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Doc. No.: 9235E

SEP 21 1990

MEMORANDUM

TO: Dr. Bruce S. Anderson, Acting Director
Office of Environmental Quality Control

FROM: William W. Paty, Chairperson
Board of Land and Natural Resources

SUBJECT: Document for Publication in the OEQC Bulletin - Environmental Assessment for Conservation District Use Application for After-the-Fact Commercial Mooring Use at Kealakekua Bay, South Kona, Hawaii

The above mentioned Chapter 343 Document was reviewed and a negative declaration was declared based upon the environmental assessment provided with the CDUA.

Please feel free to call me or Jay Lembeck of our Office of Conservation and Environmental Affairs, at 548-7837, if you have any questions.

William W. Paty

Attachment

1990-10-08-HA-FEA

AECOS No. 598

AN ENVIRONMENTAL ASSESSMENT FOR A DAY-USE AND STORM REFUGE MOORING IN KEALAKEKUA BAY

Prepared for:

Fair Wind, Inc.
78-7128 Kaleopapa Road
Kailua-Kona, Hawaii 96740

Prepared By:

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April 1990

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Section A. INTRODUCTION

Kealakekua Bay is certainly one of the better known sites in the State of Hawaii, both for its historical significance and for its natural beauty. It was here that an indigenous Hawaiian population and Europeans first made sustained contact when Captain James Cook sailed into the Bay in January 1779. Cook was killed here one month later. A monument to his memory and his exploration of the Hawaiian Islands was erected in 1878 on the small peninsula that now bears his name at the north end of the Bay.

The monument can be reached only by a difficult hike overland, or by jeep trail, or by boat. The majority of visitors to the monument get there by boat. Non-residents of the area may utilize one of several commercial tour companies that operate out of Kailua Bay or Keauhou Bay, located 12 miles and 6 miles respectively north of Cook Point (see Figure 1).

The marine life in many parts of the bay is spectacular. The protected and unpolluted waters support an abundance of fishes, corals, and other invertebrates. In recognition of this marine diversity, the State of Hawaii established the Kealakekua Marine Life Conservation District (MLCD) in 1969 (DLNR Regulation 33). At the time, the only other State MLCD in Hawai'i was at Hanauma Bay on O'ahu.

Commercial activities within Kealakekua Bay began prior to the 1960's. Today, several regular tour vessels visit the vicinity of the Cook Monument offering their customers an opportunity for enjoyment of the scenery and diverse marine life. Although some commercial entities provide only a pass through the area as part of a tour along the Kona coastline, others use Kealakekua as a primary destination. These tours moor within the protected waters of Ka'awaloa Cove (next to the Cook Monument) and provide an opportunity to swim and snorkel, a meal (or snack), and the enjoyment of a day on the water under comfortable and relaxed conditions. Finally, a third type of activity offered commercially is an underwater tour (SCUBA) of one or another part of the bay. There can be little doubt that, from the standpoint of what these tour groups purport to deliver, Kealakekua Bay provides better than any other location along the Kona Coast.

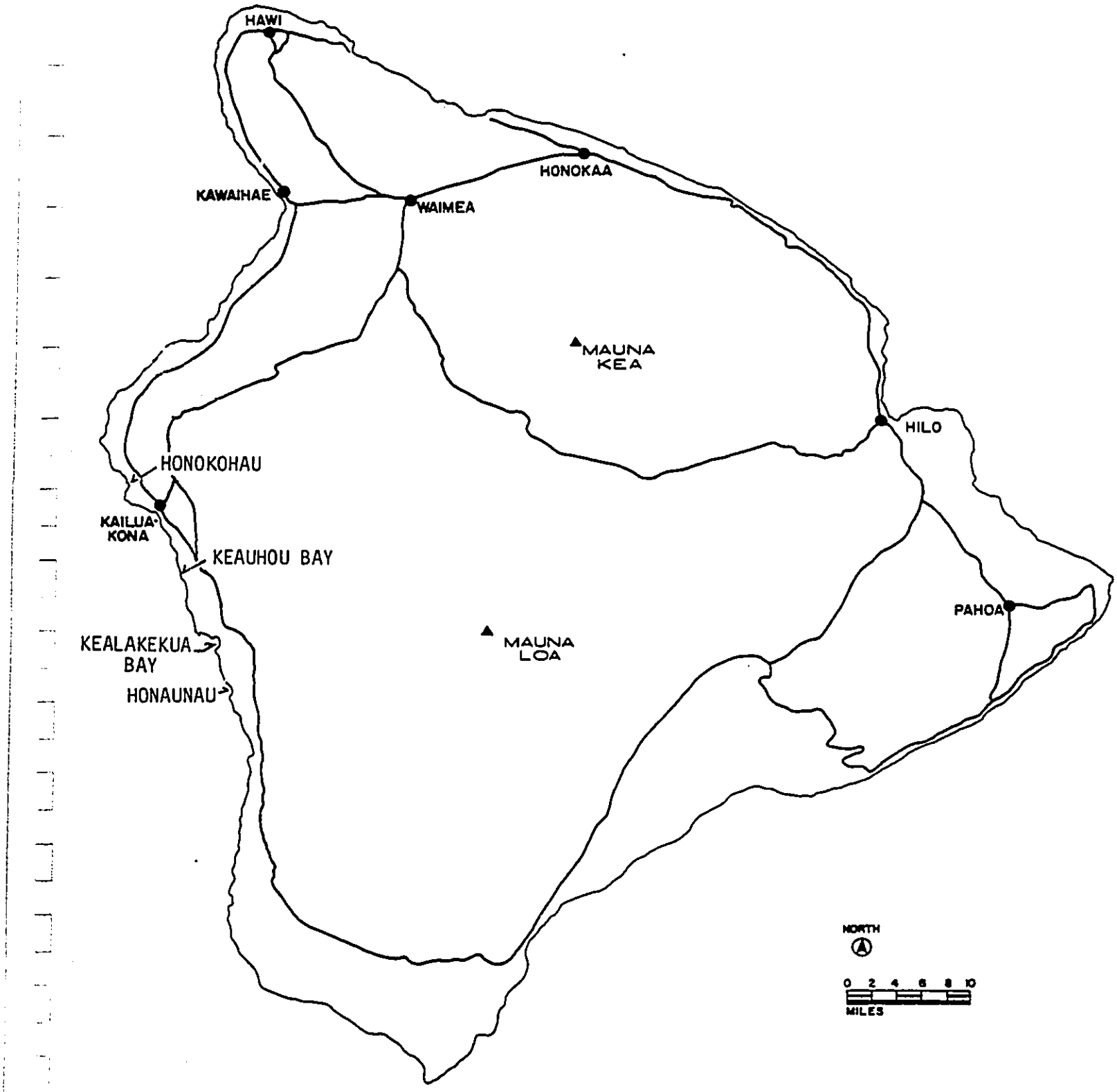

Figure 1. Kealakekua Bay. Location Map, Island of Hawai'i.

Section B. PROJECT DESCRIPTION

B.1 PROPOSED ACTIVITIES

This Environmental Assessment accompanies the Conservation District Use Application (CDUA No. HA-2374) made by Fair Wind, Inc. to continue recreational activity in subzone A of the Kealakekua Bay Marine Life Conservation District (MLCD). The application was submitted to the Department of Land and Natural Resources on April 6, 1990 by Mr. Stanley D. Suyat of Carlsmith, Wichman, Case, Mukai and Ichiki acting as agent for the applicant.

Fair Wind, Inc. proposes to continue to provide visitors to and residents of the Kona Coast the opportunity to swim, snorkel and/or SCUBA dive at Ka'awaloa Cove, Kealakekua Bay. On most days, their vessel, the Ho'okele, makes two trips between Keauhou Bay and Kealakekua. The first cruise leaves Keauhou Bay at around 0830 and returns at 1300 hrs. The afternoon cruise departs shortly thereafter and returns at 1630 hrs. Passenger loads usually vary between 20 and 60 persons each trip, and maximum capacity is 100 persons. Approximately two hours are spent in Ka'awaloa Cove on each visit (usually 2.5 hours during the morning cruise and 1.5 hours during the afternoon cruise). Passengers are given an opportunity to swim and snorkel around the Ho'okele, are provided a meal (lunch) or snack, and are then returned to Keauhou Bay. Organized SCUBA dives are also offered on occasion.

Establishment of a permanent mooring at the dive location is deemed a requirement of the Fair Wind, Inc. proposal. The proposed mooring would replace an existing mooring and would be located and attached to the bottom in a manner that is consistent with preservation of the marine resources protected by the MLCD status of the area. Small craft, under most sea conditions, can visit Ka'awaloa Cove and can conduct commercial tours of the area without mooring or anchoring in the cove. The Fair Wind, Inc. operation requires a mooring because of the larger size of it's vessel, the Ho'okele. Thus, denial of a mooring would not eliminate commercial tours in the area. It would, however, limit the kinds of tours offered and the kinds of visitors likely to utilize the offerings. In general, young children, families with children, older persons, and handicapped persons would tend to be excluded access to the site if no moorings are provided.

A mooring also would provide an important refuge during occasional periods of adverse seas. The existing mooring is used by several boats from the Keauhou area when high seas threaten this coast. Only Honokohau Harbor (and Kailua Bay to a lesser

extent) provides similar shelter during severe storms, and the harbor entrance frequently closes out before all boats can be accommodated. The mooring is important in this respect because the use of boat anchors is not permitted in the MLCD. Anchoring is discouraged because of the known damage to coral growth that results from boat anchors.

B.2 MOORING SITE STATUS

On October 13, 1989, the Board of Land and Natural Resources voted to curtail mooring activity within the Kealakekua Bay Marine Life Conservation District (MLCD). The reasons for this action derive from concerns that commercial activities within the MLCD might have an adverse impact on the marine environment. The action was deemed appropriate because the inner part of the bay is designated as both a Marine Life Conservation District and a State Underwater Park.

The specific action taken was to require all owners to remove their moorings within a grace period of 8 months (by June 1990). The Board stated that individual appeals for reinstatement could be made through the Conservation District Use Application (CDUA) process. Although some moorings predate the MLCD designation made in 1969, all moorings were subject to the removal order.

This Environmental Assessment pertains to the mooring originally established in 1963 by George Thomas and Jack Ross, and used jointly with Fair Wind, Inc. The mooring is located in Ka'awaloa Cove (Figure 2), within subzone A of the MLCD. At the present time the mooring is used regularly during daylight hours by Fair Wind, Inc. for the vessel, Ho'okele, which operates out of Keauhou Bay conducting once or twice daily commercial tours centered on a marine experience at Kealakekua Bay. However, the impact of this operation can not be viewed in isolation, and therefore this assessment addresses, in some sections, the activities of other entities.

B.3 DESCRIPTION OF EXISTING ACTIVITIES

For the purpose of preparing this assessment, the site was visited on March 13, 1990 in a small boat out of Keauhou Bay. Julio Libero of Fair Wind, Inc. served as guide. The purpose of the visit was two-fold. First, a marine biological survey was conducted to characterize the marine environment within the project site (see Section C). Second, observations on use patterns and practices as they relate to the existing moorings were made. Together, these observations allow for an assessment of the

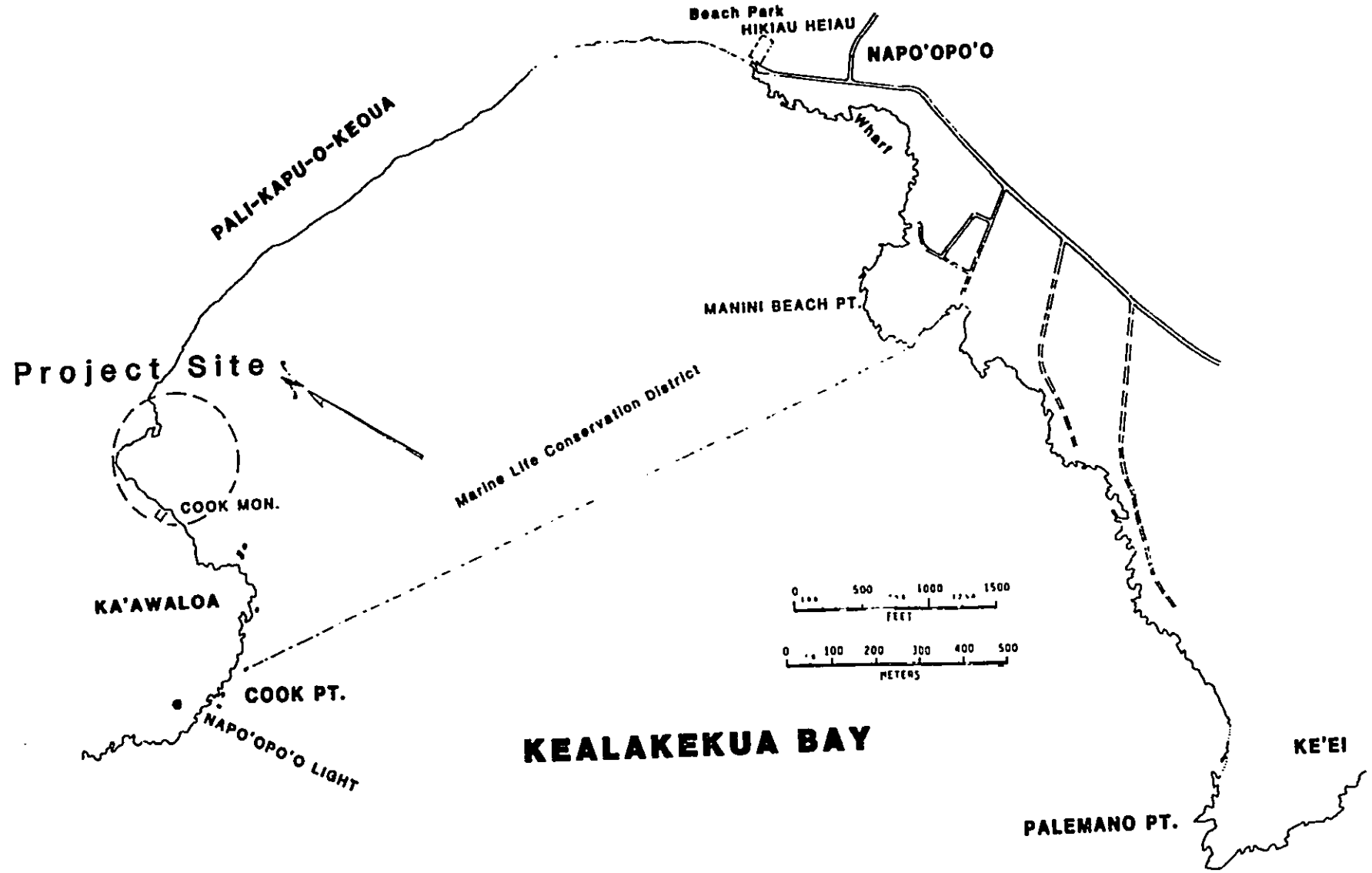

Figure 2. Project site map showing the inner portion of Kealakekua Bay and place names mentioned in text.

impact of present activities and of the Fair Wind, Inc. application to DLNR. Although visited on a Tuesday between the hours of 0900 and 1300, use of the site was judged to be fairly typical. Rough seas outside of Kealakekua Bay on this date resulted in one or two commercial dive tours that normally might not utilize Kealakekua Bay to come to Ka'awaloa Cove. On the other hand, being a week day, somewhat less non-commercial use of the area occurred than would be the case for a weekend.

No other boats were in the area prior to 0930 AM. Beginning at around 0930 the Sea Paradise (Sea Paradise, Inc.) arrived with 12 to 15 persons on a commercial SCUBA dive. The Sea Paradise moored to the Fair Wind, Inc., float and the divers entered the water. At about 1000 the Party Boat (owner unknown) arrived with approximately 30 passengers, and tied a bow mooring to a cable around a rock (See Section B.3) and set a stern anchor in the boulder talus near the shore. A majority of the passengers participated in swimming and snorkeling around the vessel. Although no SCUBA divers were noted, this commercial operation does offer SCUBA tours. Shortly thereafter, the Ho'okele (Fair Wind, Inc.) arrived with approximately 40 passengers. The Sea Paradise had by now moved away from the area (the SCUBA divers were picked up south of Cook Point as intended) and the Ho'okele attached to the Fair Wind, Inc. float and with a stern line attached to a cable wrapped around several boulders at the shore.

Not long after the Ho'okele moored, the Capt. Cook VII (Hawaiian Cruises, Ltd.) with 60 or more passengers arrived. This vessel, the largest of the commercial tour boats to moor in the Bay, attached a bowline to the rock also being utilized by the Party Boat and a stern line to the Hawaiian Cruises, Ltd. float. A few of these passengers swam in the water around the vessel. A short time later a Captain Zodiac tour arrived with 11 passengers. This smaller, inflatable boat laid off in the area between the Ho'okele and the Cook Monument. Passengers swam and snorkeled around the craft. Lunch was served aboard the Party Boat, the Ho'okele, and presumably the Capt. Cook VII.

At 1118 AM the Tamure (Capt. Bean's Cruises) arrived. This very large vessel belonging to Roberts Hawaii, Inc. passed by the area and continued towards Napo'opo'o and the south part of the Bay (the Tamure was out of the area by 1122). At about the same time the Capt. Cook VII departed. A small, private runabout with four persons arrived and attached to the Capt. Cook, Inc. float. The occupants ate lunch but did not enter the water. Over the next hour, the Party Boat and the Capt. Zodiac boat departed. By 1200 hrs, the Ho'okele had departed, leaving no boats in the area. At around 1300, two game-fishing vessels arrived, presumably to allow the occupants some rest and relaxation after a mourning at sea. One attached to the Fair Wind, Inc. float as

we departed the area. The other laid off between the float and the dock, and may have eventiually also used the mooring.

