offshore fish farming in our Kona-waters for the following reasons:

Many of the species of fish will be costly to feed. The cost of fish food, divers maintaining cages, initial costs for cages and anchoring lines, maintenance costs for cages, etc., all add to the per pound price. The cost of fish farming will be passed on to us, resulting in higher prices for fish. If not marketed here, the fish will be sold outside of Hawai'i to make money.

The fish will not have natural food which God provided for them. These fish feed on algae which lie inside the flat bed and coral reefs. Polyps are ½inch or smaller and are invisible to the human eye.

The fish are not necessarily compatible to live in a small space and you will end up needing that amount of cages times the number of fish species you intend to farm.

Our local fishermen only take what they hook. We need to take care of our home first. What will happen to these fishermen? For many years our fishermen have been using our Kona waters with no problems.

Our Kona waters cannot be compared to other islands. Kona doesn't have sandy beaches like the other islands do. In many places here, the sandy bottoms are not that deep and are seasonal. This is where the Kona crab, nabeta and weke'ula are.

The pollution on the bottom will need to find outlets, and that outlet will be our shoreline. It will not be dispersed by currents in the deeper waters, but rather driven to shore when the winds are strong. Over time the pollution will accumulate, smothering and killing the life below.

Exhibit 3

Many fish buoys placed in our Kona waters have broken loose, become lost at sea and drift upon the shore. What makes Kona Blue Water Farms think its cages are safe two miles out? You cannot fight nature.

The site you are proposing lies within the humpback whale sanctuary and that area is given to protect the whales during their migration, especially the young calves traveling with their mother. The whales will be hurt by the moorings and web mesh.

Our kūpuna group does not endorse your proposal for fish farming. If our ocean fish population is in major decline, as you say, the only alternatives are to limit the size and quantity from our oceans, or to work with our people to restore the Hawaiian fishponds on Hawai'i, Maui and Moloka'i.

Ka Ohana O Na Kupuna O Kona cannot and does not endorse Kona Blue Water Farms' open ocean aquaculture project.

Aloha ke Akua,
Lily Makuahine Namakaokaia Haanio Kong
Lily Makuahine Namakaokaia Haanio Kong
Po'o

cc: Mr. Peter Young, Department of Land and Natural Resources

Exhibit 3

Kona Blue Water Farms

A Division of Black Pearls, Inc.

P.O. Box 525 Holualoa, HI 96725 U.S.A.
Phone (808) 331-1188 Fax (808) 331-8689
www.blackpearlsinc.com

June 13th, 2003
KBWF/Lily Kong 2b

Mrs Lily Kong
Po'o, Ka Ohana O Na Kupuna O Kona
78-6797 Mamalahoa Hwy
Holualoa, HI 96725

Aloha, Mrs Kong,

Thank you for your letter of April 30th. We were disappointed that your kupuna group did not endorse our open ocean fish farm proposal. We were even more disappointed that your group was not even interested in meeting to discuss this proposal with us.

Over the last two years, as we have been moving our open ocean fish farm proposal through a series of public meetings, we have found that most people, like your kupuna group, were initially opposed to the idea of open ocean fish farming. However, when we were able to sit down and talk with people, we could directly address their questions or concerns. As people learn more about the open ocean fish farm idea, through open, constructive discussions, we have found they almost always end up eventually accepting or even endorsing the concept. I believe that if you had allowed us to give a presentation to your kupuna group, and to engage your group in such discussions, that we could have found some common areas of agreement. You may still not have endorsed the proposal, but you would have been at lease more informed and educated about its pros and cons, and about the alternatives.

We are now proposing several changes to our original project proposal, to accommodate some of the concerns that the public have shared with us through this process. To provide some greater level of assurance of no negative interaction between our project and the spinner dolphins of Makako Bay, and the commercial dive groups that use the reef area around Unualoha, we are now proposing to move our project a further 600 ft, directly to the west. This now puts our project in water between 200 ft and 220 ft deep. To accommodate this greater depth, we will now need some wider area to spread out our anchors, and so we are asking for our lease area to be expanded to around 91 acres (from 81 acres).

We are also changing from a mixed array of surface and submersible cages to all submersible kind. These will be submerged beneath the surface for most of the time, and will only be raised to at or near the surface for fish transfers or cage cleaning. This therefore alleviates the concerns that drove us to request exclusive use of the central area surrounding the cages. Consequently, we are now only asking for the wider lease are to be no anchoring, no SCUBA-diving and slow low-wake speed by boats.

