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PUNALUU KAU
G. H. BALAZS
Kewalo Basin Research Facility
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WATER QUALITY AND MARINE LIFE MONITORING AND MITIGATION PLAN FOR THE PUNALU'U RESORT PUNALU'U, KA'U DISTRICT, HAWAII

DRAFT

Prepared for

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INTRODUCTION AND PURPOSE

Plans for the Punalu'u Resort, located in the Ka'u District on the Island of Hawaii, presently include the development of golf courses and construction of residential and commercial structures. The project area fronts on approximately 3/4 of a mile of ocean shoreline between Punalu'u Harbor and Ninole Cove. In addition to the marine environment, the shoreline of the resort property contains several coastal ponds.

None of the project plans call for direct alteration of the actual shoreline, or infilling of any of the ponds on the project property. Therefore, construction of the proposed project should not involve direct changes of the physical components of the marine environment. The potential exists, however, as it does in all development situations that the changes in land uses may induce effects to the chemical and biological aspects of the marine environment. Changes in land uses may alter access, causing usage of the area by humans to vary, either through consumptive (i.e. fishing) or passive uses. Construction and operation of the development may cause alteration of chemical materials that reach the marine and aquatic environments through runoff and groundwater leaching. These chemicals are routinely used for fertilization and pest control. Because of the concern for maintaining, or even improving, the present level of environmental quality in the marine environment, it has been deemed essential to institute a marine monitoring and mitigation plan. The purpose of this document is to present the objectives and methods for this plan.

Objectives

The overall goal of the proposed marine environment monitoring program is to evaluate if activities related to the construction and operation of the Punalu'u Resort cause changes sufficient to promote the alteration of water quality and biological community structure. Specific information on which the monitoring plans are based was obtained from the "Final Environmental Impact Statement (FEIS), Punalu'u Resort" dated April 1988.

Specific objectives are:

1) To establish a baseline set of water chemistry parameters that delineate the presently occurring environmental conditions in the ocean offshore of the proposed development. Chemical composition of the environment will be evaluated by analysis of parameters specified by State of Hawaii, Department of Health water quality standards (Chapter 11-54 S11-54-06 (3)), as well as several other parameters that are not listed by DOH, but provide important information. Only very limited data relating to water chemistry were collected during surveys associated with the Punalu'u Resort FEIS. Thus, the information collected during the monitoring program will represent the earliest records of water chemistry parameters.

2) To establish a comprehensive quantitative and descriptive baseline of biotic communities in the nearshore marine environment. All methods used to assemble the baseline will incorporate criteria listed in DOH water quality standards (S11-54-07 (3)(D)). Marine biological data collected for the FEIS was limited to species checklists with only descriptive estimates of organism abundance. In

order to establish a monitoring program with meaningful comparative capabilities, biological community structure will be analyzed in a quantitative manner.

3) To evaluate the degree of natural stresses (sedimentation, freshwater input, etc.) that influence nearshore marine communities in the vicinity of the proposed development. Typically, the composition of nearshore communities is intimately associated with the magnitude and frequency of these stresses, and any impacts caused by the proposed shoreline modification will be superimposed on natural environmental factors. Therefore, evaluating the range of natural stress is a prerequisite for assessing the potential for additional change to the marine environment owing to shoreline modification.

4) To determine if water chemistry and biotic community structure (based on quantitative data bases) change during the construction and operation of the Resort beyond the range of natural variability.

5) if environmental changes are noted as a result of construction, or resort operation, to suggest mitigative measures to minimize impacts, based on the characteristics of the environment determined by the baseline.

Monitoring Schedule

The monitoring program will cover the pre-, during-, and post-construction periods. The preconstruction monitoring phase is designed to establish the existing character of the marine environment, including aspects of temporal (seasonal) and spatial variability. The characterization will include quantification of both water chemistry parameters that define water quality, and biotic assemblages. In addition, preconstruction monitoring will serve to evaluate the degree of natural stresses (sedimentation, wave scour, freshwater input, etc.) that influence the nearshore marine environment in the area that could be potentially influenced by the proposed project.

The intent of the during-construction phase of monitoring is to determine if, and to what extent, construction activities are perturbing environmental processes beyond the envelope of natural variability established during the preconstruction phase. Monitoring will occur frequently enough to allow mitigative actions to be taken to reverse any identified perturbations before such changes cause permanent or irreversible impacts.

Following completion of all construction activities, the following 12-month interval should constitute the post-construction period. The purpose of the post-construction phase of monitoring is to identify if operation of the Resort is causing alteration of marine environmental parameters that require mitigative measures. If results of post-construction surveys indicate that there are no adverse effects from the project after the 12-month period, it is suggested that monitoring frequency is reduced to a routine maintenance level. If, after one year, monitoring results indicate effects that are considered negative to the environment, post-construction monitoring should be continued.

OUTLINE OF WORK

I. WATER CHEMISTRY

A. Parameters - A baseline set of water chemistry parameters will be established that delineate the present environmental conditions of the nearshore ocean offshore of the site planned for Resort development. Chemical composition of the environment will be evaluated by analysis of all parameters specified by State of Hawaii, Department of Health water quality standards (Chapter 11-54 S11-54-06 (3)), as well as several other parameters that are not listed by DOH, but provide important information. Specific parameters include total nitrogen (TN), nitrate nitrogen (NO_3^-), ammonium (NH_4^+), total phosphorus (TP), orthophosphate phosphorus (PO_4^{3-}), dissolved silica (Si), salinity, turbidity, chlorophyll a, dissolved oxygen, temperature and pH. This range of parameters includes those that are sensitive to alteration of groundwater dynamics, and sediment input. Particular attention will be given to evaluating the influence of groundwater and pond water entering the marine environment, as these inputs may be critical in altering biotic assemblages in nearshore marine environments.