A brief additional period of observation was made on April 12 (a Thursday) from the Napo'opo'o shore. As of 10 AM on that date, only three boats were in Ka'awaloa Cove: Ho'okele, Party Boat, and Captain Zodiac. Capt. Cook VII arrived around 1045, by which time Captain Zodiac had moved out of the cove to the middle of the bay off Napo'opo'o Beach. Observations were discontinued at 1100 hrs.

It is to be noted that during the little more than 4 hours of observation on March 13, the Fair Wind, Inc. mooring was utilized by three different vessels, only one of which was owned by Fair Wind, Inc. The Hawaiian Cruises, Ltd. mooring was used by two vessels (three, if the mooring chain on the rock is included), only one of which was associated with Hawaiian Cruises. No conflicts occurred. The period of use of the moorings by each vessel was quite variable, but not continuous during the observation period for any one vessel. Although a considerable number of visitors (perhaps 150 or more) were accommodated on the several cruises which moored in the area during the morning, for nearly half of the elapsed observation time, no one was in the area (except our survey group). Presumably, the pattern of use as observed, would repeat during the afternoon hours. This would certainly be the case during the peak of the visitor season when all the commercial outfits would hope to conduct two tours each day.

Section C. ENVIRONMENTAL SETTING

C.1 KEALAKEKUA BAY

Kealakekua Bay, located in the South Kona District of the Island of Hawai'i (Figure 1), can be defined as that broad embayment between Keawekaheka Point and Palemano Point (Figure 2), a distance of about 2 miles. The sheltered portion of this embayment lies between Cook Point (Ka'awaloa) and Manini Beach Point (sometimes referred to as Wai'ama'u). All of this inner portion is included within the Kealakekua Bay Marine Life Conservation District described in Section D. The inner bay comprises an area of some 127 hectares (315 acres) in extent with an opening 1630 meters (5340 feet) or about one mile across. The north side of this inner Bay is boulder talus lying at the base of a sheer cliff known as Pali-kapu-o-Keoua (or Pali-o-Manuahi). This cliff is a fault scarp where that portion of Mauna Loa to the south has dropped relative to the portion of the mountain to the north (Macdonald and Abbott, 1970). Much of the remainder of the Kealakekua Bay shoreline (including Cook Point) consists of low lava shelves. However, at Napo'opo'o and at Ke'ei, sand beaches occur along the shore. The most protected waters are found in the northwest corner off the Cook Monument (Ka'awaloa Cove), although all of the inner bay is sheltered to some extent.

C.2 BIOLOGICAL SETTING

C.2.1 Marine Resources in Northern Kealakekua Bay

The densest coral growth (highest cover) within Kealakekua Bay occurs in the northern part (MLCD Subzone A) covering a shelf which extends out from the shore. A large portion of the bay has a sandy bottom (Figure 3). In a survey of the MLCD conducted by DLNR (1970) it was noted that at least 17 different kinds of coral are found in Kealakekua Bay. Some are rare or inconspicuous, while others are very showy and occur in great abundance. Kimmerer and Durbin (1975) surveyed the north part of Kealakekua Bay by conducting numerous transects all along the north reef between the Cook Monument and Napo'opo'o Beach. These authors divided the benthic or bottom environment into three subzones or habitats as shown in Figure 2: an inshore zone, a mid-reef zone, and an outer reef zone. A physical description of the zones is given thusly:

> All three habitats at Kealakekua Bay are narrow..., especially the inshore habitat, which all but disappears at some points along the shore. The outer reef area slopes very steeply, as much as 45 degrees in

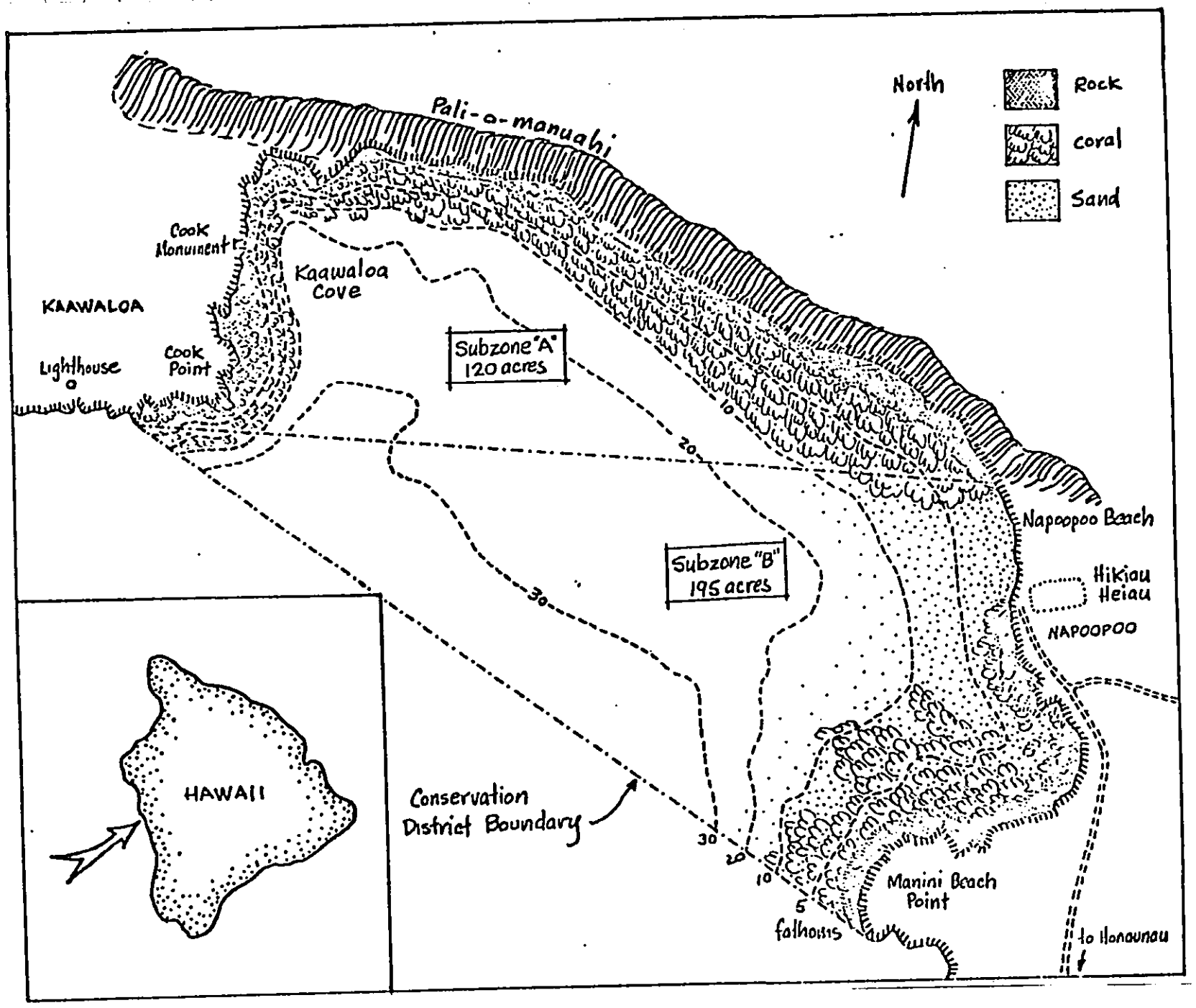

Figure 3. Department of Land and Natural Resources map of Kealakekua Bay (from DLNR, 1970).

places, down to about 33 m [108 feet], at which point there is a fairly abrupt transition to sandy bottom.

The area below Pali-kapu-o-Keoua can be affected by swells from the open sea, and the surging currents created when the swells wash on and off the rocky shore may cause the waters to become turbid (DLNR, 1970). During calm days, however, this area is suitable for snorkeling and SCUBA diving and offers a scenery of large boulders covered by an encrusting type of coral and an abundance of fishes. From shore, the bottom slopes gradually for a distance of about 50 feet with depths averaging about 15 to 20 feet, then drops off more steeply. In this area, a dense cover of coral growth extends down the slope to sand bottom at depths between 50 and 70 feet. The shelf narrows to the northwest and the frontal slope becomes steeper. A description of the marine biota in Ka'awaloa Cove is presented in greater detail in Section C.1.3 below.

C.2.2 Marine Resources in Southern Kealakekua Bay

Subzone B of the MLCD includes the nearshore environment between Napo'opo'o Beach and Manini Beach Point (Figure 3). The bottom topography within this subzone differs from that of Subzone A in that shallow water areas are more extensive, extend for greater distances from shore, and include vast areas of sand patches and sand channels. In terms of snorkeling and viewing, the flat sand bottoms have less to offer than the hard bottom and coral encrusted reefs of Subzone A (DLNR, 1975). The DLNR report goes on to describe the best underwater viewing opportunities within the south part of the MLCD:

> The rock and coral bottomed area extending from Napoopoo Landing to the southern tip of Manini Beach Point is recommended as being the most interesting in Subzone B. This area features lava formations encrusted with coral, and small caves, deep crevices and steep ledges (sic) that present a spectacular environment for the colorful reef animals. Snorkel and SCUBA divers should be aware of high surf that may build up and break along the northern side of Manini Beach Point. When these breakers occur, the water is usually cloudy and diving will not be satisfactory. Access to this area is best accomplished by boat, but an old boat landing on the north side of Manini Beach Point can also be used for entry into and exit from the area.
>
> For persons wishing to make a short snorkeling dive, the area between the Hikiau Heiau and the Napoopoo landing site is recommended. A surprisingly

abundant population of fishes occur within the narrow strip of coral encrusted lava along this shoreline.

Less survey work has been undertaken in the southern portion of the bay. However, descriptions of the nearshore bottom and biota appear in a report by Madden (1980) for areas off Napo'opo'o Landing, Manini Beach, and Ke'ei Beach (the east to south shore of Kealakekua Bay). The area off Napo'opo'o Wharf was described as a "... largely unconsolidated limestone bottom...[which] slopes gradually seaward. A few sand pockets occur. Few corals occur on the shallow bottom although coral growth increases with depth. However, approximately one-half of the coral growth ....is dead." Off Manini Beach, the bottom is predominantly basalt with limestone outcrops. Beginning 18 meters (60 feet) offshore the bottom becomes more complex with increasing coral cover (around 15%) which reaches 75% cover some 50 meters (150 feet) from shore. The area off Ke'ei Beach was described as "... composed of limestone rubble and cobbles, covered with coralline algae [mostly Porolithon gardineri]...Surge and wave action scours the nearshore area". However, coral cover increases to 80% cover some 25 meters (75 feet) from shore where Porites lobata is the most common species.

C.2.3 Ka'awaloa Cove

The following description is taken from DLNR (1970, p. 4):

> The nearshore waters of Kaawaloa Cove in the vicinity of Cook's Monument offers the best snorkeling and SCUBA diving within Subzone A and perhaps in the entire conservation district. Waters are usually calm and clear, and there occurs an abundance of marine organisms for viewing. This area is suitable for all classes of divers from the inexperienced or beginning diver to the more experienced, and it is an excellent area for underwater photography. Directly off the monument, the bottom drops rapidly to depths exceeding 100 feet, but along the shore and off to either side, a shallow shelf extends out from shore for about 30 feet before the steep incline begins. Access to this site presents the major problem as it can be reached [easily] only by boat.

ORCA/DPC (1981) surveyed the marine bottom off the Cook Monument, providing the following description:

> The reef slope community... has a unique assemblage of hard coral species which differs considerably from the typical low surge, deep water community...[usual found in open

coastal locations]. Coral cover varies from less than 5% to up to 100%, with some portions of the slope consisting of barren limestone talus. However, in some places, almost the entire bottom area below a depth of 75' [23 m] to the sand floor is covered with large, plate-like sheets of Porites (Synaraea) convexa, with occasional Psammocora verrilli and Pavona varians. Porites compressa and Porites lobata are generally more common above -60' [-18 m]. There are also large colonies of Pavona duerdini and some huge colonies of Porites lobata (Jim Maragos, pers. comm.).

For this environmental assessment, a survey of the biota in Ka'awaloa Cove was conducted by Eric Guinther and Dr. Richard Brock on March 13, 1990. Using a standardized method of transecting the bottom to obtain quantitative data on the benthic biota and fishes, Dr. Brock produced the following description of the project site biota; it encompasses the nearshore region from the shore, seaward to the 30 meter (100 foot) isobath in the northwestern corner of Kealakekua Bay. A detailed description of the survey methods is presented in Appendix A of this document.

The qualitative reconnaissance to define major biotopes in the vicinity of the existing mooring site extended from shore to the 30 meter isobath about 150 m offshore in Ka'awaloa Cove. In total approximately 2.1 ha. (5.2 acres) were surveyed in this effort and three biotopes were recognized. The physical extent of each is shown in Figure 4. It should be noted that the boundaries of each zone are not sharp but rather grade from one to another; these are ecotones or zones of transition. Biotopes were delimited by physical characteristics including water depth, relative exposure to wave and current action, and the major structural components present in the benthic communities. The latter include the amount of sand, hard substratum, and vertical relief present as well as the biological attributes of relative coral coverage, fish abundance, and dominant species of the coral community. Biotopes were named for the distinctive features.

The biotope of sand occurs in the deeper, more offshore reaches of this study; it probably extends seaward and over much of Kealakekua Bay. The biotope of sand was encountered seaward of a steep coral and rubble slope in waters of at least 25 m in depth and continues seaward from that depth. Typical of most sand bottom communities, few fishes and macroinvertebrates are commonly met with in this habitat; transient species such as rays (family Dasyatidae), uku (Aprion virescens), opelu (Decapterus macarellus) and weke pueo (Upeneus arge) are occasionally seen. Macroinvertebrates commonly seen include the kona crab (Rania rania), leopard cone (Conus leopardus), small augers (family Terebridae), sea cucumbers (Holothuria atra and Bohadschia vitiensis), and during the summer months, the helmet shell (Cassius

cornuta). Station 1 was established in the biotope of sand and sampled the communities in this zone.

The biotope of Porites compressa occurs as a band in the study area and parallels the shoreline. The seaward boundary of this biotope is the steep slope which descends into the biotope of sand. The shoreward side of the biotope of Porites compressa is in water about 10 m (30 feet) deep (about 50 m offshore) where the zone grades into the biotope of diverse coral cover. The biotope of Porites compressa is dominated by the finger coral, Porites compressa. Coral cover may, on scales of tens of square meters, exceed 75 percent. Species commonly encountered include Porites compressa, P. lobata, Pavona varians, Montipora verrucosa, M. patula and M. flabellata. Considerable cover afforded by corals provides habitat for many fish species; this zone is common along the West Hawaii coast and it is not unusual to see 50 fish species in this habitat. The high coral cover makes the assessment of invertebrates difficult. Diurnally exposed macroinvertebrates include sea urchins (Tripneustes gratilla, Echinometra mathaei, Echinothrix diadema, and Heterocentrotus mammillatus. Two stations (Numbers 2 and 3) sampled the communities present in the biotope of Porites compressa.

In the study area, the biotope of diverse high coral cover occurs in a band from the emergent basalt bench at the shoreline to a depth of about 10 m (30 feet), approximately 50 to 70 m offshore. This biotope is dominated by a diverse assemblage of corals including Porites lobata, P. compressa, P. evermanni, Pavona varians, Montipora verrucosa, M. flabellata, M. patula, Pocillopora meandrina and a number of less common species. Coral coverage may attain 100 percent over small areas. As with the preceding biotope, numerous fish species may be seen but exposed macroinvertebrates are rare. Two stations (Numbers 4 and 5) sampled this biotope; the existing Fair Wind, Inc. mooring is located in this biotope.

C.2.3.1 The Biotope of Sand

As noted above the biotope of sand occurs at depths below 25 m about 140 m from the shore in Kaawaloa Cove. The location of this station is given in Figure 3. Because of bottom time limitations, only one quantitative station (Station 1) was established to sample this biotope. Station 1 was located in the biotope of sand about 30 m seaward of the steep slope at a depth of 29 to 31 m and paralleling the shoreline. About 20 m seaward of Station 1 the sand appeared to precipitously drop off into deeper water. Thus Station 1 was established on a "shelf" of sand about 50 m in width.