We want to be explicit about our reasons for doing this – we are trusting that Kona's fishermen and divers will respect the fish cages, and that we will not encounter any pilfering, vandalism, or reckless endangerment of property, health or safety. If we do encounter any such problems, we may need to reconsider the level of exclusivity. In such a situation, we would need to go back to the Land Board for redefinition of our lease exclusivity status. We believe, however, that this will not be necessary.

Many of the other concerns you express in your letter are based on misunderstandings or misperceptions about our proposal, or about fish farming in general. I would therefore like to try to address some of your questions and concerns for you :

1. "the fish will be costly to feed". Actually, the dry pellet feed is relatively inexpensive. It costs around $0.55c per pound, landed here in Kona. Certainly, with the additional expenses that you list, fish farming is an expensive proposition, and we want to raise high-value fish in order to make the venture viable. However, our fish farm production will in no way result in an increase in fish prices locally. If anything, having more fish locally available will result in a softening of fish prices.

2. "the fish feed on algae (on) coral reefs". The pellet fish feed provides a healthy, balanced diet for the fish. We – and several other companies – are already raising various species of fish using pellet diets, and the response from people who taste these fish is very positive.

3. "fish are not necessarily compatible to live in a small space". One of the beauties of the open ocean net pens is that they allow us to raise fish at much lower densities than in a land-based system.

4. "What will happen to these (Kona) fishermen?" There are a decreasing number of commercial fishermen in Kona. Ever since increased restrictions on bottom-fishing took effect, the number of full-time commercial bottom-fishermen has been decreasing, to where it is now near zero. We have had several bottom-fishermen approach us and ask if there is a possibility for them getting jobs on the fish farm. At the moment, these fishermen have to take other full-time jobs to support their families. So, to answer your question: we hope that some of these Kona fishermen will get a chance to get back to work on the ocean!

5. "This is where the Kona crab, nabeta and weke 'ula are". Our draft Environmental Assessment specifically addresses potential conflict with existing fisheries. While these fishery resources do probably occur within our proposed farm area, the currents are so strong that there is no fishing activity there at present. Now that we are not requesting exclusive use of the area, however, there is nothing that will stop fishermen from trying to fish around our cages. Perhaps these fish will become more abundant in the area, and the increased catches will encourage fishermen to begin to fish here.

6. "The pollution .... (will be) driven to shore .... (and) over time .... will accumulate, smothering and killing the life below" Another of the beauties of open ocean fish farming is that the currents do indeed dissipate any suspended solids or dissolved nutrients in the effluent. The currents in this area run parallel with the shoreline. The winds only affect floating particulates, so the suspended solids in the water column will not be blown onto shore. There will also be an extensive environmental monitoring program that will track water quality around the farm, and corals and fish on the adjacent reef, to ensure that there is no long-term detriment. We will make this information available locally.

7. "What makes Kona Blue Water Farms think its cages are safe two miles out?" Our cages are proposed to be only 2,600 feet offshore, not two miles. Fishing buoys usually break loose because they have only one mooring line, and there is no way to replace any worn parts down near the anchor. Our cages will have an entire mooring array, with many different anchors and mooring lines. The array will be engineered to ensure that if one line is worn, or breaks, then the others can safely take the strain until the worn or broken link can be replaced.

8. "The whales will be hurt by the moorings and the web mesh". There is no scientific evidence to suggest that whales will become entangled, or otherwise be hurt by the moorings or the web mesh on the cages.

9. "the only alternatives are to limit the size and quantity (of fish taken?) from our oceans, or to work with our people to restore the Hawaiian fishponds". While these alternatives offer some potential, they are not very practical answers to the larger questions of increasing population pressure, and the need for economic diversification. Further reducing the take of fish from our oceans will not solve any of these problems, as it will not increase the available food supply. There are already many fishing regulations; any attempts at further restrictions face a myriad of objections from fishermen. We cannot just continue to take .... we have to learn how to give something back.

And yes, native Hawaiians knew this when they operated the great fishpond systems in the pre-contact period. We like to think of our offshore fish farm proposal as simply a more technologically advanced form of the Hawaiian fishpond.

Again, Mrs Kong, let me please reiterate our willingness to meet with your kupuna group to discuss these and other issues. We still seek such a meeting, not for our company's ends (as you have already refused to endorse our proposed farm), but for your own group's education and information purposes.