B. Sampling Sites - Water samples will be collected along three transect stations oriented perpendicular to the shoreline off the proposed Resort, as well as a fourth control transect. One station will be located in Punalu'u Bay off of Punalu'u Beach Park; one station will be located in Ninole Cove; and one station will be located off the central region of the property (see Figure 1). The control site will be selected so as to be physiographically similar to the project area, but spatially removed from the effects of the proposed construction. Such a control should delineate if any observed environmental changes are caused by inherent natural variability or resort-related activities. Wherever feasible, location of transects will be selected to intersect any visible areas of groundwater or pondwater efflux along the shoreline. At each transect, water samples should be collected at approximately 7 locations ranging from the highest wash of waves in the intertidal zone, to approximately 500 m offshore. As a key interest concerning project impacts deals with effects from shoreline emissions, sampling should be concentrated in the shallow nearshore areas where effects would be most noticeable. A suggested sampling scheme would include collection at distances of approximately 0.1, 1, 5, 10, 50, 100, and 500 m from shore. Where water depths are greater than 1 m, surface and bottom samples should be collected; surface samples should be taken from within the upper 2 cm of the water column, bottom samples should be collected within 0.5 m of the seafloor. Such a sampling scheme, which allows scaling of water chemistry parameters to salinity, has been established as an effective method of determining not only changes in groundwater discharge, but whether additional chemical sources on land are contributing to material input to the marine environment (Smith and Atkinson 1990, Dollar and Smith 1988). This methodology also eliminates the necessity of repetitive sampling at the same tidal state in order to compare temporal variability. In addition, the sampling scheme allows for determination of spatial variability of chemical constituents within the horizontal range of the survey (across the reef), and with respect to vertical stratification.

C. Sampling Methodology - Water samples for nutrient analyses should be collected in the field in acid-washed polyethylene bottles. Analysis for total N, total P, NH_4^+, PO_4^{3-}, NO_3^- + NO_2^-, and Si should be performed according to standard methods for seawater analysis (Strickland

and Parsons 1968). Turbidity should be determined on subsamples fixed with HgCl to terminate biological activity using a nephelometer, with results reported in nephelometric turbidity units (NTU). Chl. a should be measured on particulate material collected from filtering at least 300 ml of water through glass fiber filters; pigments on filters should be extracted and assessed fluorometrically. Salinity should be determined using a laboratory salinometer with a readability of at least 0.001°/oo. In-situ measurements should include dissolved oxygen and water temperature using field meters with readabilities of 0.01 milligrams per liter (mg/l) and 0.1° C., respectively. pH should be determined in the field with a meter with a readability of 0.1 pH units.

D. Sampling Frequency

1. Preconstruction - For the preconstruction monitoring phase, water chemistry analyses should be conducted quarterly for an annual cycle prior to initiation of any construction activity. Quarterly sampling should provide adequate information on temporal (seasonal) variability. In order to delineate the optimum range in parameters, sampling should be biased toward "extreme" situations. Such situations should include summer periods of low rainfall, and spring tides (minimum mixing in the nearshore zone), and winter periods of heavy rainfall and runoff. Such a sampling regimen should provide mean values of water chemistry parameters that encompass the range of environmental variability.

2. During-Construction - During construction of the Resort facilities, water quality monitoring surveys should be carried out bimonthly (every 2 months).

3. Post-construction - Following completion of all phases of the construction process, a water quality monitoring survey should be performed within 1 month. For the remainder of the year constituting the post-construction period, surveys should be performed quarterly.

II. REEF STRUCTURE AND BIOTA

A. Parameters - Descriptions of marine biological communities presented in the FEIS indicate relatively depauperate assemblages in Punalu'u Bay and Ninole Cove. The physical and biotic structure of the reef environment in these areas, as well as further offshore, should be evaluated by establishing a descriptive and quantitative baseline of benthic reef communities. Key components of reef communities includes hermatypic and soft corals, benthic algae, motile macroinvertebrates, reef fish, sea turtles, and substratum type. Community structure data will also serve as a baseline for evaluating actual changes that occur during and after construction.

B. Sampling Sites - The initial phase of the proposed monitoring program should include qualitative reconnaissance surveys covering the entire area fronting the Resort property between Koloa Beach and Punalu'u Harbor, from the shoreline out to the normal limits of Hawaiian coral reef formation (approximately the 20 m depth contour). These reconnaissance surveys should be useful in making relative comparisons between areas, identifying any unique or unusual biotic resources, and providing a general picture of the physiographic

structure and benthic assemblages occurring throughout the region of study. Following the qualitative survey, at least 4 quantitative survey sites should be selected. A likely placement for the biological transect sites will replicate the water chemistry sites (Punalu'u Harbor, Ninole Cove, the central area of the resort property, and a control site). At each survey site, transects should be established in each representative zone of the reef environment from the intertidal to the deep reef slope. As existing data in the FEIS is limited to shallow areas within Punalu'u Harbor and Ninole Cove, exact determination of the zonation pattern will be established only after reconnaissance surveys.

C. Sampling Methodology

1. Benthos - A recommended method for quantitative benthic surveys is a photo-quadrat method. This method involves stretching a transect line over the reef surface between two end markers. Transects should be at least 50 m long, and should be oriented parallel to the shoreline. A quadrat frame, with minimum dimensions of 1 m by 0.66 m, is then sequentially placed over 10 random marks on the transect line so that the line bisects the long axis of the frame. At each quadrat location a color photograph records the segment of reef area enclosed by the quadrat frame. In addition, a diver knowledgeable in the taxonomy of resident species visually estimates the percent cover and occurrence of organisms and substratum type within the quadrat frame. No attempt should be made to disturb substrata to observe organisms. Following the period of field work, quadrat photographs are projected onto a grid and units of bottom cover for each benthic faunal species and bottom type are recorded. Results of the photo-quadrats should be combined with the in-situ cover estimates, and community structure parameters (percent cover, species diversity) are calculated. This photo-quadrat transect method is a modification of the technique described in Kinzie and Snider (1978); it has been employed in numerous field studies of Hawaiian reef communities (e.g. Dollar 1979, Grigg and Maragos 1974, Grigg 1983), and has proven to be particularly useful for quantifying coverage of attached benthos such as corals and macrothalloid algae, and large epifauna (holothurians, echinoderms). Particular attention should be given to characterizing benthic algal abundance, in support of the sea turtle habitat assessment program.