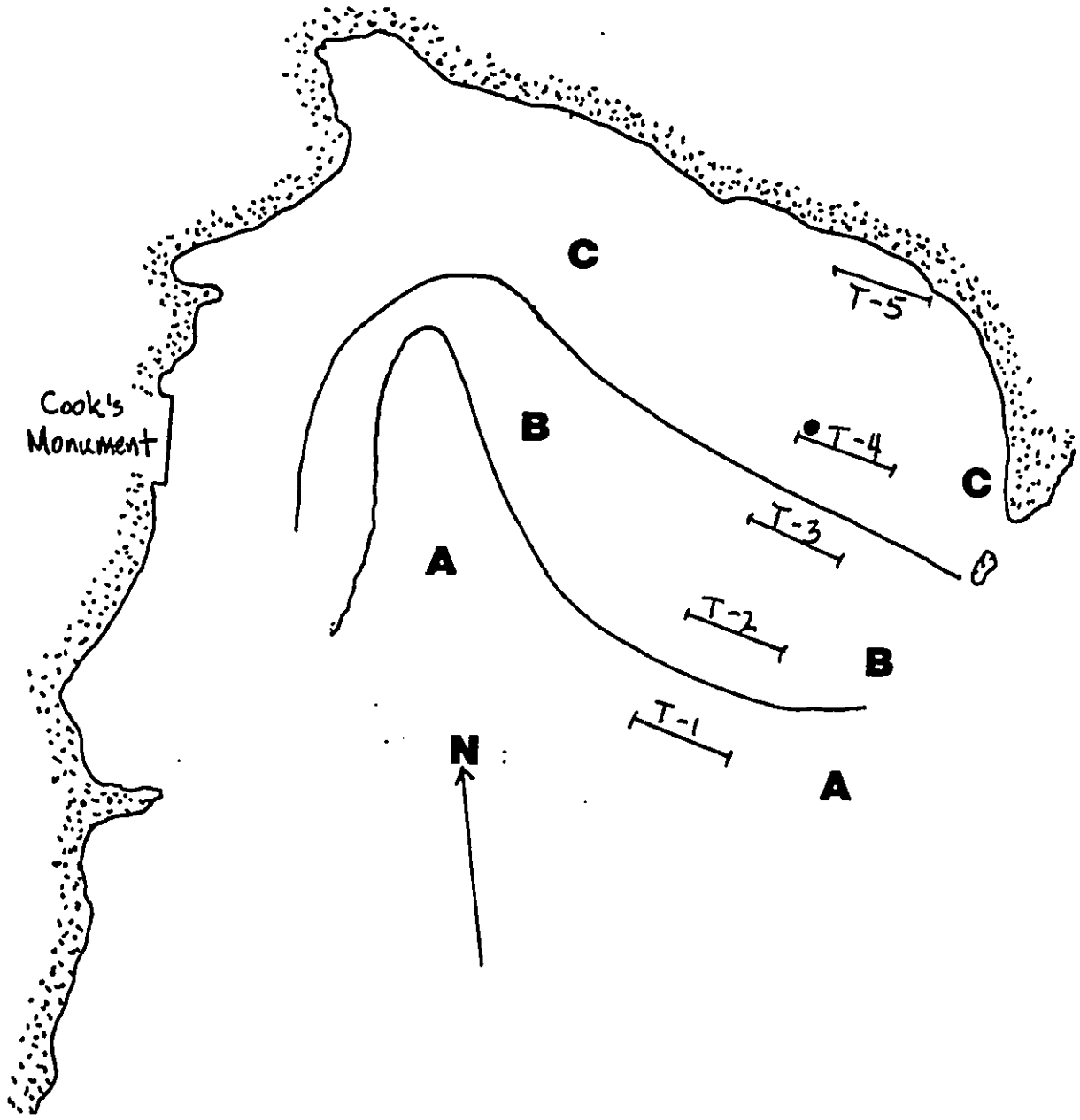

Figure 4. Map of Ka'awaloa Cove in the northwest corner of Kealakekua Bay, showing the three biotopes identified in the 1990 study (solid lines) as well as the approximate locations of the permanent mooring and five quantitative stations established to sample marine communities (T-1 through T-5). The shoreline is stippled. The biotopes are lettered: A = the biotope of sand, B = the biotope of Porites compressa and C = the biotope of diverse high coral cover. Not to scale.

Table 1. Summary of the 13 March 1990 benthic survey conducted at Station 1 approximately 120 m from shore in the northwest corner of Kealakekua Bay, in the biotope of sand. Results of the 6m^2 quadrat sampling of the penthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A summary of the fish census is given in Part D. Water depth 29-31 meters; mean coral coverage is 0 percent (quadrat method).

A. Quadrat Survey

	Quadrat Number					
Species	0m	5m	10m	15m	20m	25m
Sand	100	100	100	100	100	100

B. 50-Point Analysis

Species	percent of the Total
Sand	100

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Conus pulicarius	1
Phylum Echinodermata	
Bohadschia vitiensis	1

D. Fish Census (4 x 25m)

7 Species
15 Individuals

The results of the quantitative survey at Station 1 is presented in Table 1. No corals were encountered in the 100 m^2 survey area and the substratum is sand. The invertebrate census noted two species, a single flea cone (Conus pulicarius) and a sea cucumber, Bohadschia vitiensis. In total seven fish species (15 individuals) were censused; the most abundant fishes were four weke (Mulloides flavolineatus) and three small gobies (Psilogobius sp.). The results of the fish census are presented in Appendix B. In the vicinity of Station 1 were seen the sea star (Luidia sp.), sea cucumber (Holothuria atra), augers (Terebra maculata and Terebra crenulata), leopard cone (Conus leopardus), 'ulae (Saurida flamma), opelu (Decapterus macarellus) and kahala (Seriola dumerili).

C.2.3.2 The Biotope of Porites compressa

Approximately 30 m shoreward of Station 1 the biotope of Porites compressa commences. The division between the biotopes of sand and Porites compressa is at the base of the steep slope which rises from the sand at 25 m about 100 m from shore; the biotope of Porites compressa continues shoreward to within 50 to 70 m of the shore in 10 m of water in Kaawaloa Cove. Thus this biotope which is a common feature along the West Hawaii coast at similar depths and wave exposures, occurs as a band paralleling the shoreline. As the name implies, the biotope of Porites compressa is dominated by the coral, Porites compressa. Two stations (Numbers 2 and 3) sampled the biota in this biotope.

Station 2 was located about 90 m from shore at a depth of 16.8 to 18 m along the steep slope shoreward of Station 1 (see Figure 4). The substratum at Station 2 is comprised of rubble and live corals. The dominant coral species is Porites compressa but Pavona varians is also abundant. A summary of the benthic survey carried out at Station 2 is presented in Table 2. Six coral species were noted in the quadrat survey having a mean coverage of 85 percent. A rather uncommon species, Porites (synaraea) convexa, was present in the quadrats. The invertebrate census noted three species; most common was the slate-pencil sea urchin, Heterocentrotus mammillatus. The census of fish found 28 species (157 individuals) which are detailed in Appendix B. The most abundant fishes were the kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), damselfish (Chromis agilis) and the taape (Lutjanus kasmira). In the vicinity of Station 2 were seen the corals (Montipora patula and Pavona duerdini), cowry (Cypraea maculifera), a juvenile ula'papa or slipper lobster (Paribaccus antarcticus), palukaluka (Scarus rubroviolaceus), cornetfish (Fistularia commersoni) and sharpback puffer (Canthigaster jactator).

Table 2. Summary of the benthic survey conducted at Station 2 approximately 90 m from shore in Ka'awaloa Cove on a steep slope in the biotope of Porites compressa. Results of the 6 m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A summary of the fish census is given in Part D. Water depth 16.8-18 meters; mean coral coverage is 84.9 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Corals						
Porites lobata	4	3	2	3	31	9
P. compressa	62	61	6	5	22	63
P. (synaraea) convexa		3				7
Pavona varians	34	17	61	42	47	21
Montipora verrucosa		6				
Fungia scutaria			.25			
Rubble		10	30.75	50		

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	1
P. compressa	58
Pavona varians	14
Montipora flabellata	1
M. verrucosa	2
Rubble	24

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Echinodermata	
Echinothrix diadema	1
Tripneustes gratilla	3
Heterocentrotus mammillatus	12

D. Fish Census (4 x 25m)

28 Species
157 Individuals

Table 3. Summary of the benthic survey conducted at Station 3 some 75 m from shore in Ka'awaloa Cove biotope of *Porites compressa*. Results of the 6 m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A summary of the fish census is given in Part D. Water depth 10.6-12.2 meters; mean coral coverage is 100 percent (quadrat method).

A. Quadrat Survey

	Quadrat Number					
Species	0m	5m	10m	15m	20m	25m
Corals						
Porites lobata			30	2	2	26
P. compressa	29	64	51	75	84	36
P. (synaraea) convexa	34	14				
P. evermanni					3	2
Pocillopora meandrina	3		3	1	2	3
Pavona varians	26	15	6	19	3	33
Montipora verrucosa	2		31			
M. patula	6		9		6	
M. flabellata		7		3		

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	12
P. compressa	46
P. evermanni	1
Montipora verrucosa	14
M. patula	5
Pavona varians	21
P. duerdini	1

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Arthropoda	
Dardanus sp. (juv.)	1
Phylum Echinodermata	
Heterocentrotus mammillatus	43
Echinometra mathaei	3
Tripneustes gratilla	2

D. Fish Census (4 x 25m)

22 Species
151 Individuals

Station 3 was established shoreward of the steep slope in about 10 to 12 m of water approximately 75 m from shore in Ka'awaloa Cove (Figure 4). The substratum at this station is a mix of coral species; most common is Porites compressa. These corals form small mounds 2 to 4 m in greatest diameter spaced from 1 to 8 m apart. The area between mounds is filled with numerous corals; this mosaic of corals results in a near-continuous coverage of the substratum. The results of the quantitative survey carried out at Station 3 is presented in Table 3. Nine coral species were noted in the quadrat survey. These corals have an estimated coverage of 100 percent. Corals contributing the most to the local cover include Porites compressa, Porites lobata and Pavona varians. The invertebrate census noted four species; one juvenile hermit crab and three echinoderm species. The most common macroinvertebrate species present was the slate-pencil sea urchin (Heterocentrotus mammillatus). Twenty-two fish species (151 individuals) were encountered in the 4 x 25m census area (Appendix B); the most abundant were the kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), damselfish (Chromis agilis) and mamo (Abudefduf abdominalis). In the vicinity of Station 3 were seen sea cucumber (Actinopyge mauritana), banded shrimp (Stenopus hispidus), algae or limu (Valonia ventricosa), nenue (Kyphosus bigibbus), puhi'oni'o (Gymnothorax meleagris), 'o'ili'lepa (Cantherhines sandwichiensis) and palani (Acanthurus dussumieri).

C.2.3.3 The Biotope of Diverse High Coral Cover

The biotope of diverse high coral cover occurs as a band paralleling the shore to about a 10m depth approximately 50 to 70 m offshore in the northwest corner of Kealakekua Bay. Near the emergent lava bench, the coral is less well developed than further offshore; this may be related to the obvious input of ground water at the shoreline. Adjacent to the shore are basalt boulders and pahoehoe relatively free of corals; this hard substratum is dominated by coralline algae (Porolithon spp.) and an array of microalgal species. Corals are the dominant visual feature throughout the entire biotope; there are at least ten species present and local cover varies from just a few percent to full (100%) coverage. Numerous fishes are present in this setting that affords considerable cover. Two stations (Numbers 4 and 5) sampled the communities in this biotope.

Station 4 was established approximately 40 m from and paralleling the shoreline. The station commenced adjacent to the mooring thus sampling the benthic community at that location. Water depth at Station 4 was 6 m. The substratum at this station is comprised of live corals and small open areas of coral rubble. Coral rubble patches range from 1 x 1 m to 4 x 5 m in dimensions

and are spaced from 3 to 30 m apart. Between these rubble depressions are low mounds of corals; dominant coral species include Porites lobata, P. compressa and Pavona varians.

Table 4 presents the results of the quantitative survey of the benthos made at Station 4. Eight coral species were encountered in the quadrat survey and the mean coverage was estimated to be about 70 percent. The macroinvertebrate census noted four echinoderm species; most abundant was the slate-pencil sea urchin (Heterocentrotus mammillatus) and the black sea urchin (Tripneustes gratilla). Twenty-nine species of fishes (260 individuals) were censused in the 100 m^2 area (Appendix B). Abundant fish species included the kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), hinalea lauwili (Thalassoma duperrey), taape (Lutjanus kasmira), damselfish (Chromis agilis) and mamo (Abudefduf abdominalis). In the vicinity of Station 4 were seen the coral (Fungia scutaria), swimming crab (Charbydis erythrodactyla), cone shell (Conus miles), wana (Echinothrix diadema), kikakapu (Chaetodon auriga), sharpback puffer (Canthigaster jactator), palukaluka (Scarus rubroviolaceus) and a kahala (Seriola dumerili) estimated at 10 kg.

The obvious visual impact of the present mooring were the anchors and chain; the mooring is situated in an open area of coral rubble (about 5 to 8m in diameter) surrounded by live corals. In the vicinity of the mooring were numerous fishes probably due to the presence of a tour vessel tied up and occasional feeding of the fishes. The feeding appeared to cause an aggregation primarily of four species: approximately 235 humuhumu'ele'ele (Melichthys niger), 48 nenue (Kyphosus bigibbus), 77 taape (Lutjanus kasmira) and 188 mamo (Abudefduf abdominalis). Other species more loosely associated with the feeding aggregation included several cornetfishes (Fistularia commersoni), lau wiliwili (Chaetodon miliaris), humuhumu hi'ukole (Melichthys vidua) and aholehole (Kuhlia sandvicensis).

Station 5 was established between 5 to 10 m offshore of the rock beach in water between 1.8 and 3 m in depth (Figure 4). The substratum at this station is comprised of basalt boulders (up to 3 m in greatest dimensions) sand and smaller rocks. Sand occurs as patches 1 to 15 m in length, 2 to 8 m in width and spaced from 1 to 20 m apart. Northwest of this station (towards the Cook Monument) the substratum becomes pahoehoe with scattered basalt rocks and boulders spread across it. The input of ground water emanating from the shore in Ka'awaloa Cove is evident throughout the entire inshore area as a lens of cooler, less saline surface water.

Table 5 presents the results of the benthic survey carried out at Station 5. Nine species of corals were encountered in the

Table 4. Summary of the benthic survey conducted at Station 4 approximately 40 m from shore in Ka'awaloa Cove in the biotope of diverse coral cover. Results of the 6 m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 6.1 m; mean coral coverage is 69.4 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Corals						
Porites lobata		13			15	21
P. compressa	1	2		92	83	23
P. (synaraea) convexa	2		2			
P. evermanni						49
Pavona varians	28	39	16	8		7
Pocillopora meandrina		2.5	2		2	
Leptastrea purpurea	0.1					
Montipora patula			9			
Rubble	68.9	43.5	26			
Hard Substratum			45			

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	9
P. compressa	29
P. evermanni	2
Pavona varians	12
Cyphastrea ocellina	1
Montipora flabellata	2
M. verrucosa	6
Rubble	21
Hard Substratum	18

C. Invertebrate Census (4 x 25 m)

Species	Number
Phylum Echinodermata	
Tripneustes gratilla	17
Heterocentrotus mammillatus	27
Echinothrix calamaris	1
Echinometra mathaei	8

Table 4. Continued.

D. Fish Census (4 x 25 m)

29 Species
260 Individuals

quadrat survey having a mean estimated coverage of 17 percent. Coral species making the greatest contribution to this coverage include Porites lobata, P. compressa, P. (synaraea) convexa, and Pavona varians. Four macroinvertebrate species were censused in the 4 x 25 m area; these were all echinoderms and the most abundant were the green spine sea urchin (Echinometra mathaei) and the slate-pencil sea urchin (Heterocentrotus mammillatus). Twenty-seven fish species (276 individuals) were noted in the census area (Appendix B). The most common fishes include the kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), humuhumu'ele'ele (Melichthys niger), aholehole (Kuhlia sandvicensis) and umaumalei (Naso literatus). In the vicinity of Station 5 were seen corals (Montipora patula and Pavona duerdini), cone shell (Conus lividus), 'ula or spiny lobster (Panulirus penicillatus), 'o'opuhue (Arothron meleagris), 'api (Acanthurus guttatus), sharpback puffer (Canthigaster amboiensis), kikakapu (Chaetodon lineolatus), cornetfish (Fistularia commersoni) and ala'ihi (Adioryx lacteoguttatus).

The large number of fishes encountered at Station 5 are probably related to (1) the tour boats feeding of fishes that was noted at the time of censusing, and (2) the high cover afforded by the adjacent lava rock shoreline that drops into about 1.5 m (5 feet) of water.

C.2.3.4 Biological Summary

This study was conducted in Ka'awaloa Cove, a location protected from surf and storm waves much of the time. Storm surf coming out of the southeast through east to northwest quadrants would probably not impact this corner of the bay. Coral community development and succession in Hawaiian waters are largely controlled by physical disturbance (Grigg and Maragos 1974). Thus reefs that are exposed to occasional storm surf usually harbor fewer corals (less coverage) than do reefs of the same age and substratum characteristics in more protected areas. Many of the Hawaiian corals grow slowly, hence storm surf does not have to impact a coral community with a frequency much greater than

Table 5. Summary of the benthic survey conducted at Station 5 5 to 10 m from shore in Ka'awaloa Cove. Results of the 6 m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B; counts of invertebrates are in Part C; and a summary of the fish census is given in Part D. Water depth 1.8-3 m; mean coral coverage is 16.7 percent (quadrat method).

A. Quadrat Survey

	Quadrat Number					
Species	0m	5m	10m	15m	20m	25m
Corals						
Porites lobata	3	12		0.5	1.5	
P. compressa		9	2			
P. (synaraea) convexa		12				
P. evermanni			8			
Pocillopora meandrina		4.5		2.5	2	1.5
Pavona varians				4	2	21
Montipora verrucosa	4		1	3		4
Cyphastrea ocellina	0.75					
Leptastrea purpurea		2				
Sand	86.25		70			
Hard Substratum	6	60.5	19	90	94.5	73.5

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	6
P. evermanni	2
P. compressa	2
Pocillopora meandrina	2
Montipora flabellata	1
Pavona varians	4
Sand	8
Hard Substratum	75

C. Invertebrate Census (4 x 25 m)

Species	Number
Phylum Echinodermata	
Tripneustes gratilla	4
Heterocentrotus mammillatus	33
Echinometra mathaei	62
Holothuria atra	1

D. Fish Census (4 x 25m)

27 Species
276 Individuals

once every ten years to have a noticeable effect. The relative protection of the study area from storm surf and presence of appropriate hard stable substratum has probably allowed corals to flourish. This development is particularly evident in the coral cover data for Stations 2, 3, and 4 described above.