We believe that groups such as yours could play a crucial role in fostering wider acceptance of new technologies, such as open ocean fish farms. However, it would seem to be difficult for you to offer informed guidance or educated suggestions for our community when you do not wish to discuss these new ideas with the proponents. We hope you will revisit this decision, and that we can meet at some time in the future.

Aloha, and mahalo,

Neil Anthony Sims
Vice-President / Research Director

c.c. Lands Division, DLNR, 1151 Punchbowl St, Rm 220, Honolulu HI 96809

Cates
International, Inc.
P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0894
e-mail: info@catesinternational.com

May 8, 2003

Neil Anthony Simms
Kona Blue Water Farms
P. O. Box 325
Holualoa, Hawaii 96725

Dear Neil,

Upon review of the Draft Environmental Assessment for your open ocean farm project we would like to submit our concerns.

Cates International, Inc. is committed to the growth of a viable offshore aquaculture industry in Hawaii that is environmentally sound, technologically progressive and co-exists with existing users and traditional cultural practices.

For these reasons we are opposed to these aspects of your proposal:

1. Surface net cage operations
2. Exclusivity outside of the sea cage

First, surface net cages are widely known to pose severe failure problems when secured at the surface particularly in open water conditions. Technology has therefore advanced toward totally submersible operating cages. To our knowledge, no native Hawaiian species require surface cages to be viable. Surface cages are industrial looking eyesores, with no visual relation to typical ocean structures, such as vessels, buoys, and piers. Surface cages also compromise security; are attractive nuisances, and may facilitate the need for exclusivity at the surface.

Second, exclusivity of all Hawaiian waters is sacred and is not a requirement of an offshore aquaculture facility, with the exception of the area inside of a net or trap that has traditionally also been sacred to fishermen both here in Hawaii and in many places worldwide.

Thank you for the opportunity to comment.

John R. Cates

Yours truly,

John. R. Cates
President

Kona Blue Water Farms
Kona, Hawai'i
A Division of Black Pearls, Inc.
P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

KBWF/Randy Cates 1b.doc
May 20, 2003

John Randy Cates
Cates International, Inc.
P.O. Box 335
Kailua, HI 96734

Aloha, Randy,

We are in receipt of your letter dated May 8, 2003, which detailed your two reasons for opposing some aspects of our open ocean fish farm application. We believe that several of your statements therein are either misrepresentations of the facts, or misunderstandings on your part. We wish in this letter to point out to you these areas needing revision or re-evaluation, and to correct the record.

We have witnessed your commitment to the growth of "a viable offshore aquaculture industry in Hawaii", and we have appreciated your positive input at several of the public meetings that we have held in Kona discussing our farm proposal. As the founder of the first offshore fish farm in Hawaii, you are certainly in an influential position. However, we might have hoped that this leadership position would have been used to further the broader growth of offshore fish farming industry, rather than to constrict its growth, by compelling any other industry aspirants to adhere to the exact same techniques that you have chosen.

This is a developing industry, and we believe that there is much to be gained from innovation, and from adapting new technologies to meet Hawaii's needs. We should not be closed-minded in how we approach new ideas. Having said that, let me point out that there are only two fish farms in the world that use submerged cage technology: yours, and one other in Puerto Rico. The remainder of the world-wide cage fish farming industry, of at least 1.5 million tons per year, is based on surface cages.

Your letter describes your two main objections as based on our proposed surface cage operations, and our request for an area of exclusivity around the cages. To respond to these pointwise:

1. Surface cage operations

You assert that "surface net cages are widely known to pose severe failure problems", yet surely this is simply a matter of siting or engineering. Certainly, surface cages have failed when they were either inappropriately sited, or inadequately moored. But then, by the same token, submersible spar-buoy

cages have also failed where the sites were not well selected, or when the moorings have been poorly engineered or installed. Given how few submerged cages there are in the world, I suspect percentage-wise, they have fared much worse than surface cages. The real problem lies in the cage siting, and the engineering of the moorings, rather than in surface cages per se. Our Kona site is ideal for surface cages, and we intend to have our moorings and anchors professionally engineered.