2. Reef Fish - Quantitative assessment of reef fish community structure should be conducted in conjunction with the benthic surveys. One method of conducting fish survey is as follows: As the benthic transect line is being laid along the bottom, all fishes observed within a band approximately 2 m wide along the transect path are identified by species name and enumerated. Care is taken to conduct the fish surveys so that the minimum disturbance by divers is created, ensuring the least possible dispersal of fish. This transect method is an adaptation of techniques described in Hobson (1974).

D. Sampling Frequency

1. Preconstruction - In contrast to water chemistry parameters, which can vary substantially on time scales as small as hours or days, benthic communities are generally not subject to short term temporal fluctuations. For this reason, two samplings, one in the summer and

one in the winter, should be sufficient to provide a preconstruction baseline characterization of reef communities.

2. During-Construction - During project construction, biotic community structure monitoring should be conducted at least twice yearly. If substantial changes to water chemistry are noted during this phase of monitoring, annual biotic structure monitoring should be increased to quarterly until it is established that chemical alteration is not responsible for alterations of community structure.

3. Post-construction - Following completion of all phases of construction, a benthic monitoring survey should be performed within 2 months. A second post-construction survey should be performed after an additional time increment of 6 months.

III. SEA TURTLES

A. Survey Objectives

The Punalu'u area of Ka'u has been cited as an important foraging and resting environment for the threatened Hawaiian green sea turtle (Chelonia mydas), and a nesting area for the endangered hawksbill turtle (Eretmochelys imbricata) (Balazs 1979, Naughton 1986). In order to quantify turtle abundance, delineate habitat usage, and attempt to determine if behavior is modified as a result of development, a turtle monitoring program will be established and carried out.

B. Sampling Area

Documented observations of turtles indicate that turtle foraging takes place in the inner reaches of Punalu'u Harbor, where luxuriant growths of benthic algae occur. Results of other surveys around the Hawaiian Islands suggest that daytime turtle resting habitat is often the undercut ledge at approximately the 20 m depth contour. For the present survey, the entire area fronting the Punalu'u Resort will constitute the area of investigation (total survey area = approximately 1000 m of shoreline).

C. Sampling Methods

Turtle abundance and behavior in shallow shoreline areas of Punalu'u Harbor and Ninole Cove will be assessed by divers swimming from shore in a search pattern designed to cover the entire inner shoreline area. If practical, outer reef areas will be surveyed with battery powered dive scooters, or tow sleds. While accompanied by a surface escort boat, divers in tandem will traverse the offshore area fronting the Resort property out to the 20 m depth contour. On sighting a turtle, divers will note approximate location of siting, carapace length, sex, behavior, and any distinguishing characteristics (tags, tumors). On reaching the terminus of the transect, the route and procedure will be repeated in the opposite direction. While divers are traversing underwater, the boatman will note any surface sightings. A collaborative effort of the turtle surveys and benthic reef surveys will involve characterization of algal resources. Reef surveys will identify and quantify algal species distribution and abundance.

D. Frequency

1. Preconstruction - Turtle surveys should be conducted quarterly for a year preceding construction. If, after several surveys it is agreed by National Marine Fisheries representatives that turtle populations and habitat usages have been adequately defined, further preconstruction surveys may be eliminated.

2. During-construction - During construction of the Resort, turtle surveys will be carried out quarterly (every 3 months). Monitoring will be increased to bimonthly (every 2 months) if substantial changes are noted in water chemistry parameters associated with construction.

3. Post-construction - Following completion of all construction, a turtle survey will be conducted within 2 months. A second post-construction survey will be conducted after an interval of six months.

MITIGATIVE MEASURES

The best mitigative measure for ensuring that there are no adverse environmental impacts is proper planning prior to any construction. Specific criteria which should be addressed in the planning phases are:

1) All grading plans should conform to State and County requirements limiting the amount of land that is exposed to erosion at any one time. If possible, schedules for grading should minimize the time when land is exposed during the winter season, when heavy rainfall is most prevalent.

2) Planning should eliminate the placement of lights around the Resort area that are visible at night from the beaches known as Hawksbill turtle nesting sites.

3) All fertilization and pest control practices should be coordinated and carried out by trained personnel familiar with "best management practices" for golf course and landscape maintenance.

The analytical methods proposed for the monitoring program are designed with the intent of being able to identify material added to the marine environment from extraneous sources (i.e. other than natural inputs), at levels lower than are likely to cause significant alterations to either water quality or marine community structure. As a result, the monitoring program should function as an "early warning" indicator of potentially stressful situations. If monitoring results indicate that material is being added to the marine environment as a consequence of construction or operation of the proposed development, mitigative actions can be undertaken. In the construction phase, the most likely cause of perturbation is erosion and runoff associated with exposure of soils during grading. As this phase is essentially a "one-time" event most mitigative measures involve the planning stages. In the operational phase, the most likely cause of impacts would be leaching of chemicals to groundwater or stream flow with subsequent discharge to the coastal ponds and nearshore ocean. Monitoring methods are specifically sensitive to addition of fertilizer nutrients (nitrogen and phosphorus), and excess materials can be detected at extremely low levels compared to naturally

occurring concentrations in the marine environment. Any detected throughput of fertilizer nutrients that is responsible for changing water quality, or marine community structure, should trigger a cessation of fertilization until the causative factors are identified. In this case, mitigative measures would involve scaling down application rates to match uptake.

DATA REPORTING

Following the commencement of the monitoring program, a written report will be prepared quarterly. Each report will contain all cumulative data collected to that point in the program presented in tabular form along with appropriate graphic representations and explanatory text. Geometric means and individual measurements of water quality will be analyzed for compliance with DOH Water Quality Standards by comparison to specific criteria for open coastal waters. During the construction and post-construction phases, water quality data will be compared to preconstruction data to determine if there are changes occurring beyond the ranges identified during the baseline surveys. If data analysis reveals that there is augmentation to chemical constituents as a result of construction, interpretation will be made as to the detrimental potential of the increased values. If the evaluation is made that there is potential for detrimental changes, mitigative measures will be suggested.