In general, fish assemblages in Ka'awaloa Cove are well developed, a fact probably related to (1) the presence of reasonable shelter afforded by corals and lava in all areas but the biotope of sand, (2) the status of inner Kealakekua Bay as a Marine Life Conservation District which restricts the taking of marine life, and (3) the addition of food subsidies enhancing the local fish population.

No threatened or endangered species were seen in the study area during the time of the field survey; however humpback whales (Megaptera novaeangliae) could be heard offshore of the bay while diving underwater. Spinner dolphins (Stenella longirostris) are known to use Kealakekua Bay as a resting area (Shallenberger 1981), but none were seen during the field work.

C.3 WATER QUALITY

The watershed surrounding Kealakekua Bay is only sparsely developed. The setting is rural with residential housing at Napo'opo'o, behind Manini Beach to Kahauloa, and near Ke'ei Beach. No flowing streams enter the Bay. Further, the bay is deep (depths in the inner bay exceed 180 feet; DLNR, 1975) and apparently enjoys adequate circulation. Water quality is excellent, although ground water seepage along the shore is substantial. ORCA/DPC (1981) noted fresh water intrusion between Napo'opo'o and Palemano Point, and especially in the area of Kahauloa Bay. Fresh water intrusion was very noticeable around the Cook monument during the field survey for this environmental assessment. Generally, water clarity is good to exceptionally good (see ORCA/DPC, 1981). However, the water may become turbid when high waves enter the Bay. Turbid water moved into Ka'awaloa Cove during our field survey. However, areas closest to shore remained clear.

These waters are designated as Class AA in State of Hawaii Water Quality Regulations. Open coastal waters are so designated for essentially all of the Kona Coast of the Big Island [Chapt. 11-54-06(b)(2)(A)(i)], and Kealakekua, by virtue of its status as a MLCD is included within Class AA waters [Chapt. 11-54-06(a)(2)(A)(i)]. However, somewhat different standards (or water quality criteria) would apply to the different parts of the Bay. Interestingly, the inner bay (MLCD portion) would have less restrictive criteria (not-to-exceed parameter values higher) than the outer portion.

Specific surveys or measurements of water quality for this area could not be found. Thus, existing conditions relative to the State's water quality parameters can not be assessed. Most of the time, most of the parameters are likely to be within the criteria levels established by the State Department of Health, although ground water intrusion possibly contributes excessive nitrates.

The State of Hawaii, Water Quality Standards make an attempt to define marine biological communities (the "benthic standards") or marine bottom types (See Chapt. 11-54-07). The "lava rock shorelines" and reef areas within the MLCD are defined as Class I, all other shore and reef areas are Class II. Sand bottom areas throughout the Bay would be Class II.

C.4 CULTURAL AND HISTORICAL RESOURCES

The lands surrounding Kealakekua Bay are rich in ancient Hawaiian sites and places of considerable significance to Hawaiian culture and history. The significance of Cook Point in Hawaiian history has been mentioned above. Remnants of the former village of Ka'awaloa are reportedly present on the peninsula. Hikiau heiau is very much evident at Napo'opo'o Beach Park. The face of Pali Kapu-o-Keoua is riddled with lava tubes, and many of these appear to have been ancient burial sites.

In the Introduction (Section A) the claim was noted that Kealakekua Bay was the place of the first sustained contact between Hawaiians and Europeans. As a first, this claim is dependent upon the word "sustained". The first island sighted by the Cook Expedition was O'ahu (one year earlier, in January 1778); the first contact with Hawaiians occurred off Kaua'i; and the first landing occurred in the vicinity of Waimea on Kaua'i. Kealakekua Bay is historically noteworthy as the place where the expedition spent nearly a month living among the Hawaiians and the place where Captain Cook met his death in February 1779 (Barrow, 1976).

C.5 EXISTING USES

C.5.1 Public Access

Ready access to parts of the Kealakekua Bay shore is confined to the eastern part of the Bay from Napo'opo'o to Palemano Point. Ka'awaloa (Cook Point) can be reached by a jeep road which is privately owned, or by overland trail (along the top of the cliff), or by climbing along the talus at the base of Pali Kapu-o-Keoua when seas are calm (this would be difficult).

However, for most persons, access to Ka'awaloa Cove is generally by boat. Visitors to the Big Island interested in seeing the monument and the western part of the bay would generally need to utilize one of several commercial tour ventures operating out of the Kailua-Kona area.

Recreational facilities are provided at Napoopoo County Beach Park at the north end of Napo'opo'o (erroneously located on the ORCA/DPC map at Manini Point). The route down the mountain from Captain Cook and State Highway 11 is an excellent road as far as Napo'opo'o and the intersection with the Napo'opo'o to Honaunau Road. The latter is paved but in poor condition and mostly only one lane wide. Directly opposite the intersection with the Napo'opo'o to Honaunau road is the old Napo'opo'o Landing. The shore here is rocky, except for the massive concrete wharf. Napoopoo County Beach Park can be reached a short distance west (about 230 meters or 800 feet) of the intersection. The wharf area appears to be serving primarily as additional parking for the beach park. No other shoreline access exists in the Napo'opo'o area.

The nearshore waters between Napo'opo'o and Ke'ei (east side of Kealakekua Bay) are reportedly popular fishing, snorkeling, and SCUBA diving areas (ORCA/DPC, 1981). Shoreline access in the Manini Beach area (within the MLCD) is very limited. Roads in this area are narrow and houses occupy most of the backshore properties. Although the shoreline can be reached in one or two places, no or very limited street parking is available. Viewed from Napo'opo'o Landing, Manini "Beach" appears to be a white cobble deposit set above a rocky shore.

The road into Ke'ei and Palemano Point is unimproved and rough in parts. Most of this section of coast is outside of the MLCD. Shore casting and thrownet fishing occur here. A section of the road before Ke'ei runs close to the shore and is undeveloped. Access to the shore is presently excellent here with ample offroad parking. However, only divers and fishermen are likely to utilize this area to any extent as the shore is a low, rocky cliff and the area is difficult to find.

C.5.2 Public Use

All of the inner portion of Kealakekua Bay is a Marine Life Conservation District, the boundaries of which follow the high-water line and extend across the mouth of the bay from Cook Point to Manini Beach Point. Thus, uses of the inner bay waters are restricted in various ways. Only nonconsumptive activities are allowed in Subzone A (western shore), with certain restrictions with respect to mooring or anchoring of vessels. Within

subzone B (eastern shore), hook and line and net fishing along the shore are permitted, as are certain kinds of offshore fishing. Essentially all of the shoreline of Kealakekua Bay accessible from public roadways is either in subzone B or outside of the MLCD.

Parking at Napoopoo County Beach Park is somewhat limited. When visited on the morning of April 12, 1990 all available parking was taken. Many visitors come here just for the view and to see Hikiau Heiau located in the park. However, beach use is heavy relative to the size of the available parking and sand areas. A pavilion, restrooms, showers, and picnic facilities are located here. The beach is composed of dark sand at the shore, but much of the upper beach is basalt cobble. This section of the coast is within the MLCD Subzone B where pole fishing and net fishing are allowed (see Section D.1 for a discussion of permitted activities within Subzone B), but beach recreation, swimming, and snorkeling appear to be the most common activities. Strong swimmers can reach an area of abundant coral growth along the base of Pali-Kapu-o-Keoua which begins some 300 to 400 meters from the beach. Otherwise, very satisfactory snorkeling close to points of access can be found east of the beach and off Napo'opo'o Landing. None of these areas, however, is likely to exceed the Ka'awaloa Cove area in regards to abundance and diversity of fishes and corals.

C.5.3 Boats and Moorings

When visited on April 12, four yachts were observed moored in the water off Napo'opo'o. A total of at least 8 mooring buoys could be counted from the shore in this area. All of these moorings appear to be within subzone B of the MLCD. Presumably, many or most of the moorings were established by local residents and fishermen.

Two moorings exist in the Ka'awaloa Cove area. These are described in Section E.1.1 and were established for and are used by commercial vessels on a daily basis. The moorings are available for public use much of the time (the "owners" occupy the moorings less than 4 hours out of each day). The moorings in the cove serve another important use: a number of boat owners (particularly those normally moored in Keauhou Bay) come here during certain severe storm conditions when this part of Kealakekua affords the only safe harbor along a considerable distance of the West Hawaii coast. On two occassions in the recent past (Hurricane "Iwa" in 1982 and May 1988), eight boats rode out storms in Kealakekua Bay (Jack Ross, open letter), having no where else to seek shelter.

Section D. ENVIRONMENTAL POLICIES AND CONTROLS

D.1 THE MARINE LIFE CONSERVATION DISTRICT

A substantial portion of Kealakekua Bay is included within the Kealakekua Bay Marine Life Conservation District (Department of Land and Natural Resources, Chapt. 13-29) established in June 1969. The applicable Chapter 29 of Title 13, Administrative Rules of the DLNR derived from Regulation 33, is provided in Appendix C.

The Kealakekua Bay MLCD consists of two subzones, A and B (Figure 5). The restrictions imposed by the MLCD are different for each as described in DLNR (1970):

> In Subzone A, the fishing for or removal of any marine animal or plant, and the destruction, alteration, defacing or removal of any rock, coral, geological feature or specimens is prohibited. It is also unlawful to contaminate or otherwise alter the physical, chemical or biological properties of the water and to build structures of any kind within this subzone. The restrictions for Subzone B are slightly less stringent. The restrictions for Subzone A also apply to Subzone B with the exception that hook and line and thrownet fishing for all species of fishes are permitted, and furthermore, any lawful fishing method may be used for catching akule, opelu and crustaceans except that traps cannot be used for crustaceans.

A DLNR (1970) report states that "Although the taking of marine life from the bay is prohibited...., the public is encouraged to swim and dive in Kealakekua Bay and to make underwater observations of its fascinating submarine features and aquatic fauna."

Subzone A contains 120 surface acres and consists of the portion of the bay extending from Cook Point at the northwestern end of the conservation district to the spot on the shoreline at the north end of the pebble beach where the base of Pali-kapu-o-Keoua (Pali-o-manuahi) leaves the shoreline and heads inland. Because of the steepness of the underwater slopes in this subzone, shallow water areas with depths less than 100 feet are limited to a narrow band along the coastline. The majority of the fishes, corals, algae and other marine organisms are found concentrated within this shallow water band.

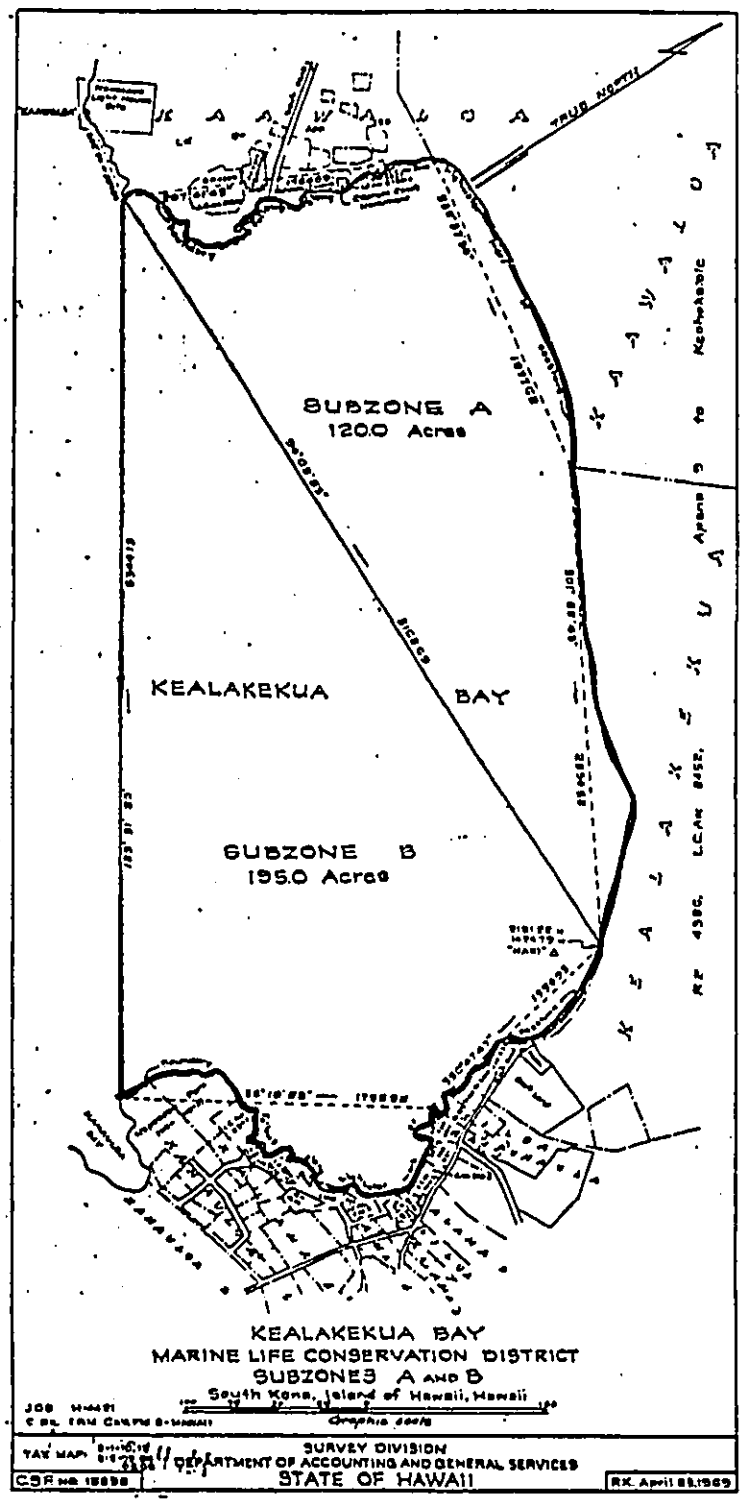

Figure 5. The Boundaries and subzones of the Kealakekua Bay Marine Life Conservation District.

D.2 STATE UNDERWATER PARK

The inner part of Kealakekua Bay is also a State Underwater Park, governed under Chapter 13-146 of Hawaii Administrative Rules of the Department of Natural Resources. Section 13-146-13 pertains to boating and is copied in entirety here:

> §13-146-13 Boating. (a) No person shall operate, leave unattended, beach, park, or launch vessels, as defined in §267-3, HRS, including but not limited to boats, motorboats, houseboats, rowboats, powerboats, jet skis, sailboats, fishing boats, towboats, scows, flatboats, cruisers, motor vessels, ships, barges, tugs, floating cabanas, party boats, charter boats, windsurfers, catamarans, ferryboats, canoes, rafts, kayaks, or any similar buoyant devices permitting or capable of free flotation where prohibited by the posting of appropriate signs, except with the written authorization of the board or its authorized representative, or in cases of emergency.
>
> (b) No person shall moor or anchor vessels as defined in subsection (a) without the written permission of the board or its authorized representative, except anchoring in cases of emergency. [Eff: APR 16 1990] (Auth: HRS §184-5) (Imp: HRS §184-5)

Chapter 146 of Title 13, Administrative Rules, is based substantially upon Chapter 145, Title 13. Chapter 146 was adopted, and Chapter 145 repealed, effective April 16, 1990.

The Hawaii Revised Statutes, Section 190-4.5 as adopted, provides for the regulation of moorings in marine conservation districts by requiring that "[t]he department of land and natural resources shall, persuant to chapter 91, adopt rules for the regulation of mooring in each marine conservation district established..." This statute would seem to be a policy determination by the Hawaii Legislature that moorings in areas like Kealakekua Bay should be regulated as marine conservation districts, not as State parks. We are not aware of any regulations that have been adopted to implement HRS Section 190-4.5 at the present time.

Section E. ASSESSMENT OF IMPACTS

E.1 OBSERVED IMPACTS OF THE EXISTING ACTIVITY

That part of Kealakekua Bay most heavily utilized by commercial tours is located adjacent to the Captain Cook Monument (Ka'awaloa Cove; Figure 6). These waters are well protected from most sea swells. A combination of conditions at this location (isolation, natural beauty, usually calm, clear water, and historical significance) account for the popularity of the cove as a destination for commercial tours and public boat owners. Two floats (plastic spherical buoys) are presently available for vessel mooring. In addition, a cable has been wrapped around a large rock off a point which projects into the area ("rock mooring", Figure 6) and another cable is attached to several large rocks at the shore northwest of the "rock mooring". Fronting the monument at the shore is a concrete wharf.

The Board has requested that all moorings be removed from the MLCD. However, the existing moorings are described here for completeness of the assessment process. No case is being made by this description that the existing moorings would remain as described in the event that the Board of Land and Natural Resources grants permits for moorings within the MLCD.

E.1.1 Description and Impacts of the Existing Mooring Designs

The Fair Wind, Inc. mooring is a float attached to a weight in about 20 feet of water. Two (possibly three, although only two were seen) ground lines (heavy chains) extend from the bottom weight into deeper water and terminate in boat anchors set within the coral bottom. The Hawaiian Cruises mooring float is positioned further offshore in water at least 60 feet deep. The bottom in this area is sand. Very little biological community development occurs directly on the mooring materials, suggesting that the materials are not suitable for benthic settlement. This is not unexpected when the entire surrounding area is comprised of natural coral rubble and basalt substratum amply providing appropriate bottom for invertebrate larval settlement.