It is interesting to note that while you object to the visual impact of surface cages (calling them "industrial looking eyesores"), to date, throughout all of our public meetings and discussions, not a single Kona resident has complained about the potential impact of our proposed farm on their view plane. Kona residents are very concerned about impacts on the marine environment. It appears that they really don't mind the idea of looking at these cages. This may largely be a function of their location offshore from the Kona International Airport, gravel mountains, Cyanotech's spirulina ponds, and light industrial/aquaculture park at Natural Energy Laboratory of Hawaii Authority. Again, it's a matter of appropriate siting, and this is one of the main reasons for locating here.

You state that "no native Hawaiian species require(s) surface cages", yet the entire industry, to this point, is based on only one farm (yours), culturing one species (moi). You may indeed be able to grow various fish in submersible cages, but can you do it safely and cost-effectively? As a private company, entering a new industry, it would be foolish of us to commit to one kind of cage only, when we anticipate culturing several new species which have never before been raised in the ocean. This is not good science, and it makes poor business sense.

Please also note that our Management Plan specifies two types of cages – surface cages and submersible cages. We believe that our project can provide an excellent test of the efficiency and durability of these two kinds of cages. At some point, 10 or 20 years down the road, we may be in a position to insist that the industry in Hawaii use only one kind of cage. To insist on this now is premature, to say the least.

Your letter also does not address the positive aspects of surface cages. As we detail in the draft Environmental Assessment, surface cages are safer for workers to operate, requiring no specialized diving skills; they are more efficient to stock, to feed and to harvest; they offer better mixing of effluents; and, they offer much better means for monitoring fish feeding and health. This latter point will be crucial as we develop new species for culture in Hawaii. Surface cages also offer entry opportunities for displaced fishermen. An exclusively submerged farm industry would severely limit potential participants to those –like yourself - with commercial SCUBA-diving expertise.

To commit to exclusively submersible fish cages is to wed our company's future – and this promising new industry – solely to the one company that makes Sea Station cages. I would like to see an industry that explores a range of possibilities, and selects the most appropriate technology based on experience, economics, and actual environmental impacts.

2. Exclusivity outside of the sea cage

We believe the comments you make here are a misrepresentation of the native Hawaiian traditions, and of Chapter 190D. In pre-contact Hawaii, traditional marine tenure reserved areas of ocean or reef, or specific 'konohiki' fisheries for exclusive use of individuals, families or clans. The konohiki fisheries even persisted into the 20th Century. There is certainly nothing "sacred" about open ocean access in traditional Hawaiian culture.

In the drafting of 190D, the wording was kept deliberately flexible, to allow for exclusive use where the Board considered it appropriate. We were both party to these discussions, and so I am unsure why you have chosen to omit this fact. The following excerpts from Chapter 190D should serve to reinforce my point (with my emphases added, as underlined) :

The purpose of the Chapter is .... "to establish procedures for the leasing of state marine waters and to guarantee property rights and protection for any activities approved under these procedures."

Under Definitions, the Chapter refers to ... "activities in, on, or under state marine waters."

Under Section 23, Lease provisions: "Section (a).(1) Each lease shall specify the term of the lease and the nature of the exclusive use of the area being granted.", and further ...

"(14) Each lease shall contain a statement describing the degree of exclusivity or access to the site by the public that will be based on an analysis of the user listing and descriptions provided in the application, and comments made by the public and in consideration of, but not limited to the following: compatibility of the operation with existing uses, perceived liability to the lessee and the public, and perceived risk to the lessee's investment."

As we have detailed in our draft Environmental Assessment, we believe that our proposal fully justifies the exclusive use of only the central 9 acre area around our proposed cages (both the surface cages, and the submersible cages). This is primarily to provide safety to our workers in the water around the cages, as well as to boaters who might run afoul of mooring lines close to the surface.

Thank you for your comments. We hope that the above clarifies the issues in your letter.

Yours sincerely,

Neil Anthony Sims
V.P. / Res. Dir.

Kona Blue Water Farms

Kona, Hawai'i

A Division of Black Pearls, Inc.

P.O. Box 525 • Holualoa, HI 96725 • U.S.A. • Tel: (808) 331-1188 • Fax: (808) 331-8689 • Website: www.blackpearlsinc.com

KBWF/Randy Cates 2.doc
June 13, 2003

John Randy Cates
Cates International, Inc.
P.O. Box 335
Kailua, HI 96734

Aloha, Randy,

Further to our response to you of May 20th, we would like to inform you that Kona Blue Water Farms is now proposing several changes to our original project proposal.