Community structure parameters including abundance and diversity of all transect results will be presented in each quarterly report. Statistical analyses will indicate if differences exist between the preconstruction baseline and subsequent construction and post-construction data. All characteristics of sea turtle population parameters will be reported. If any community characteristics are revealed that indicate negative impacts that have not been addressed by evaluation of water quality, additional mitigative measures will be suggested.

Copies of quarterly monitoring reports will be submitted within 30 days of the end of the quarter to the Project owners for review and distribution to pertinent agencies or parties.

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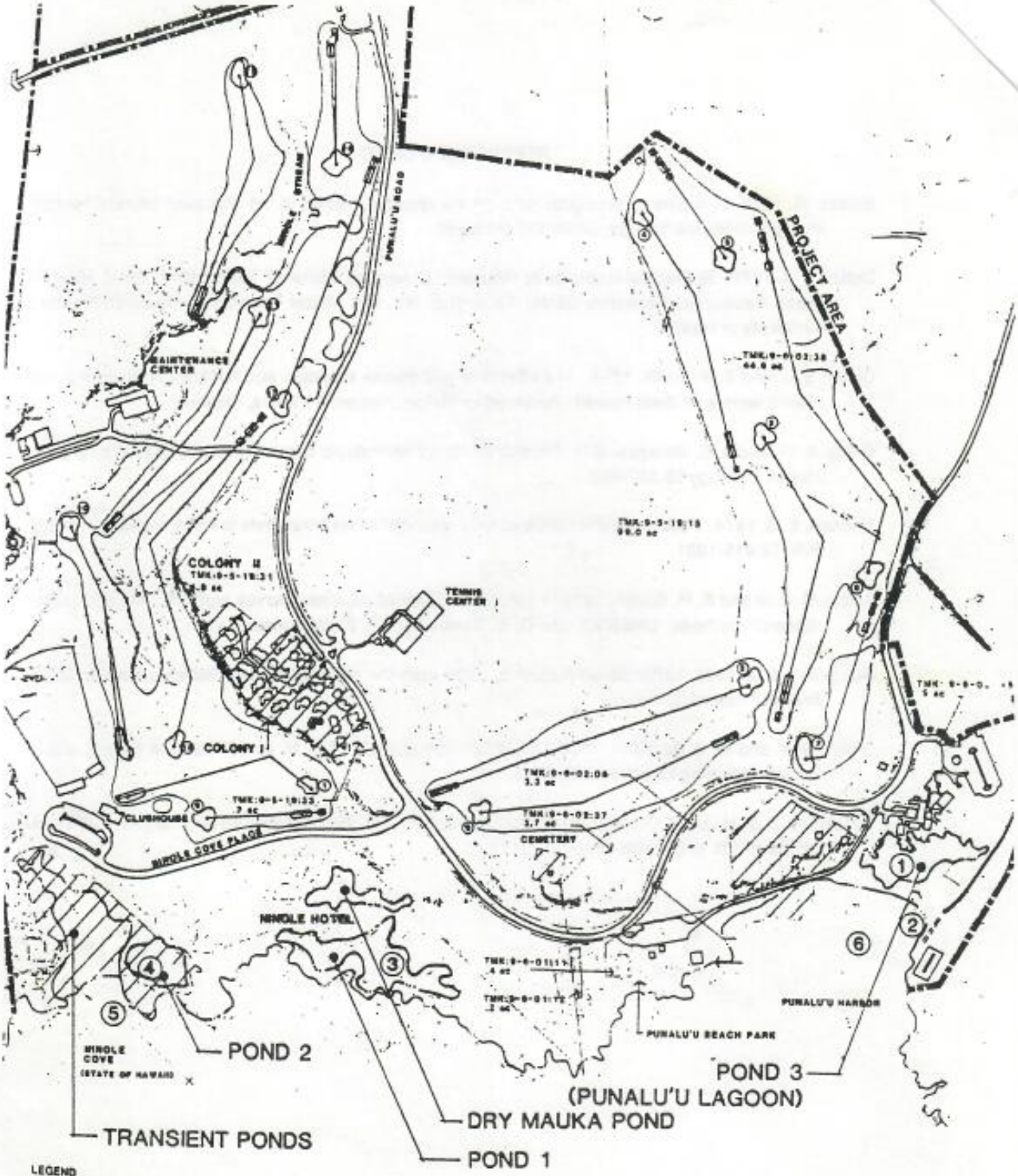

FIGURE 1.

COASTAL POND SURVEY AREAS

Punalu'u Resort

KA'U, ISLAND OF HAWAII

NORTH SCALE 200 0 200 400 FEET

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FIGURE IV-19

resort expansion

One of the objectives of Chapter 205A relating to Coastal Zone Management (CZM) is to protect valuable coastal ecosystems and to minimize adverse impact on all coastal ecosystems. According to a botanical survey of the project site, the flora within the project site is composed largely of exotic species due to the development of residential and recreational facilities. The only portion of the project site where native plants provided the dominant cover is along the coast. The study recommended that improvements within the coastal strand and wetland areas be limited. The survey also identified the coastal region, including the numerous coastal brackish ponds, as potential wetland habitats. The scarcity of such habitats on the Island of Hawaii only adds to the importance of its preservation. As previously mentioned, a marine and coastal baseline survey of the area found that the coastal waters fronting the project site were the foraging habitats of the endangered Green Sea Turtle and the Hawksbill Turtle. In addition, the coastal area fronting the project site is a nesting area for the Hawksbill Turtle. A Shoreline and Pond Management Plan has been prepared by the applicant in compliance with the conditions of the zone change of the project site. The objectives and goals of the management plan are to: 1) Preserve the beauty and uniqueness of the Punalu'u coastline; 2) Protect and enhance the significant natural, scenic, cultural and historic resources of the area; 3) Ensure public access to the shoreline area; 4) Protect the coastal ecosystem; specifically the endangered populations of marine and terrestrial species of the area; 5) Enhance the system of coastal ponds to improve habitats for animal species and increase aesthetic and recreational opportunities for the local community and resort guests; 6) Manage and improve the shoreline area for long term sustainable use by balancing the needs for preservation with increased recreational and cultural opportunities; and 7) Provide a comprehensive overview and guide for future utilization and management of the Punalu'u shoreline. The plan currently proposes that the shoreline area from Ninole Cove to Punalu'u Beach Park and its proposed park expansion area be preserved in its natural state. Vehicular traffic will be restricted from the shoreline areas. The area surrounding Ninole Cove will be enhanced with landscaping and improvements to the pathway system. The primary improvement within the coastal area is the proposed construction of a pedestrian pathway with picnicking and rest areas. The plan states that maximum consideration will be made to protect the Hawksbill