The bottom immediately around the Fair Wind, Inc. mooring weight and on either side of two of the ground lines for a portion of their length has clearly suffered some destruction of coral (mostly finger coral, or Porites compressa). The pattern of destruction indicates occasional movement of the weighted parts of the mooring as might occur under high swell conditions. The anchor ends of the ground lines, on the other hand, are overgrown with coral, indicating no movement. Thus, the damage ob-

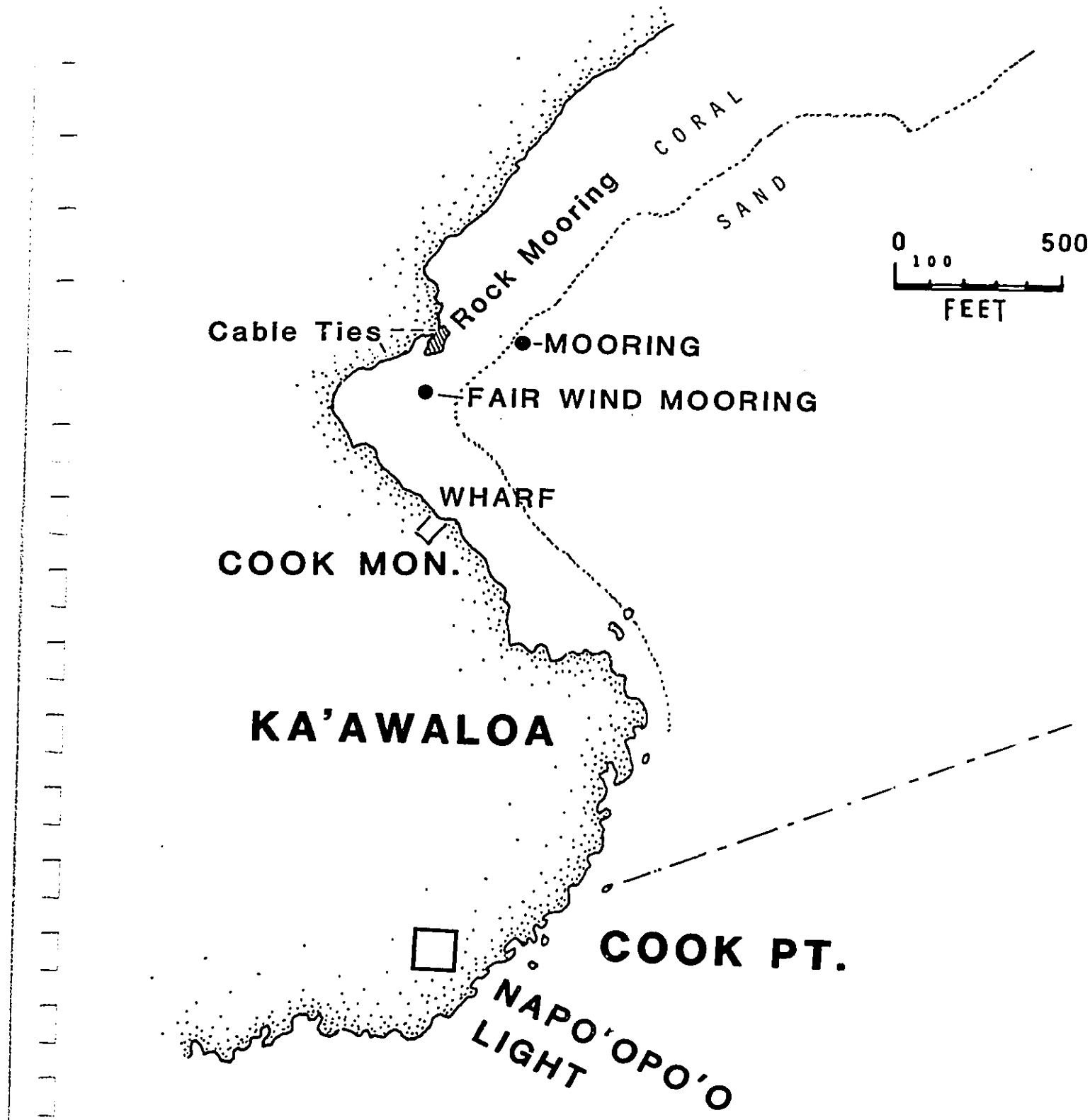

Figure 6. Existing moorings and tie-offs in Ka'awaloa Cove, Kealakekua Bay.

served is related to the design of the mooring system and has probably occurred over a long period of time. The Hawaiian Cruises mooring system was not inspected, but being on sand bottom, probably does not show a similar pattern of damage to live coral bottom. On the other hand, the cable attached to the rock and used by the Capt. Cook VII and others for a line attachment point is sufficiently loose to be causing damage to Pocillopora heads growing on the face of the rock. An uncommon ahermatypic coral, Tubastraea coccinea, grows on the shaded, back side of this rock. The similar cable arrangement used by the Ho'okele and the shore anchor set by the Party Boat are in areas too shallow to support coral growth and thus are causing no particular damage.

E.1.2 Assessment of Impacts of Commercial Activities

The present activities in Ka'awaloa Cove appear to have no direct negative impact on the surrounding marine assemblages. The results of the quantitative study presented herein (Section C.2.3) suggest that marine communities directly adjacent to the Fair Wind, Inc. mooring are indistinguishable from others in the same biotope at some distance away. Table 6 presents a synopsis of the important quantitative biological characteristics measured in our study. The results suggest that the coral and fish communities are well developed in this part of Kealakekua Bay and nowhere appear unusually different in structure which might suggest negative impact.

Anchor damage to the coral bottom is not evident in the cove. This fact can be attributed to the presence of the mooring structures already established here. Much of the coral bottom is dominated by Porites compressa or finger coral, which has a growth form that is clearly very sensitive to destruction if frequent anchoring of boats (commercial or private) were occurring (see Davis, 1977). A narrow area directly off the Cook Monument wharf did show evidence on the steep sloping bottom of destruction of the finger coral bed, but this damage did not appear to be recent, and may or may not have resulted from boat anchors.

Another evidence of potential negative impacts from use of the area would be the occurrence of trash on the bottom. An effort was made on March 13 to locate litter on the bottom around the mooring. A few charcoal briquettes were seen near the shallow mooring; and, about 80 m seaward of the mooring in 30 m depth on the sand, were a number of older (ca. 20 years) soda and beer ("Primo stubbies") bottles. In general, little modern trash was present, suggesting that despite considerable use of the area by both private and commercial boaters, care is being taken by most

not to dump refuse overboard. Because litter could have a negative impact on the economics of the commercial users of the area, self-policing of the area and monitoring of illegal activities by transient users is likely to be occurring. In a case such as this where much of the site use is by private business concerns, an economic incentive to prevent pollution problems and to protect the substantial value that the surrounding natural environment exists.

Table 6. Summary of quantitative biological parameters surveyed in the three biotopes identified in Ka'awaloa Cove.

Station No.	Depth (m)	Biotope	No. Coral Species	Mean % Coral Cover	No. Invert Spp.	No. Fish Spp.	No. Fish Ind.
1	29-31	Biotope of Sand	0	0	2	7	15
2	17-18	Biotope of P. compressa	6	85	3	28	157
3	11-12	Biotope of P. compressa	9	100	4	22	151
4*	6	Biotope of Diverse Coral	8	69	4	29	260
5	2-3	Biotope of Diverse Coral	9	17	4	27	276

* - transect closest to the Fair Wind, Inc. mooring.

A potential source of impacts associated with use of the moorings might be disposal of human wastes from vessel heads. The dive/snorkel tours do not dump sewage from their vessels; these boats are for day-use only (i.e., single dives and short trips) and are equipped with adequate holding tanks. Smaller boats visiting the area lack head facilities, but the period of visitation is short and the number of passengers (mostly divers)

relatively small. Water clarity is exceptional within the cove most of the time, indicating that this area is well-flushed and minimal pollutants from boats and/or land drainage are entering the water.

As a general rule, the operators of the commercial tours to Ka'awaloa Cove do not allow passengers to land on the shore. The smaller tours (i.e., the small boats) have the capability to land at the Cook Monument wharf, but this apparently is not done. Thus, the commercial activities are having no impact on the cultural/historical resources of this area.

The present-day commercial operations appear to be having only a minor impact on use of the area by others. Actual mooring time is under four hours per day, or less if only one daily tour is conducted. Commercial activities have been occurring here for such a long period of time, that use conflicts appear to be amicably resolved and public sentiment against the tour operations is absent. However, additional observations would need to be made during weekends when the number of private craft visiting the area is presumably greatest to fully assess this impact.

E.1.3 Fish Feeding

At least some of the commercial tours are involved in fish feeding at the site. The distribution of fishes, including large schools of several species which are present near the surface that normally would not be in this area or would associate with the bottom, indicates this practice is very successful at achieving the purpose of creating a colorful assemblage which can be readily viewed by passengers from the craft and/or by snorkeling the area. The affect is one similar to that which exists in Hanauma Bay on O'ahu (also a MLCD, extremely popular with novice divers and snorkelers, and an area where fish feeding is probably extreme). Kimmerer and Durbin (1975) made the following observation related to fishes in Kealakekua Bay: "[In the area just off the Captain Cook monument]...the fish appeared very tame, probably because of feeding by visitors on the glass-bottom boats. Large schools of nenue, Kyphosus cinerascens, were seen in this area." The same observation can be made today at this location.

Because of problems related to crowding at Hanauma Bay on Oahu, the subject of feeding fishes has become embroiled in the present concern with preserving the ecology of Hanauma Bay. However, the practice of feeding fish is not unusual (in Hawaii and elsewhere) where commercial tours of nearshore areas are conducted, primarily because the practice can be successful at increasing the density and "friendliness" of resident fishes (at least where fish spearing is not allowed). As is demonstrated by

the Hanauma Bay situation, fish feeding on a large scale can also occur in the absence of any promotion by commercial interests.

The objections to fish feeding arise from environmental concerns. Clearly, the result of a regular program (even if informal but regular because of use patterns) is to promote the presence of a number of species that might not normally occur in the fish assemblage. The "nutritional" value of commonly used feeds (bread, peas, lunch scraps) has been questioned, and the suggestion made that such food is unhealthy for the fish population (this is largely an anthropomorphic argument) or is based on observations on captive animals (zoos). In the absence of physiological studies of the impact on each species of fish (particularly reproductive success), the large size of the individuals seems ample proof of nutritional value, although may in fact reflect an absence of exploitation by spear and net fishermen. In any event, and in the absence of evidence either way, nutritional concerns can best be met by encouraging the use of commercial fish feeds as opposed to food scraps. It must be realized, however, that the content of potential hazardous chemical residues (pesticides, etc.) is not regulated in animal feeds to the extent that it is in human food.

Water quality concerns may be valid in situations where water circulation is poor and feeding heavy because feeds represent a nutrient input to the aquatic environment. Feeds can be particularly high in phosphates, the absence of which is often the factor suppressing phytoplankton growth. No evidence exists that fish feeding in Kealakekua Bay has caused environmental problems of any kind. The Ho'okele presently offers a commercial fish food for use by its the passengers. The practices of other tour companies is not known.

E.2 IMPACTS OF PROPOSED ACTIVITY

The Fair Wind, Inc. application (CDUA HA-2374) is for mooring rights in Ka'awaloa Cove. From the applicants standpoint, this request can be satisfied by either retaining the existing mooring or replacing this mooring at the same or a nearby location. In either case, the impacts of the proposed activity would be largely unchanged from the impacts identified in Section E.1 above because the proposed activity is a continuation of an activity that has occurred for over two decades. This section attempts assess impacts by projecting future increases in the number of commercial and private visitations to Ka'awaloa Cove. That an increasing density of users will occur is not inevitable, but over the long term may require that limitations of some kind be imposed by the DLNR (see Section G.2).

E.2.1 Impacts on Water Quality

Long-term impacts could occur from changes in water quality associated with the operation of increasing numbers of vessels in Ka'awaloa Cove. Water quality changes may come about through the introduction of various pollutants including fuels from boats and boat engines, sewage from improperly operated boat heads, and trash. Marine sanitation devices may discharge disinfectants or other chemical additives of greater potential harm to marine biota than untreated wastes, the latter posing a potential health problem. Trash of various kinds can smother or mechanically damage corals or other sessile biota.

Potential negative impacts might derive from oil spills and/or petroleum hydrocarbons from engine exhausts. Damage to submerged corals by floating oils has not been conclusively demonstrated (Rutzler and Sterrer 1970, Johannes 1975) and reef communities may exist in areas subjected to long-term chronic oil pollution (Spooner 1970). The impact of light fuel spills (as opposed to heavy oils and crude oils) are usually minor and this source of pollution can be controlled or reduced through careful operation and maintenance of vessel engines and fuel systems, which would certainly be a safety requirement for larger commercial vessels. Outboard engines release a fair proportion of unburned fuel in the exhaust which is directed below the water surface. The engines on larger vessels usually vent the exhaust through stacks and burn fuel more efficiently. Thus, despite a far greater fuel consumption rate, larger vessels may contribute less hazardous chemicals to the water. In any case, mooring facilities contribute to a reduction in both water and air pollution by allowing boats to remain in position with the engines off.

E.2.2 Impacts on the Benthic Biology

Deterioration of water quality and anchoring of boats within the coral rich zones of the MLCD constitute the greatest threats to the marine benthic biota. Over-fishing and pollution carried in by terrestrial run-off appear not to be potential problems at Kealakekua Bay (particularly in subzone A). Water quality problems from the existing level of use (see Sections E.1.2 and E.2.1) appear not to be developing. The potential for water quality deterioration from substantially increased vessel traffic cannot be assessed without further study. Destruction of sensitive coral bottom areas by anchors is a well established fact in marine preserves and other popular dive areas where controls have not been imposed. If all moorings are removed from Kealakekua Bay, or if only the moorings in subzone A are removed, destruc-

tion of the coral bottom can be expected to occur from the casual users. Some infrequent visitors will either have no knowledge of the ban against anchoring or will have little interest in the long-term preservation of the coral bottom. As use of Ka'awaloa Cove by boaters increases in the future, DLNR will find, as has been the case elsewhere in Hawai'i (e.g., Molokini Islet) and other tropical locations (e.g, Florida), that one or more moorings will have to be established. Davis (1977, p. 33) concluded:

> Areas especially sensitive to anchor damage need to be identified in coral sanctuaries. Anchorages can be established in less sensitive areas, such as sand flats, and perhaps mooring buoys provided in sensitive areas when anchoring is absolutely necessary for shelter or access for visitors.

Ka'awaloa Cove and the shelf of diverse coral growth which extends eastward from the cove can be identified as an area sensitive to anchor damage.

It is clearly in the interest of tour operators to maintain the natural diversity in the marine communities of Ka'awaloa Cove as well as throughout Kealakekua Bay. Any activity resulting in a negative impact to the marine communities may decrease the attractiveness of the area to customers of the tour companies. Use patterns by commercial activities up to this point in time have not adversely affected the biota in Ka'awaloa Cove, which remains diverse and pristine. Maintenance of these attributes will insure economic viability to the primary users of the moorings. Given this incentive, the commercial users presently perform a service that normally would require a full-time on-site manager of the preserve.

Section F. ALTERNATIVES

F.1 ALTERNATIVE OF NO MOORING

Denial of a mooring will impact some commercial activities more than others. Unless the State bans all commercial activity within the Kealakekua Bay MLCD, commercial operations in Ka'awaloa Cove will still be conducted. Small boats will bring dive groups to the area for snorkel and SCUBA tours, leaving a crewman on board to maintain the boat's position while the divers are down. Often, this will be possible without continuously running the engine because of the shelter from wind and waves afforded within the cove. Presumably, commercial entities utilizing the area on a regular basis will be aware of and will follow the regulations prohibiting the use of anchors within the MLCD. Such tours will be attended mostly by young adults, because the trip to Kealakekua from Kailua-Kona or Keauhou Bay in a small boat will not appeal to older persons or families with young children. Larger vessels, such as the Ho'okele may be able to conduct tours in the cove, but the vessel would have to remain under power during the entire stay. Operating in this manner may not be economically feasible. If not, the removal of the moorings will in effect limit the numbers and types of persons that will have access to the cove and vicinity of the Cook Monument.

Of course, noncommercial boats will continue to visit the cove, and many can be expected to drop anchor, causing damage to the coral bottom. Indeed, the threat of such damage, which can be substantial in an area which is a popular destination for divers and can practically be reached only by boat, is alone sufficient reason for the State to establish and maintain one or more moorings within the MLCD (see Section G.2).

If all moorings are removed from the MLCD, the consequences during severe storm conditions when boats which cannot reach or be accommodated at Honokohau Harbor are difficult to predict. In all likelihood, some boats will be forced to seek shelter in Kealakekua Bay and these boats will have to set anchors. Indeed, anchoring within the MLCD under conditions of adverse seas would probably be an emergency use and defensible as allowable under DLNR Administrative Rules, Chapt. 13-146-13(b) (see Section D.2). In any event, the damage to the coral bottom caused by such infrequent occurrences may or may not be significant.

F.2 MOORING ELSEWHERE IN THE MLCD

Moorings could be allowed in the Kealakekua Bay MLCD, but in an area other than Ka'awaloa Cove -- in subzone B, for example.