Of relevance to your stated concerns, we are now changing from a mixed array of surface and submersible cages to all of the submersible kind. These will be submerged beneath the surface for most of the time, and will usually only be raised to at or near the surface for fish transfers or cage cleaning. This therefore alleviates the concerns that drove us to request exclusive use of the central area surrounding the cages. Consequently, we are now only asking for the wider lease area to be no anchoring, no SCUBA-diving and slow low-wake speed by boats.

We want to be explicit about our reasons for doing this – we are trusting that Kona's fishermen and divers will respect the fish cages, and that we will not encounter any pilfering, vandalism, or reckless endangerment of property, health or safety. If we do encounter any such problems, we may need to reconsider the level of exclusivity. In such a situation, we would need to go back to the Land Board for redefinition of our lease exclusivity status. We believe, however, that this will not be necessary.

We are also still asking for the option of retaining two smaller surface cages, to be used as either nursery cages or as harvest cages. We hope that this will help to reduce the need for divers to be inside the cages when transferring or harvesting the fish, thus minimizing the risks to our employees.

We recognize that this still establishes a precedent for surface cages in Hawaii, but there may well be a time when that is the most practical, cost-effective route for a company to follow, and we do not think that we should exclude ourselves from ever farming fish in surface cages.

Therefore, while we still adhere to the opinions and the principals we espoused in our May 20th letter, we hope that you will be somewhat assuaged to know that we are now moving forward with a project proposal for cages to be largely submerged, and we no longer request exclusivity around the cages.

Thank you for your comments. We hope that the above clarifies the issues in your letter.

Yours sincerely,

Neil Anthony Sims
V.P. / Res. Dir.

Comments on Kona Blue Water Farms CDUA delivered at May 27 hearing at NELHA
By Noreen Parks

Mahalo for the opportunity to address this hearing today and submit comments for the public record. My name is Noreen Parks. I have lived in Hawaii for 8 years. I am here today as a concerned citizen, as a scuba diver, kayaker, snorkeler, and unabashed lover of marine life. I have a degree in marine biology, and I make my living primarily as a professional science and environmental writer. For the past 13 years the focus of my writing has been marine issues. Land-based aquaculture here at NELHA is one topic I have written about with enthusiasm.

I'd like to begin by quoting the law that applies to the consideration of this CDU permit. The Ocean and Submerged Lands Leasing Act, as amended in 1999, states that:

"The board shall not lease state marine waters unless the board finds that a lease for the proposed activity, after detailed consideration of the present uses, is clearly in the public interest upon consideration of the overall economic, social, and environmental impacts and consistent with other state policy goals and objectives."

Further, the 2002 report to the legislature on implementation of this law, states that it was enacted "to allow potential utilization of Hawaii's ocean resources for research and *sustainable* development of open ocean aquaculture."

The report goes on to state: "Reviews of offshore marine aquaculture projects should employ *the precautionary approach*, adhere to the environmental review requirements of the National Environmental Policy Act, and consider mitigation measures to address adverse impacts on other ocean uses. *A set of special standards related to the impact of offshore aquaculture operations on the natural and human environments should be taken into account in the environmental review process.*"

These governing documents affirm that the state aims to develop "sustainable" aquaculture. But neither the legislation or the report or any other official document, to my knowledge, discusses a definition of "sustainable aquaculture."

The dictionary provides these definitions of "sustain": to hold up, support, supply with sustenance, nourish, to keep up or prolong. From that definition we can see that "sustainable" implies the activities in question can be carried out indefinitely without adverse effects on the environment, economy, and communities. However, I have found no evidence that state officials have considered how open-ocean aquaculture stands to benefit the long-term public interest, or sustain the priceless marine resources that Hawaii residents and visitors enjoy. We know that our unique and irreplaceable offshore waters draw tens of thousands of people annually to recreate in and simply enjoy the exquisite palette of blues and greens that bathe our shores. The waters off most of the Kona-Kohala are designated Class AA, the highest rating for water quality. Hawaii's marine environment and its tourist economy— valued at $10 billion a year by the Department of Business, Economic Development and Tourism—depend crucially on maintaining healthy coastal waters.

With tourism as the lifeblood of the state economy, any proposed activity that threatens it deserves the closest possible scrutiny and monitoring. But, as personnel from the Division of Aquatic Resources and Department of Health have told me, the state does not have in place any guidelines specific to offshore aquaculture: no operations standards, site selection criteria, or *"special standards related to the impact of offshore aquaculture operations on the natural and human environments that should be taken into account in the environmental review process,"* as the report quoted earlier states.