Turtle during its July to December nesting season. The further review and approval of the Shoreline and Pond Management Plan by appropriate agencies and the imposition of the 1000±-foot structural setback from the shoreline will ensure that the objectives of the plan are properly executed. With these considerations, the Coastal Zone Management policy of minimizing disruption of coastal ecosystems will be supported.

Another criteria in reviewing an SMA Use Permit application is that "The development will not have any significant adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interest. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect and elimination of planning options." The proposed development is not anticipated to have any substantial adverse environmental or ecological effects, provided approved management and mitigation plans are implemented. Botanical and terrestrial fauna surveys, conducted by Char & Associates in 1984, indicate that no endangered or threatened plant or animal species will be affected by the proposed development. The applicant's Shoreline and Pond Management Plan states that the habitat for the endangered Hawksbill Turtle and Green Sea Turtle will be maintained in their natural state and maximum consideration will be given to the Hawksbill Turtle during its nesting season. As previously mentioned, further review and approval of the Shoreline and Pond Management Plan will minimize disruption to coastal areas within the project site.

A full archaeological reconnaissance survey of the entire project site was conducted in 1986. The applicant intends to preserve all sites recommended by the consulting archaeologist. Further, to implement a condition of the previously mentioned change of zone ordinance, further review and approval of the applicant's Cultural Resource Management Plan by the affected agencies will ensure that the CZM objective to "protect, preserve and where desirable restore significant historic and cultural resources" will be satisfied.

It should be noted that any potential runoff or discharge which could reach ocean waters can be handled by on-site improvements. Negative impacts on the local water quality resulting from soil erosion and runoff during site preparation

WEST HAWAII TODAY
4-12-90 P.9A

LETTERS

Just say no

Editor:

To all those who despair that our opposition to Governor Waihee's proposed rocket launch facility will not be heard — take heart.

Do not be discouraged by the apparent arrogance of former admiral Hayward. His long and illustrious career in the military has prepared him to give orders, not to listen to the people. He is ill at ease in situations where people want to know the truth and all the details of his activities, preferring instead that we follow orders and leave the strategy to him. The good news is that his power is extremely limited, and those politicians who control him have heard us.

We were very fortunate to have had the opportunity to hear William Paty speak at a meeting of the Greater Kona Community Council on the evening of March 26. Paty serves as chairman of the Board of Land and Natural Resources, and also as chairman of Governor Waihee's re-election campaign. Many questions concerning the rocket launching facility were asked of Paty that night. He let us know that Gov. Waihee was aware of our strong and broad-based opposition to that project.

Then Councilman Harry Ruddle brought the loudest applause of the night when be announced that he and Helene Hale had spoken to U.S. Senator Daniel Inouye and U.S. Representative Daniel Akaka to let them know that Hawaii County would prefer not to have a rocket launch facility developed here. He further informed us that the facility was not Waihee's idea, that he had "inherited" it. It's starting to sound as if he wished it would disappear. If he would just say no, it would.

Let's all continue to encourage Gov. Waihee to re-evaluate his position, as he certainly shouldn't feel obligated to realize someone else's bad idea. Call 1-800-468-4644. Helene Hale and Harry Ruddle have heard the people and have taken action. Governor Waihee should do the same and withdraw his support from this project.

Diane Keffer
Keokea

November 14, 1989

Ms. Teresa Bellah, Co-President
The league of Women Voters in Hawaii

Dear Teresa:

Thank you for your letter of November 17th regarding a public forum on the proposed launching facility to be held in Kona on December 18th. Unfortunately there must have been some mistake as I don't recall that we ever discussed this by telephone (as indicated), nor did I receive any earlier correspondence on this subject. Nevertheless, even if we had been in communication, I regret to say that I would have to decline attending a meeting of this design as a scientist employed by the National Marine Fisheries Service.

You see, my personal views on this subject would be very outspoken to the point of being incongruent with the tone that one would need at this early stage as a representative of my federal agency. Secondly, I am a biological researcher, in the research branch, thereby making me the wrong (agency-wise) person to be one of the panelists at the forum.

In case you are wondering, my personal viewpoint on the proposed facility may be simply stated as follows: If the resident people of the district want it, then the process should move forward. If the resident people don't want it, then it should die right here and now. The decision should be made immediately by a plebiscite in which a 2/3 vote would be required for the proposal to move ahead. Until such a plebiscite is held, it is my view that no environmental planning studies, or other scoping research, should be allowed, or required, because such investigations, and the resulting reports, have a way of being "neutrally biased" in favor of the project proponents, and seemingly moreso when the proponents are the ones paying for the work. The will of the people living in the district should prevail. Because there is a high percentage of people of Hawaiian heritage, to me the plebiscite idea seems even more appropriate and "just".

Again, these are my own views, and in no way should be construed as having anything to do necessarily with the agency I work for. I wish you success with your forum, and will be watching the newspapers to see how it turns out (assuming, perhaps unrealistically, that an accurate accounting will be reported in the papers).

Sincerely,

George H. Balazs

943-1240
395-6409

$5B&A 6-11-89

Brewer confirms pending Punalu'u sale

By Hugh Clark
Advertiser Big Island Bureau

PUNALU'U, Hawaii — C. Brewer & Co. Ltd. officials met with employees and community supporters last week to discuss a pending sale of its Punalu'u Seamountain Hawaii Resort to a Japanese company.