For this alternative, much of the assessment made above for the alternative of no mooring would still apply, since both casual users and commercial dive tours will continue to be attracted to subzone A. Alternative mooring sites might serve as emergency shelter during storms, although the vicinity of the cove provides the only certain protection from the west and northwest seas that occassionally force boats to seek refuge in Kealakekua Bay. That is, sufficient protection from certain conditions may not be afforded in subzone B.

Dependent upon location, larger commercial tour boats such as the Ho'okele might find that a mooring elsewhere in Kealakekua Bay MLCD is satisfactory. However, the competition throughout the industry, between the operators of the larger boats and with the operators of smaller craft, is based on the quality of experience offered to clients. The combination of factors (scenery, sheltered water, underwater attractions, etc.) that are essential for the type of cruise conducted by the Ho'okele (and some others) is not likely to be found within the bay outside of Ka'awaloa Cove. These tour companies would need to find sites along the Kona coast that best provide these factors to develop a viable product. For example, the Tamure, a very large tour boat, presently frequents an area on the outside of Cook Point when calm seas prevail.

Ironically, most of the SCUBA dive tours operating with small boats, utilize Ka'awaloa Cove only infrequently. Suitable sites for the larger boats are rare on this coast, but not so for companies conducting strictly SCUBA tours from small boats. These groups may use a variety of locations dependent upon the interests, skill, and experience of the tour group. Thus, one consequence of forcing larger vessels out of Ka'awaloa Cove is likely to be an increase in visitations by smaller boats as commercial operators find they are sharing their traditional dive sites outside of Kealakekua Bay with the displaced larger boats and as the demand presently met by the larger boats is shifted to smaller craft that can operate within the cove without a mooring. A consequence could be an even greater need for moorings in the cove than presently exists to limit anchor damage, or the banning of all commercial activity in subzone A of the MLCD.

F.3 MOORING OUTSIDE THE MLCD

The use of a mooring buoy or buoys by commercial tour vessels of any size is clearly a sound environmental approach, regardless of the site. Presently, a number of moorings have been established along the Kona coast for use by private and commercial vessels. These moorings reduce impacts on benthic communities by limiting anchor damage. They also reduce fuel con-

sumption which is economically attractive as well as an environmental benefit. Although many of the existing moorings have been established without DLNR approval, such approval through the CDUA process is required by statute. The alternative of Fair Wind, Inc. establishing a mooring outside the MLCD amounts essentially to a separate application which itself would address environmental concerns specific to that site. Thus, further consideration of this alternative is unnecessary in the present document.

Section G. MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACTS

G.1 MOORING DESIGN

If the mooring in Ka'awaloa Cove is changed, consideration should be given to the selection of the most appropriate design that would have the least impact to benthic communities. A relatively new concept in mooring design utilizes eyebolts that are attached to the substratum which serves as the "anchor" rather than the use of a mooring with a conventional anchor. The eyebolt system was developed for use on coral reefs in sanctuaries such as the Key Largo National Sanctuary as a means of reducing anchor damage to corals. This anchoring method is based on the "Halis system" where a hole is drilled into the substratum and an eyebolt inserted and held with epoxy; the eyebolt serves as the anchor for the mooring. Normally a line and float are attached to the eyebolt and users tie their vessels to the float. The absence of heavy, movable parts near the bottom eliminates damage to corals as can occur with more conventional weighted mooring designs. The Key Largo moorings have been in place for 3 to 5 years with no serious problems.

The Halis system has been modified by University of Hawaii engineers and is presently in use in the islands. A number of "Hawaiian Eyebolts" were deployed in the Molokini Marine Life Conservation District in 1988. (Also used were concrete anchors.) The Hawaiian eyebolts have been quite successful in reducing anchor damage because dive tour operators (the principal users of the area) have been consistent in using them. Prerequisites for either the Hawaiian eyebolt or Halis systems are the presence of a hard substratum (limestone or basalt) into which a 7/8 inch diameter by 18 inch deep hole is drilled. The hole receives some epoxy glue and a 3/4 inch diameter monel stainless steel eyebolt is then inserted. A tautline mooring and float complete the unit.

The presence of solid substratum is necessary for the successful use of the Hawaiian eyebolt system. In the vicinity of the present mooring in Ka'awaloa Cove, exposed basalt is evident; thus, if a change in mooring design is to be considered, the eyebolt system may be appropriate as it is the least environmentally damaging mooring system presently available. The existing cables wrapped around boulders at the shore should be replaced with eyebolts to eliminate damage to shallow water corals and other attached invertebrates.

G.2 NUMBER OF MOORINGS

This environmental assessment pertains only to the mooring utilized by Fair Wind, Inc. for its vessel Ho'okele. While the actual number of commercial users presently exceeds the number of existing buoys, conflict for use of the mooring sites appears not to be occurring. This assessment cannot specifically address other applications for moorings in Ka'awaloa Cove. However, while use of the area is heavy for relatively brief periods of time, over-use or crowding is not presently evident.

Additionl moorings could be accommodated within subzone A. It is recommended that the State of Hawaii consider establishing at least one mooring in the area for use by private boats wishing to visit this part of the underwater park. Such a mooring would be justified on the basis of encouraging public use of the underwater park and reducing impacts that would occur from boats setting anchors over the coral rich bottom. The two existing commercial moorings have probably prevented a significant amount of bottom damage by providing private boats a place to tie off. Very likely, infrequent or first time vessels visiting the area are unaware of the ban against anchoring here. A posted sign on Cook Point is not visible from within the cove.

Alternatively or additionally, the DLNR might consider establishing a permit system as a means of regulating boating activities within the cove and preventing negative impacts that might inevitably occur with over-use of the area. Permits should seek to balance private and commercial uses by setting limits on the duration of use of specific moorings by commercial entities. We point out the present cooperative use of the moorings and the fact that none of the commercial users occupy a mooring continuously through the daylight hours.

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APPENDIX A.

BIOLOGICAL SURVEY MATERIALS AND METHODS (Brock, 1990):

The fieldwork which provided the database for this baseline study of the marine macrobiota in the vicinity of the Captain Cook monument mooring site in Kealakekua Bay (Ka'awaloa Cove) was conducted on 13 March 1990. The area encompassed in this survey includes the nearshore region from the shore, seaward to the 30 m (100 foot) isobath in the northwestern corner of the bay.

The quantitative sampling of macrofauna of marine communities presents a number of problems; many of these are related to the scale on which one wishes to quantitatively enumerate organism abundance. Marine communities in the Kealakekua Bay Marine Life Conservation District may be spatially defined in a range on the order of a few hundred square centimeters (such as the community residing in a Pocillopora meandrina coral head) to major biotopes covering many hectares. Recognizing this ecological characteristic, we designed a sampling program that attempted to delineate all major extant communities in the limits of the study area and to quantitatively describe these communities. Thus, a number of methods were used.

To obtain an overall perspective on the extent of the major communities or "zones" occurring in the study area, a diver slowly swam over most of the study site from shore seaward to the 30m isobath (the outer limits for this study). This exercise allowed the qualitative delineation of major biotopes based partially on the presence of large structural elements (e.g., amount of sand, hard substratum, fish abundance, coral coverage or dominant coral species). Within each of these stations were established and quantitative studies were conducted, including visual enumeration of fish, counts along benthic transect lines and cover estimates in benthic quadrats. Besides these quantitative measures, a qualitative reconnaissance was made in the vicinity of each station by swimming and noting the presence of species not encountered in the transects. All assessments were carried out using SCUBA.

The location of stations were subjectively chosen as being representative of a given biotope. Immediately following site selection, a visual fish census was undertaken to estimate the abundance of fishes. These censuses were conducted over a 25 x 4m corridor and all fishes within this area to the water's surface were counted. Data collected included species and the numbers of individuals. A single

diver equipped with SCUBA, transect line , slate and pencil would enter the water, count and note all fishes in the prescribed area (method modified from Brock 1954). The 25m transect line was paid out as the census progressed, thereby avoiding any previous underwater activity in the area which could frighten wary fishes.

Fish abundance and diversity is often related to small-scale topographical relief over short linear distances. A long transect may bisect a number of topographical features (e.g., cross coral mounds, sand flats, and algal beds), thus sampling more than one community and obscuring distinctive features of individual communities. To alleviate this problem, a short transect (25m in length) has proven adequate in sampling many Hawaiian benthic communities (Brock and Norris 1989).

Besides frightening wary fishes, other problems with the visual census technique include the underestimation of cryptic species such as moray eels (family Muraenidae) and nocturnal species, e.g., squirrelfishes (family Holocentridae), aweoweos or bigeyes (family Priacanthidae), etc. This problem is compounded in areas of high relief and coral coverage affording numerous shelter sites. Species lists and abundance estimates are more accurate for areas of low relief, although some fishes with cryptic habits or protective coloration (e.g., the nohus, family Scorpaenidae; the flatfishes, family Bothidae) might still be misssed. Obviously, the effectiveness of the visual census technique is reduced in turbid water and species of fishes which move quickly and/or are very numerous may be difficult to count and to estimate sizes. Additionally, bias related to the experience of the diver conducting counts should be considered in making any comparisons between surveys. In spite of these drawbacks, the visual census technique probably provides the most accurate nondestructive method available for the assessment of diurnally active fishes (Brock 1982).

After the assessment of fishes, an enumeration of epibenthic invertebrates (excluding corals) was undertaken using the same transect line as established for fishes. Exposed invertebrates usually greater than 2 cm in some dimension (without disturbing the substratum) were censused in a 4 x 25 m area. As with the fish census technique, this sampling methodology is quantitative for only a few invertebrate groups. e.g., some of the echinoderms (e.g., sea urchins and holothurians). Most coral reef invertebrates (other than corals) are cryptic or nocturnal in their habits making accurate assessment of them in areas of topographical complexity very difficult. This, coupled with the fact that

the majority of these cryptic invertebrates are small, necessitates the use of methodologies that are beyond the scope of this survey (e.g., see Brock and Brock 1977). Recognizing constraints on time and the scope of this survey, the invertebrate censusing technique used here attempted only to assess those few macroinvertebrate species that are diurnally exposed.

Exposed sessile benthic forms such as corals and macrothalloid algae were quantitatively surveyed by use of quadrats and the point-intersect method. The point-intersect technique only notes the species of organism or substratum type directly under a point. Along the previously set fish transect line, 50 such points were assessed (once every 50 cm). These data have been converted to percentages. Quadrat sampling consisted of recording benthic organisms, algae and substratum type present as a percent cover in six one-meter square frames placed at five-meter intervals along the transect line established for fish censusing (at 0, 5, 10, 15, 20 and 25 m).

If macrothalloid algae were encountered in the 1 x 1 meter quadrats or under one of the 50 points, they were quantitatively recorded as percent cover. Emphasis was placed on those species that are visually dominant and no attempt was made to quantitatively assess the multitude of microalgal species that constitute the "algal turf" so characteristic of many coral reef habitats.

During the course of the fieldwork, an effort was made to note any green sea turtles and other threatened or endangered species seen within or near to the study area.

APPENDIX B. Results of the quantitative visual censuses conducted at five locations in the northwest corner of Kealakekua Bay, Hawaii on 13 March 1990. Each entry in the body of the table represents the total number of individuals of each species seen; totals are presented at the foot of the table.

Family and Species	Station Number 1	2	3	4	5
ACANTHURIDAE					
Acanthurus triostegus				1	
A. nigroris					3
A. nigrofuscus				3	
A. dussumeri		1		1	
A. thompsoni		3			
Ctenochaetus strigosus		36	31	95	93
C. hawaiiensis				2	1
Naso literatus		4	3	2	11
Zebrasoma flavescens		29	23	52	32
Z. veliferum					2
AULOSTOMIDAE					
Aulostomus chinensis		1	1	1	3
BALISTIDAE					
Melichthys niger			2	8	39
M. vidua		3	1	3	
Sufflamen bursa		3		1	1
CANTHIGASTERIDAE					
Canthigaster jactator					3
CHAETODONTIDAE					
Chaetodon multicinctus		4	2	2	4
C. lunula			2		
C. miliaris		2			
C. ornatissimus		2	4	2	2
C. trifasciatus		1			
C. unimaculatus				1	
Forcipiger flavissimus		3	1	2	4
F. longirostris					1
CIRRHITIDAE					
Paracirrhitus forsteri		1	1		
P. arcatus		1			2
GOBIIDAE					
Psilogobius sp.	3				
Gnathelepis sp.	1				

APPENDIX B. Continued.

Family and Species	Station Number 1	2	3	4	5
KUHLIIDAE					
Kuhlia sandvicensis					53
KYPHOSIDAE					
Kyphosus bigibbus				4	3
LABRIDAE					
Bodianus bilunulatus		1			1
Thalassoma fuscum					1
T. duperrey		6	7	11	5
Gomphosus varius		3	1	2	2
Cheilinus unifasciatus			3	3	
Labroides phthirophagus				1	
LUTJANIDAE					
Lutjanus kasmira		13	3	14	
MONACANTHIDAE					
Cantherhines dumerili		2	1	3	
Aleutra scripta		7			1
Pervagor spilosoma	2		1		3
MULLIDAE					
Mulloides flavolineatus	4	2			
Parupeneus multifasciatus		1			
MURAENIDAE					
Gymnothorax meleagris				1	
G. eurostus		1			
OSTRACIONTIDAE					
Ostracion meleagris					1
PARAPERCIDAE					
Parapercis schauslandii	2				
POMACANTHIDAE					
Centropyge potteri		1		1	1

APPENDIX B. Continued.

Family and Species	Station Number 1	2	3	4	5
POMACENTRIDAE					
Chromis vanderbilti				3	
C. agilis		22	34	18	
Plectroglyphidodon johnstonianus				1	
Abudefduf abdominalis			21	18	
A. sordidus					1
Dascyllus albisella	2				
SCARIDAE					
Scarus sordidus		1	6	4	2
S. taeniurus		3			
Calatomus carolinus			2		
TETRAODONTIDAE					
Arothron meleagris	1				
ZANCLIDAE					
Zanclus cornutus			1		
Total Number of Species	7	28	22	29	27
Total Number of Individuals	15	157	151	260	276

APPENDIX C.

TITLE 13

DEPARTMENT OF LAND AND NATURAL RESOURCES

SUBTITLE 4 FISHERIES

PART I MARINE LIFE CONSERVATION DISTRICTS

CHAPTER 29

KEALAKEKUA BAY MARINE LIFE CONSERVATION DISTRICT; HAWAII

Historical Note: Chapter 29 of Title 13 is based substantially upon Regulation 33 of the Division of Fish and Game, Department of Land and Natural Resources, State of Hawaii. [Eff. 6/13/69; R MAY 26 1981]

§13-29-1 Boundaries. The Kealakekua Bay Marine Life Conservation District, subzones A and B, shall include that portion of the submerged lands and overlying waters of Kealakekua bay beginning at the highwater mark at the shoreline and those lands described in the survey description entitled "Kealakekua Bay Marine Life Conservation District, subzones A and B, situated in the offshore waters of Kaawaloa, Kealakekua, Kiloa, Waipunala, Kalama 1, 2, 4, and 5, Liloa, and Kahauloa 1, South Kona, Island of Hawaii" and as identified as C.S.F. No. 15,832, dated April 23, 1969, on file with the departments of land and natural resources, and accounting and general services, and delineated in "Map of the Kealakekua Bay Marine Life Conservation District, Hawaii 4/23/69" attached at the end of this chapter. [Eff: MAY 26 1981] (Auth: HRS §190-3) (Imp: HRS §§190-1, 190-2, 190-3)

§13-29-2 Prohibited activities. No person shall engage in the following activities in the Kealakekua Bay Marine Life Conservation District:

(1) Fish for, catch, take, injure, kill, possess, or remove any finfish, crustacean, mollusk including sea shell and opihi, live coral, algae or limu, or other marine animal, or other marine life, or eggs thereof; or
(2) Take, alter, deface, destroy, possess, or remove any sand, coral, rock, or other geological feature, or specimen. [Eff: MAY 26 1981] (Auth: HRS §190-3) (Imp: HRS §§190-1, 190-3)

APPENDIX C

§13-29-3

§13-29-3 Permitted activities. A person may:
(1) Fish for, catch, take, possess, or remove, from subzone B:
  (A) Any finfish by hook-and-line or thrownet; and
  (B) Akule (Trachurops crumenophthalmus), opelu (Decapterus pinnulatus) and crustacean by any legal fishing method or device, except traps; and
(2) Possess in the water, any knife and any shark billy, bang stick, powerhead, or carbon dioxide (CO_2) injector for the sole purpose of personal safety. [Eff: MAY 26 1981] (Auth: HRS §190-3) (Imp: HRS §§190-1, 190-3)

§13-29-4 Exceptions; permits. The department may issue permits to engage in activities otherwise prohibited by law and §13-29-2 for scientific, propagation or other purposes not inconsistent with chapter 190 and §187-4, Hawaii Revised Statutes, provided that:
(1) The board may impose terms and conditions it deems necessary to carry out the purpose of chapter 190, Hawaii Revised Statutes;
(2) The board may revoke any permit for any infraction of the terms and conditions of the permit; and
(3) A person whose permit was revoked shall not be eligible to apply for another permit until the expiration of one year from the date of revocation. [Eff: MAY 26 1981] (Auth: HRS §190-3) (Imp: HRS §§187-4, 190-4)

§13-29-5 Penalty. A person violating the provisions of this chapter or the terms and conditions of any permit issued as provided by this chapter, shall be guilty of a petty misdemeanor, and upon conviction thereof, shall be punished as provided by law. [Eff: MAY 26 1981] (Auth: HRS §190-3) (Imp: HRS §190-5)

FILE COPY

February 1983

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

RECEIVED
'90 SEP 24 A9:12
OFC. OF ENV. QUALITY

DEPARTMENT MASTER APPLICATION FORM

(Print or Type)

FOR DLNR USE ONLY
Reviewed by _____
Date _____
Accepted by _____
Date _____
Docket/File No. _____
180-Day Exp. _____
EIS Required _____
PH Required _____
Board Approved _____
Disapproved _____
Well No. _____

I. LANDOWNER/WATER SOURCE OWNER (If State land, to be filled in by Government Agency in control of property)

Name: Department of Land and Natural Resources
Address: 1151 Punchbowl Street
Honolulu, Hawaii 96813
Telephone No. _____
SIGNATURE _____
Date _____

II. APPLICANT (Water Use, omit if applicant is landowner)

Name: Fair Wind, Inc.
Address: 78-7128 Kaleopapa Road
Kailua-Kona, Hawaii 96740
Telephone No. 322-2788
Interest in Property N/A
(Indicate interest in property; submit written evidence of this interest)
*SIGNATURE Melynda Dart
Date April 6, 1990

*If for a Corporation, Partnership, Agency or Organization, must be signed by an authorized officer.