The only existing requirement for water quality monitoring is a quarterly reporting on water quality parameters in connection with the NPDES permit, administered by the Dept. of Health. This is completely inadequate for operations in which mishaps could have serious consequences for the surrounding waters. Furthermore, this function is currently self-regulatory, with the monitoring to be carried out by the fish farm operators or their sub-contractor—a situation that may be beneficial to the operator, but hardly conducive to

independently verifiable environmental monitoring. It results from the fact that there are no funds allotted for the additional environmental monitoring; as the Board knows, not even a fraction of the lease monies from such projects is earmarked for this purpose.

So we must ask: why is this permit application even under consideration at this time? To allow any offshore leases to go forward before a carefully considered regulatory framework is established is to renege on the state's fundamental responsibility to manage Hawaii's natural resources for the public interest.

The question of sustainability goes beyond our coastal waters. Despite claims that mariculture increases world fish supplies, many researchers are concluding that raising carnivorous species such as the finfish the permit applicants propose to raise requires as much as five pounds of wild-caught fish for every one pound of farmed fish. This is according to a 2000 article titled "The Downside of Fish Farming in the prestigious science journal *Nature*. This article by Rosamond Naylor, of Stanford University, and nine other eminent scientists, reviews the findings from close to 100 scientific reports and articles that strongly suggest "aquaculture is a contributing factor to the collapse of fishery stocks worldwide."

According to the authors, catches of anchovies, sardines, herring, and other small pelagic fishes have tripled in the last decade, largely to supply food for farmed fish. Needless to say, these fish caught to feed farmed fish could feed people, or the bigger fish and mammals that depend on them for survival. The authors write: "The use of wild fish to feed farmed fish places direct pressure on fisheries resources. But aquaculture can also diminish wild fisheries indirectly by habitat modification, collection of wild seedstock, food web interactions, introduction of exotic species and pathogens that harm wild fish populations, and nutrient pollution."

Around the world, offshore aquaculture has provoked serious criticism and opposition due to its adverse effects on the environment. From Norway to Chile, British Columbia to Scotland, the Mediterranean Sea to Australia it's been reported that open-ocean fish farms produce huge volumes of wastes that contaminate local waters, drive whales and dolphins from their coastal habitats, and cause alarming declines in wild fish species populations. The Swedish Environmental Protection Agency has declared salmon farming an "environmentally dangerous industry," and the state of Alaska has outlawed it.

Fish cages leak continuous plumes of excess food, fish feces, and disease organisms into the surrounding waters. Scientific reports from British Columbia reveal that operations there annually discharge as much sewage as a city of 500,000. The pollution causes "dead zones" around and beneath the cages, where sewage-fed bacteria suck up most of available oxygen, killing shellfish and other life. Thus mariculture operations have earned a reputation as "floating pig farms," as fisheries expert Dr. Daniel Pauly calls them.

As I continue on the particulars of the Kona Blue Water proposal, I ask you to remember that this is but the first of many projects being proposed for offshore waters, so consider the possibility of a string of similar projects, each with similar, or greater impacts.

The applicants contend that their operation 2,000 feet (about three city blocks off Unualoha Point will be different from those that have proliferated around the world over the last decade. They say that they have more modern technology than operations that started 20 years ago. That may be so, but the volume of offshore aquaculture doubled from 1987 and 1997, and I suspect each new operation likely made the same claim, yet the environmental consequences have escalated. The applicants also claim Hawaii's offshore currents will dilute their fish-farm pollution, thus minimizing environmental damage. In other words, dilution is the solution to pollution.

However, their project EA fails to support this. First, the EA does not include adequate estimates of wastes that would be generated by raising their projected 80,000 ten-pound fish a year. When I asked Dale Sarver about this in April he told me the amount of waste won't be known "until we get out there and set up the cages." The EA does state that it will take 1.5 pounds of food to produce one pound of kahala, but this food conversion ratio is questionable. Perhaps this is Mr. Sarver's experience in the closed-system hatchery, but according to Naylor et al. in the 2002 *Nature* article, the average ratio for a dozen categories of marine finfish is 2.2 pounds of feed for one pound of farmed fish. Adjusting the fish-feed value to a realistic level would