Details of the sale of the 200-plus-acre project were not disclosed, nor was the buyer identified.

Mufi Hannemann, C. Brewer vice president put in charge of the Ka'u project two years ago, confirmed the pending deal yesterday.

Hannemann stressed that final terms of the sale have not been reached because of Brewer's desire to provide job security for resort employees in Ka'u, who number less than 100.

The sale of the resort should not come as a surprise, Hannemann said. Brewer officials have long said they needed outside money to pay for an expansion of the resort that could cost as much as $500 million.

Brewer won Hawaii County approval last year for the expansion after a long and controversial series of hearings before the Planning Commission and County Council. Major elements of the expansion include a 350- to 500-room hotel and a commercial village center.

There is now a golf course, a tennis complex and condominiums in the resort but no hotel. The development is located behind the Punalu'u Black Sands Beach between Pahala and Naalehu.

Punalu'u opened in the early 1970s and suffered several setbacks, including a 1975 tsunami that gutted the Punalu'u Restaurant. It has since been rebuilt.

While there have been several Japanese purchases of residential and resort property in North Kona and South Kohala, the Punalu'u sale would be the first major purchase by foreign investors on the eastern side of the Big Island.

Hannemann said he held the meeting with employees to try to reassure them and to put an end to a week of rumors about the sale and its impact.

He said the sale does not affect Brewer's commitment to Ka'u agriculture — including sugar, macadamia nuts and a fledgling orange industry — nor its interest in a spaceport at Palima Point southeast of Pahala.

"We still expect to have an important role in the district and we want any sale that may come in the future to be handled in the best way possible for the Ka'u residents," said Hannemann.

Sekitei completes Big Isle deal

8-9-89 HSB

☐ Seamountain's new Japanese owner plans to build a hotel

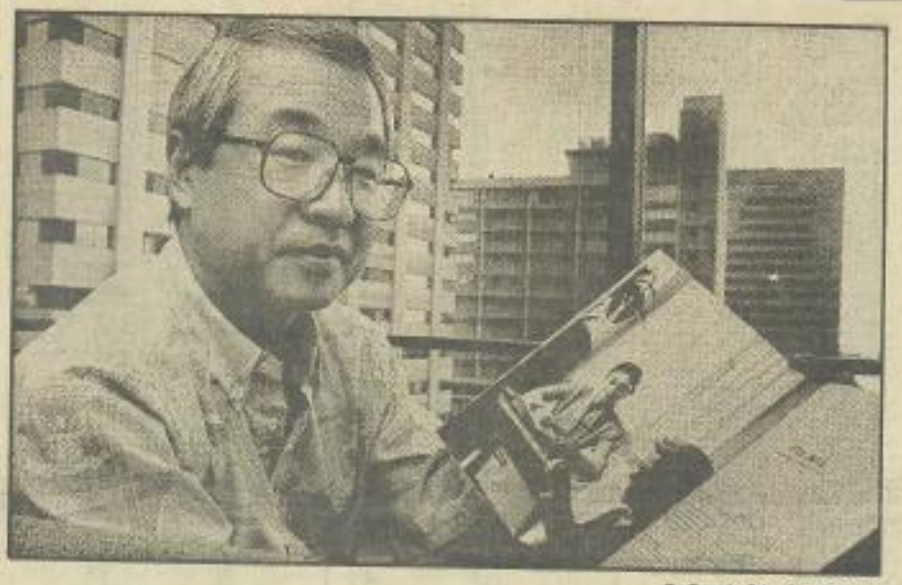
By Ken Andrade
Star-Bulletin

Sekitei Kaihatsu Co., which yesterday completed its purchase of the Seamountain at Punalu'u Resort on the Big Island and is mulling a possible investment in the Hotel Hana-Maui, doesn't want to be seen as just another Japanese conglomerate jumping on the buy-a-Hawaii-resort bandwagon.

"We are not mere real estate investors who buy and sell real estate and make a profit margin," said Kunio Arai, director of overseas projects for Sekitei and president of its newly formed Punalu'u Development Inc. subsidiary. "We are a hotel operator."

Throughout its 95-year history, the company has concentrated on running relatively small luxury hotels, Arai said, especially the Japanese-style inns known as *ryokan*.

Until its May purchase of the 92-room Hotel Bel-Air in California — which became the company's 10th resort property — all of its hotels were in the Far East. It also has a golf club and 14 restaurants in Japan, plus a restaurant each in Seoul and San Francisco.



By Dennis Oda, Star-Bulletin

Kunio Arai says Sekitei Kaihatsu is working on plans to build a hotel on its new property, the Seamountain at Punalu'u Resort, and to spurce up the golf course.

Arai was in Honolulu this week to help complete Sekitei's purchase of the 435-acre Seamountain property and to meet with Big Island officials and community leaders.

Neither Seikitei nor the seller, C. Brewer & Co., would disclose the price, but other sources have put it at about $35 million.

Arai said Sekitei is still formulating detailed plans for Seamountain, but added that the company does intend to build some sort of hotel on the property "as soon as possible" and spruce up the existing golf course.

While no final design decisions have been made, he said, the hotel probably will be in the 100-room range, with expansion possible later. The resort is zoned for a hotel of 350 to 500 rooms.

Sekitei's purchase did not extend to any of the resort condominium units that currently are the resort's only lodging facilities, nor will the company be involved in managing them, Arai said.

Sekitei's plans for the Hotel Hana-Maui — on which it has right of first refusal from the Maui resort's current owner, Rosewood Property Co. — are less certain.

"We're still negotiating," Arai said. "Nothing has been finalized yet."

Rosewood, which also sold Sekitei the Hotel Bel-Air, has indicated that it is interested in selling anything from a minority stake in the Valley Isle property to the entire resort, and Arai said that at present anything remains possible.

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LIBERT K. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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

January 4, 1988

Ms. Puanani Woo
4300 Waialae Ave., #601A
Honolulu, HI 96816

Dear Ms. Woo:

Thank you for your letter of December 22, 1987 and expression of concern for our Hawaiian sea turtles.