III. TYPE OF PERMIT(S) APPLYING FOR

( ) A. State Lands
(x) B. Conservation District Use
( ) C. Withdraw Water From A Ground Water Control Area
( ) D. Supply Water From A Ground Water Control Area
( ) E. Well Drilling/Modification

IV. WELL OR LAND PARCEL LOCATION REQUESTED

District: South Kona
Island: Hawaii
County: Hawaii
Tax Map Key: N/A
Area of Parcel: N/A (Indicate in acres or sq. ft.)
Term (if lease): N/A

Applicant is also aware of Hawaii Administrative Rules, Title 19, Chapter 82, which regulates commercial catamaran, canoe, surfboard and motorboat activities in Waikiki and Kaanapali shore waters. When these regulations were adopted, the number of catamarans were limited to four in Waikiki shore waters and ten in Kaanapali shore waters. However, all catamaran owners who were operating in these shore waters on the effective date of the regulations were permitted to continue to operate, despite the limitation. See HAR, Section 19-82-37. Applicant maintains this same principle should be applied in this instance with regard to moorings that were in place prior to the effective date of the regulations for Kealakekua Bay.

V. Environmental Requirements See Attachment "A"

Pursuant to Chapter 343, Hawaii Revised Statutes, and in accordance with Title 11; Chapter 200, Environmental Impact Statement Rules for applicant actions, an Environmental assessment of the proposed use must be attached. the Environmental assessment shall include, but not be limited to the following:

(1) Identification of applicant or proposing agency;

(2) Identification of approving agency, if applicable;

(3) Identification of agencies consulted in making assessment;

(4) General description of the action's technical, economic, social, and environmental characteristics;

(5) Summary description of the affected environment, including suitable and adequate location and site maps;

(6) Identification and summary of major impacts and alternatives considered, if any;

(7) Proposed mitigation measures, if any;

(8) Determination;

(9) Findings and reasons supporting determination; and

(10) Agencies to be consulted in the preparation of the EIS, if applicable.

VI. Summary of Proposed Use (what is proposed) See Attachment "B"

INFORMATION REQUIRED FOR ALL USES

I. Description of Parcel See Attachment "C"

A. Existing structures/Use. (Attach description or map).

B. Existing utilities. (If available, indicate size and location on map. Include electricity, water, telephone, drainage, and sewarage).

C. Existing access. (Provide map showing roadways, trails, if any. Give street name. Indicate width, type of paving and ownership).

D. Vegetation. (Describe or provide map showing location and types of vegetation. Indicate if rare native plants are present).

E. Topography; if ocean area, give depths. (Submit contour maps for ocean areas and areas where slopes are 40% or more. Contour maps will also be required for uses involving tall structures, gravity flow and other special cases).

F. If shoreline area, describe shoreline. (Indicate if shoreline is sandy, muddy, rocky, etc. Indicate cliffs, reefs, or other features such as access to shoreline).

G. Existing covenants, easements, restrictions. (If State lands, indicate present encumbrances.)

H. Historic sites affected. (If applicable, attach map and descriptions).

II. Description: Describe the activity proposed, its purpose and all operations to be conducted. (Use additional sheets as necessary). See Attachment "D"

III. Commencement Date: 1963

Completion Date: 1963

IV. TYPE OF USE REQUESTED (Mark where appropriate) (Please refer to Title 13, Chapter 2)

1. Permitted Use (exception occasional use);
DLNR Title 13, Chapter 2, Section _____; Subzone _____.

2. Accessory Use (accessory to a permitted use):
DLNR Title 13, Chapter 2, Section _____; Subzone _____.

3. Occasional Use: Subzone _____.

4. Temporary Variance: Subzone _____.

5. Conditional Use: Subzone P.

Area of Proposed Use Approximately 22,000 sq. ft.
(Indicate in acres or sq. ft.)

Name & Distance of Nearest Town or Landmark
Kealakekua Bay, approximately 200 yards offshore from Captain Cook monument.

Boundary Interpretation (If the area is within 40 feet of the boundary of the Conservation District, include map showing interpretation of the boundary by the State Land Use Commission).

Conservation District Subzone Protective
County General Plan Designation N/A

V. FILING FEE

1. Enclose $50.00. All fees shall be in the form of cash, certified or cashier's check, and payable to the State of Hawaii.

2. If use is commercial, as defined, submit additional public hearing fee of $50.00.

INFORMATION REQUIRED FOR CONDITIONAL USE ONLY See Attachment "A" and Exhibits C-1 to C-4

I. Plans: (All plans should include north arrow and graphic scale).

A. Area Plan: Area plan should include but not be limited to relationship of proposed uses to existing and future uses in abutting parcels; identification of major existing facilities; names and addresses of adjacent property owners.

B. Site Plan: Site plan (maps) should include, but not be limited to, dimensions and shape of lot; metes and bounds, including easements and their use; existing features, including vegetation, water area, roads, and utilities.

C. Construction Plan: Construction plans should include, but not be limited to, existing and proposed changes in contours; all buildings and structures with indicated use and critical dimensions (including floor plans); open space and recreation areas; landscaping, including buffers; roadways, including widths; offstreet parking area; existing and proposed drainage; proposed utilities and other improvements; revegetation plans; drainage plans including erosion sedimentation controls; and grading, trenching, filling, dredging or soil disposal.

D. Maintenance Plans: For all uses involving power transmission, fuel lines, drainage systems, unmanned communication facilities and roadways not maintained by a public agency, plans for maintenance shall be included.

E. Management Plans: For any appropriate use of animal, plant, or mineral resources, management plans are required.

F. Historic or Archaeological Site Plan: Where there exists historic or archaeological sites on the State or Federal Register, a plan must be submitted including a survey of the site(s); significant features; protection, salvage, or restoration plans.

II. Subzone Objective: Demonstrate that the intended use is consistent with the objective of the subject Conservation District Subzone (as stated in Title 13, Chapter 2). See Attachment "E"

ATTACHMENT "B"

VI. Summary of Proposed Use

Fair Wind, Inc., Applicant herein, proposes to continue to provide visitors to Hawaii County's Kona Coast the recreational opportunity to swim, snorkel or scuba dive at Kealakekua Bay, as it has done for the past 19 years. A photograph of Applicant's vessel at Kealakekua Bay is included as Exhibit B-1. In order to continue this recreational activity in an environmentally responsible manner, Applicant is willing to conform to reasonable terms and conditions required by the Board of Land and Natural Resources to properly regulate recreational activities within the bay. Applicant firmly believes that reasonable regulation of the use of the bay's waters is a more acceptable alternative than the staff recommendation submitted to the Board on October 13, 1989 to remove all post-1962 moorings from the bay. Even if moorings are removed from the bay, Hawaii residents and visitors will continue to visit Kealakekua Bay by boat and the probability of damage to coral increases when anchors are used instead of fixed moorings.

Applicant has made a substantial financial investment in promoting recreational activities in Kealakekua Bay, it provides employment for 25 Hawaii residents, and it contributes to the Kona Coast economy. In order to continue to provide a needed service to visitors from other parts of Hawaii as well as from other parts of the world, Applicant is willing to conform to reasonable terms and conditions that will result in acceptable uses of the waters of Kealakekua Bay.

The mooring used by Applicant was installed in 1963 by Captain Jack Ross, who still resides in Kona. A copy of a letter from Captain Ross attesting to this matter is attached as Exhibit B-2. Applicant requires a mooring to properly provide its recreational services in the bay. Since this was installed prior to the current regulations regarding boat moorings, Applicant believes that this mooring has been "grandfathered".

Applicant is aware of the Kealakekua Bay Marine Life Conservation District Regulations adopted in 1981; the Division of State Parks Regulation No. 1 adopted in 1971; the Small Boat Harbors Regulation adopted in 1970; and the Division of Fish and Game Regulations for Kealakekua Bay adopted in 1969. However, the mooring set by Captain Ross predates all of these regulations.

March 24, 1990

Dear Sirs,

In 1963 George Thomas (then owner of Aerial II) and I, set a mooring in Kealakekua Bay to be used by Aerial II, and my boat, Kalama. The mooring was also to be used as a storm refuge for Keauhou Boats. George Thomas then leased the Aerial II to the Kona Village Resort and reverted the use of the Kealakekua Bay mooring to me.

In 1971 I told Mike Dant, owner of Fair Wind, that he could use the mooring in Kealakekua Bay for his snorkel cruises, since I was only using the mooring for storm refuge. The agreement was that Mike was to keep the mooring well maintained and in good condition.

Throughout the last 27 years I've owned the following boats: The Kalama, Marlene, Miss Kona, and the Captain Jack and would take them to Kealakekua Bay for storm refuge. In 1982 I survived hurricane Iwa with 8 other boats joining me in Kealakekua Bay. In May of 1988 a storm hit Kona and 16 Kailua boats could not get in to Honokohau Harbor for refuge. There were 8 boats that rode out the storm in Kealakekua Bay, (including the Captain Jack and Fair Wind), when its use was imperative.

I would like to mention that at least a half dozen days and nights are spent riding out severe high surf and winds. The Kealakekua Bay mooring remains a vital one for storm refuge because Honohokau Harbor often gets closed out and can be extremely dangerous to enter or leave during high surf or storm conditions. Several boats have been destroyed while attempting to enter or leave the harbor. I also want to mention that the mooring in Kealakekua Bay is a 3-point mooring which means no dragging of the chain on the bottom and no damage to the coral. It would seem only fair that with 27 years of continual use of the mooring there would be some consideration for a Grandfather Clause.

Use of the mooring in Kealakekua Bay remains vital to the safety of our vessels. Isn't it better to keep a well maintained mooring in the bay for times when refuge is needed than to have boats come in and drop anchor?

Sincerely,

Jack Ross

Jack Ross

EXHIBIT B-2

ATTACHMENT "C"

I. Description of Parcel

A. Existing Structures/Use. Applicant is requesting approval to set a boat mooring in Kealakekua Bay, which would be used to moor Applicant's boats in the course of daily visits to that location. Applicant has moored its trimaran boats at this location in the course of daily visits to Kealakekua Bay for the past 19 years and the mooring has been at its present location since 1963. Applicant's owners have been engaged in providing guided visits to Kealakekua Bay and this activity has been their only means of livelihood during this period. Site plan maps of the area are attached as Exhibits C-1, C-2, C-3, and C-4. The present location of the mooring is indicated on Exhibit C-4.

B. Existing Utilities. There are no utilities involved in this application.

C. Existing Access. Access to the mooring is by sea vessel only and is usually approached by entering Kealakekua Bay from a southwesterly direction. Please refer to Exhibit C-4.

D. Vegetation. A complete description of the vegetation is described in the environmental assessment, included with this application as Attachment "A".

E. Topography. The waters of Kealakekua Bay vary between shoreline and over 80 feet in depth. A contour map showing the underwater area is included in the environmental assesesment.

F. Shoreline Area. The shoreline area will not be considered as part of this application.

G. Existing Covenants, Easements, Restrictions. Applicant is not aware of any existing covenants or easements affecting the subject mooring.

H. Historic Sites. Historic sites will not be considered as part of this application.

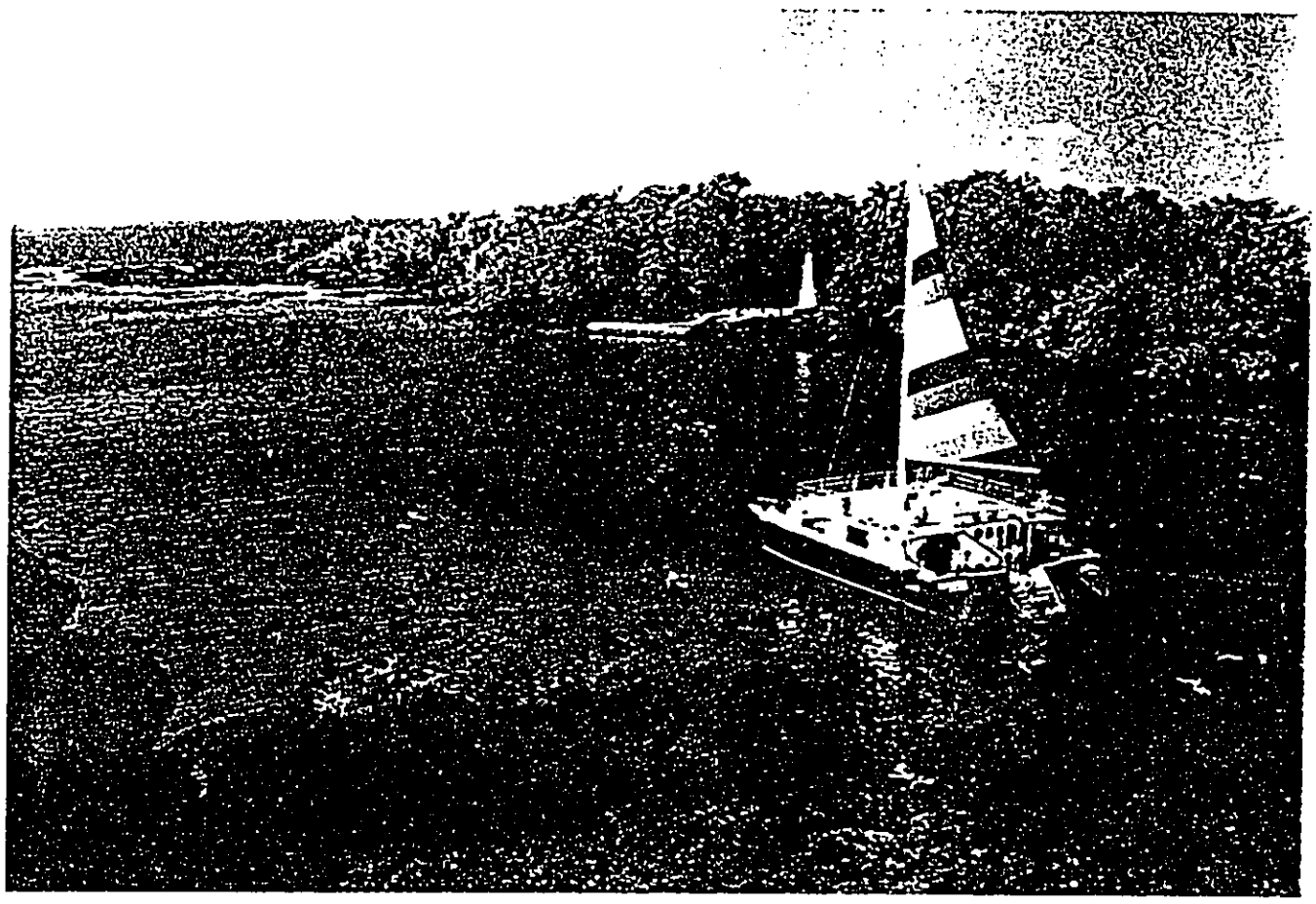
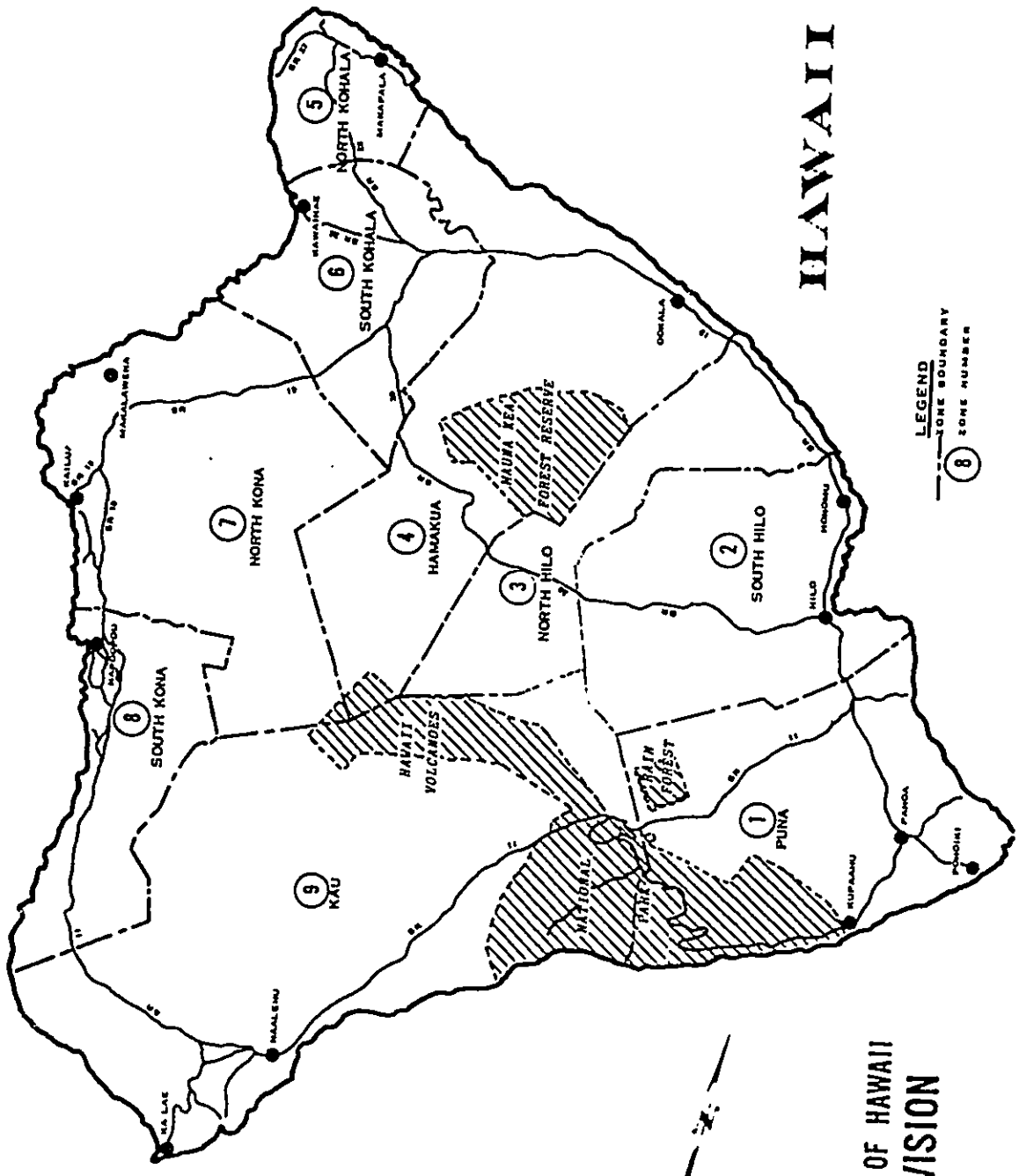