We share your views and have sent a copy of your letter to Mr. George Balazs, Team Leader of the Hawaiian Sea Turtle Recovery Team. The Team is finalizing a dratt Recovery Plan for Hawaiian Sea Turtles. Therefore, it would be both timely and appropriate for the Team to consider your suggestions on how Marine turtles and human beings can reasonably share Punaluu Beach for their respective needs.

Once again, we appreciate your bringing this matter to our attention.

Very truly yours,

WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

cc: G. Balazs w/attach.

1265

"A.R."

Tuesday December 22, 1987

DIVISION OF AQUATIC RESOURCES		
DIRECTOR	✓	Suspense Date:
COM FISHERIES		Draft Reply ☐
AQ RES/ENV	✓	Reply Direct ☐
AQ RECR'N		Comments ☑
STAFF SVCS		Information ☐
FISH DEV		Comp. Act & File ☐
STATISTICS		Return To:
AFRC		Copies to:
SECRETARY		Remarks:
OFFICE SVCS		
FED AID		

RECEIVED
DEC 24 A9:41
DEPT. OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
DEC 28 1987
Div. of Aquatic Resources

William Paty, Director
DEPARTMENT OF LAND AND NATURAL RESOURCES
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Paty.

Aloha. The purpose of ~~this letter is to call~~ your attention to the plight of turtles nesting on Punaluu Beach in Ka'u Hawaii.

My second home is in Pahala since 1970 and my parents live in it. Besides, my mother was born in Waiohinu Ka'u, and this is why I feel I can speak with some authority on the matter.

Problem: The problem is how Punaluu Beach can be shared with both the needs of female turtles who instinctively want to lay their eggs there and people who want to swim and shoreline fish there.

Background: You see, in August of 1987, my husband and I and parents were at Punaluu Beach and lo and behold, we spotted at least 2 dozen turtle heads poking out of the water periodically.

I feel they were checking to see if the black sand beach was safe for them to come ashore to lay their eggs.

It wasn't safe of course, because there were many tourists on the sand, and a few of them in the water near the shore. One local boy was spear fishing along the rocks near the shore.

Summary statements: The problem, as I've outlined it above is very simplistic I know. For I am aware of the development of the SeaMountain Resort complex in the Ninole-Punaluu area.

I do know however, that a reasonable solution can be worked out to service the needs of the turtles and human beings, and I would be happy to be part of a consortium to problem solve on the matter.

Sincerely yours,

Puanani Woo

Puanani Woo
4300 Waialae Avenue, 601A
Honolulu, HI 96816
Phone: 737-1140, home
842-8279, work

cc: Mr. Richard Lyman, Trustee, B.P. Bishop Estate

3 Enclosures

Ka'u News

BULK RATE
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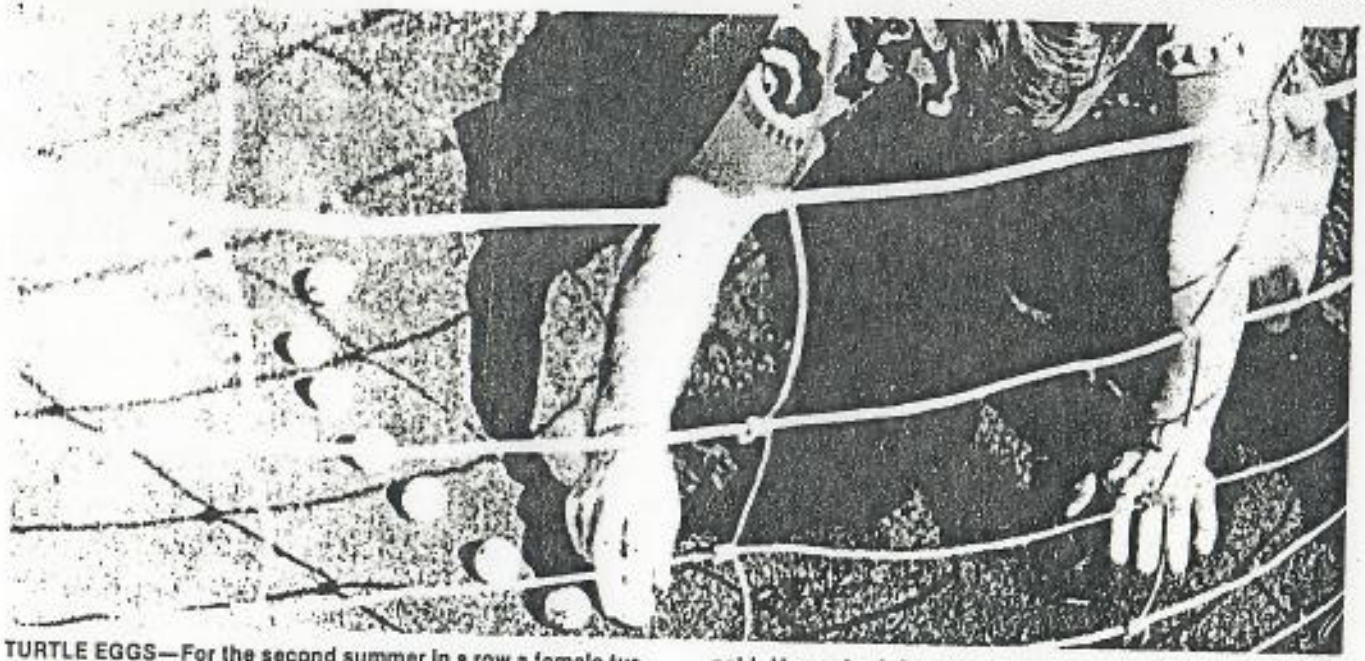
BOXHOLDER, LOCAL

VOL IV, NO.9

KA'U, HAWAII

AUGUST 5, 1975



TURTLE EGGS—For the second summer in a row a female turtle has layed her eggs on the sand at Punaluu Beach. Last summer a Hawksbill layed her eggs and in late August the nest hatched and the baby turtles crawled into the sea. One early morning in late June a new nest with eggs was discovered by Arnold Howard of Punaluu. Here, Ed Crook, vice president, Hawaiiana Investment Co., carefully looks at a few of nearly 200 eggs layed near the same spot. The area was secured by a wire fence to keep the eggs from being disturbed until they hatch sometime in August.—Ka'u News Photo.