EXHIBIT B-1

EXHIBIT C-1



INDEX MAP OF HAWAII
3rd DIVISION

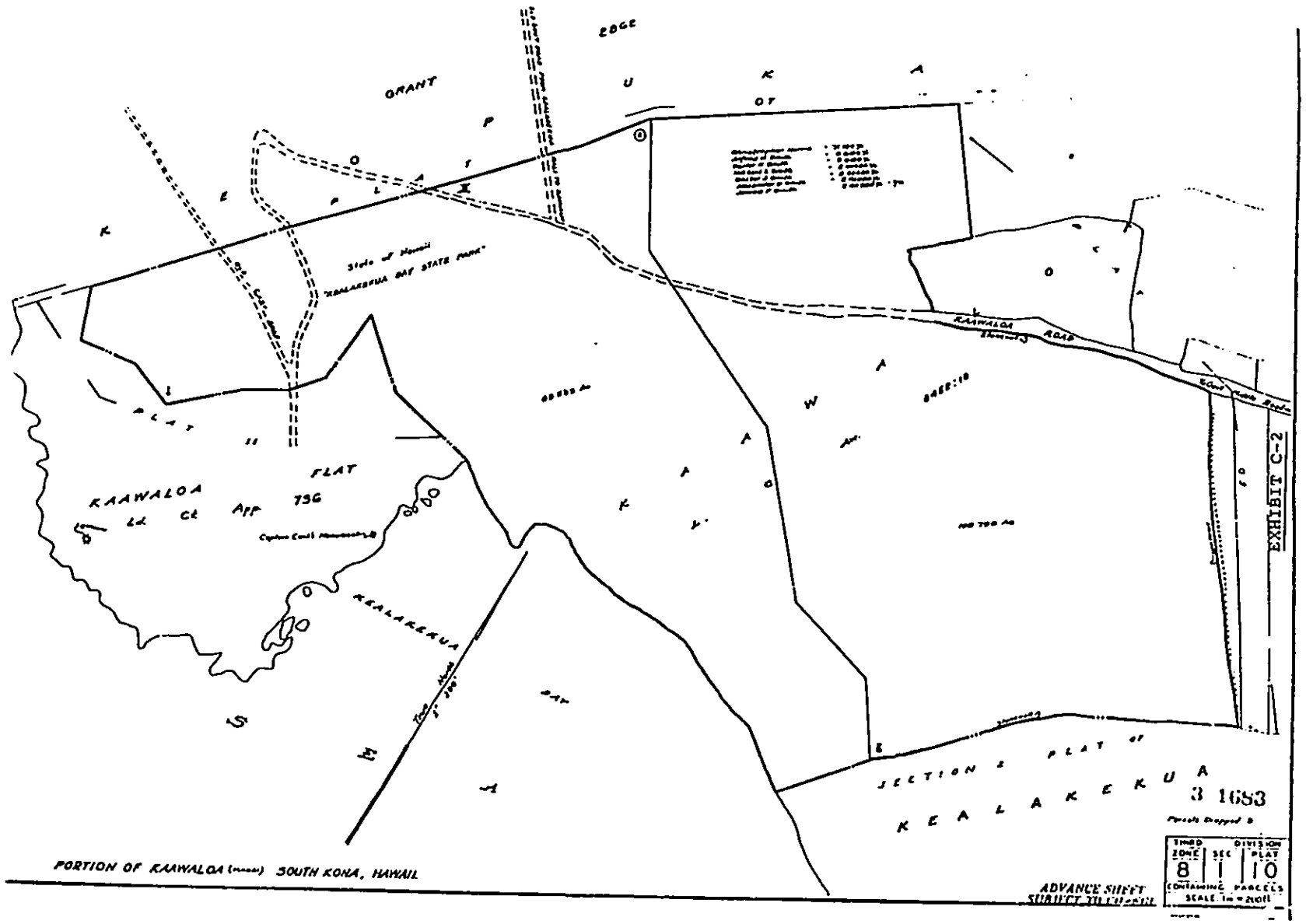
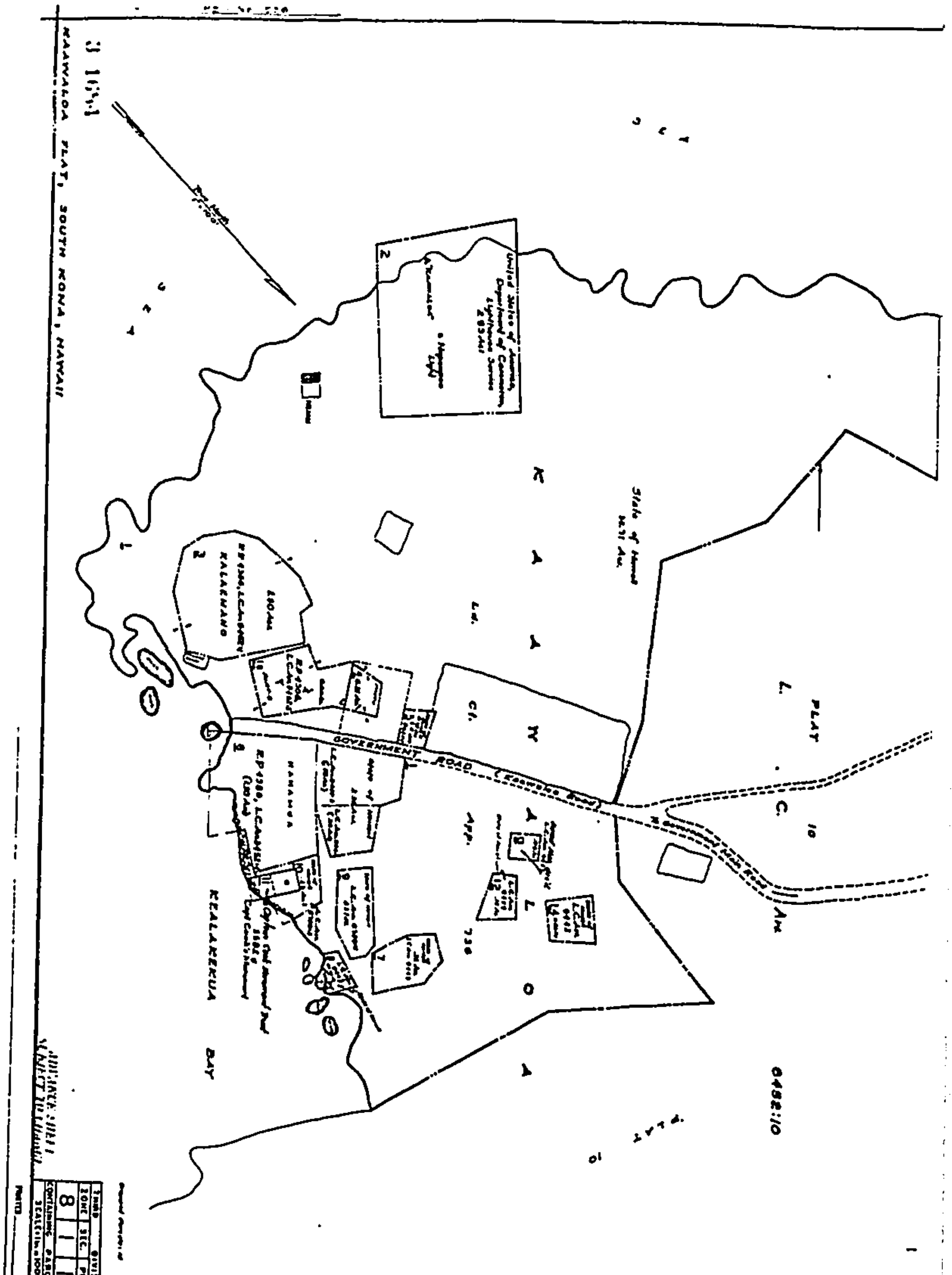

EDGE
GRANT
KAAWALOA
FLAT
KAAWALOA
KEALAKEKUA
SECTION 2 PLAT 47
KEALAKEKUA
3 1683
THIRD ZONE 8
SEC 1
DIVISION PLAT 10
ADVANCE SHEET
SUBJECT TO REVISION
PORTION OF KAAWALOA (ahupuaa) SOUTH KONA, HAWAII

EXHIBIT C-2



KAAWALOA FLAT, SOUTH KONA, HAWAII
GOVERNMENT ROAD
KEALAKEKUA BAY
KALAEMANO

EXHIBIT C-3

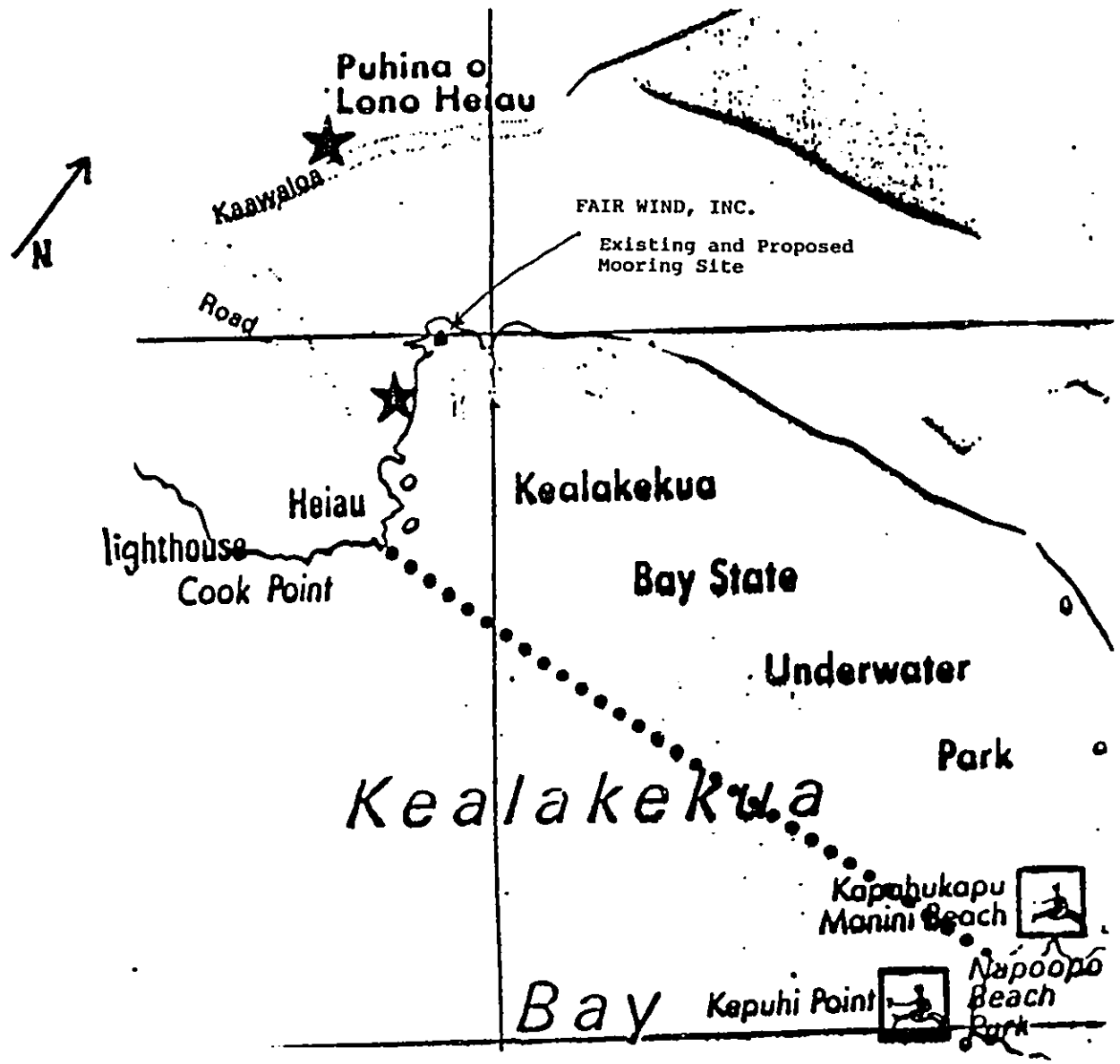

Puhina o
Lono Heiau
Kaawaloa
N
FAIR WIND, INC.
Existing and Proposed
Mooring Site
Road
Heiau
lighthouse
Cook Point
Kealakekua
Bay State
Underwater
Park
Kealakekua
Bay
Kapahukapu
Manini Beach
Napoopo
Beach
Park
Kapuhi Point

EXHIBIT C-4

ATTACHMENT "D"

II. Description of Proposed Activity

Applicant conducts two daily tour boat cruises to Kealakekua Bay, located along the Kona Coast on the Island of Hawaii. Each cruise commences and terminates at Keauhou Bay and transports its passengers aboard the trimaran Hookele. The trimaran Fairwind is also used but it is currently in dry dock repair. The route is along the Kona Coast from Keauhou Bay to Kealakekua Bay. While at Kealakekua Bay, the visitors swim, snorkel and scuba dive. A meal or snack is served to the passengers and the vessel returns to Keauhou Bay. The morning sail commences at 8:30 a.m. and ends at 1:00 p.m., with about a 2-1/2 hour stay at Kealakekua Bay. The afternoon sail commences at 1:00 p.m. and ends at 4:30 p.m., with about a 1-1/2 hour stay at Kealakekua Bay. Applicant is a family-owned business that has been providing guided tours to Kealakekua Bay for 19 years. The family has made substantial investments in two trimaran boats, provides employment for 25 Hawaii residents, and produces about $60,000 in Hawaii taxes each year. Applicant seeks approval of the placement of a boat mooring in the bay in order to provide this recreational service to Kona visitors and a determination that its present mooring has been "grandfathered" because it was installed prior to the effective date of State regulations regarding boat moorings.

ATTACHMENT "E"

II. Subzone Objective: The intended use is consistent with the objective of the Protective Conservation District use Subzone.

The relevant portion of the stated objective for the Protective (P) Conservation District Subzone provides for the protection of marine sanctuaries. See Hawaii Administrative Rules, Section 13-2-11.

The use intended through this application, guided tours to Kealakekua Bay for the purposes of swimming, snorkeling, glass bottom viewing and scuba diving, is specified as a permitted recreational use by the regulations. Indeed, Kealakekua Bay has been designated as a state park so that the public may enjoy the fish, plants and coral growths found at that location. Without the service provided by Applicant, many visitors to the Kona Coast would not be able to enjoy this recreational activity.

There is a question, however, with regard to the appropriate boat moorings to be used to accommodate vessels that bring visitors who wish to use the waters of the bay for recreational purposes. Clearly, there is a demand for services to transport visitors to Kealakekua Bay, which should be recognized and tempered by reasonable terms and conditions. Visitors who are interested in visiting the bay will find some means to do so and, through this application, Applicant proposes to meet a part of that demand in a reasonable manner. The environment of Kealakekua Bay can be protected, but it need not be done by prohibiting the use of the bay's waters by excluding visitors, but rather by reasonably regulating the intensity of the human use of the area.