Mashiyama Ka'u Jaycees Prexy

Richard Mashiyama

Richard Mashiyama, outreach counselor at Ka'u High School, is the new president of the Ka'u

Fish kapu plan gets new look

Star-Bulletin Staff

The state Department of Land and Natural Resources may call fisherman together again for more input before making a decision on the controversial kapu fishing system.

The department has two possibilities under consideration, according to Henry Sakuda, chief of the department's Aquatic Resources Division.

He said they are:

- Making more waters off all islands into state Shoreline Fisheries Management Areas, such as the Waikiki-Diamond Head one between Kapahulu Avenue and Diamond Head Lighthouse. A demonstration program there started in 1978, with the waters open for fishing every two years. It will be open again July 1, 1988. The first year, there will only be pole fishing, but all legal fishing will be allowed in the second year.
- Making the waters Marine Life Conservation areas, such as the one at Hanauma Bay, where nothing is to be disturbed nor any fish taken.

"Before we do anything, we need to make a basic fish count, which is being done for us by the University of Hawaii marine options program," Sakuda said.

"Surveys of fish populations in the Waikiki-Diamond Head area show marked recovery when fishing is forbidden," he said. "Either plan would allow fish to repopulate and spill into neighboring areas."

PBN 8/17/87

Price of Punalu'u project going up

By Nancy Davlantes

Seeking to achieve that delicate balance between a successful resort and long-term benefits to the surrounding community, C. Brewer & Co. Ltd. has revised its plans for the proposed $500 million expansion of its Ka'u resort at Punalu'u.

Initially, Brewer was only going to redo its environmental impact statement when it decided to withdraw the document last February.

But subsequent analysis and re-evaluation in light of concerns raised by some area residents led to revisions that will up the price of the project by more than $6 million.

"There's a significant cost to the revisions," said Pete Moynahan, senior vice president for C. Brewer Properties.

"First," he said, "there's the replanning and processing of the EIS," which will run between $250,000 and $300,000. "Then the new plan has a higher direct cost of $1 million because we're moving roads and golf holes. And third, the plan will yield fewer units in the shoreline area, and that's kind of a double whammy because not only are there fewer units, but there are fewer valuable units, and we'll end up with a $5 million reduction in value received. We don't do things like that lightly."

Brewer's original plans called for adding two hotels of up to 1,400 rooms, more than 1,000 multifamily units, about 75 single-family homes, and 75,000 square feet of commercial space.

Now, after several months of careful deliberation, including working with Big Island Mayor Dante Carpenter, the plans call for a reconfigured resort of considerably lower density.

"We'd started out with a plan that we thought provided the greatest potential visitor satisfaction," Moynahan said. "But in response to community concerns, we've moved out of the shoreline area."

The planned 350-room Ninole Hotel would be moved mauka from the original shoreline setback, to a bluff overlooking the beach and integrated into the planned Punalu'u Village residential area.

Another beach for the hotel is also planned to reduce the impact when more tourists visit the area.

The number of condominium units that would eventually be built behind the new setback have been reduced by a third, and a reconfigured golf course will use a part of the area vacated by the relocation of the Ninole Hotel.

Another 150-room, three-story hotel would be built mauka of the existing restaurant and adjoining ponds.

"We've increased the setbacks significantly," said Moynahan, "from a minimum of 70 feet to 250 feet from the shoreline, and we're up 30 feet in elevation. So the impact on the shoreline will be significantly less."

Acknowledging that the new plans, which were announced last week at Carpenter's office, did not quell all the opposition to the project, Moynahan said "there will always be people that won't be satisfied . . . But a resort must have proximity to the shoreline. You can't have a resort in the mountains."

He said the goal of this effort "is to bring stability to Ka'u with a proven successful industry, and give the visitor a quality experience. If he likes it, he comes back, and that means more jobs. And long-term jobs net long-term benefits. A lot of people will come and go, but either you have impact plus jobs, or impact and no benefits."

To some degree, he reflected, it's a compromise.

"What we'll never know is which is better — a hotel on the water or one off the water," and whether by making the revisions "we have pushed (the resort) over the cliff and made it not successful."

By Kevin Hand, Star-Bulletin

Riviera resort plan cut dramatically

☐ The Kau site will be reduced from 2,344 acres to 656

By Peter Wagner
Star-Bulletin

HSB 2/24/90

KAILUA-KONA — Developers of the proposed $700 million Hawaiian Riviera Resort on the Big Island's Kau coast have dramatically cut back the size of the project — but not its price tag.

Robert Lombardi, senior vice president of Palace Development, yesterday told the state Land Use Commission the number of hotel rooms would be cut in half — 2,100 to 1,050. And the site, now covered with lava, would be reduced from 2,344 acres to 656.

Despite the changes, which drop two of five planned hotels and one of three golf courses and cut the size of a planned marina in half, Lombardi said development costs won't change.

"Our costs have gone up, and the level of service we now intend to provide has gone up," he said. "Together, they take up the slack."

Still intact are plans for a small airport, support community to include affordable housing, polo field, tennis facility and other amenities. The original plan to build 1,175 condominiums has been cut to 350.

The commission is considering a request from Palace Development and its partner Hawaii Kau Aina to change the 2,344-acre site near Pohue Bay from agricultural and conservation to urban use.

Yesterday's hearing was held at the Kona Surf Resort, about 40 miles from the project site.

While the commission was only gathering testimony and is months away from making a decision, Chairman Renton Nip expressed concern about the effect such a major tourist destination could have on the rural area.

"What kind of society would that create for the future, not just for us but for our grandchildren?" he said. "Isn't there an increasing dichotomy between the haves and the have-nots? I think there is, and we should look for ways to address it."

Kau, a district larger than the island of Oahu, has less than 5,000 residents.

The community, which includes the historic fishing village of Milolii, is sharply divided on the project. Many say they welcome the resort because of the jobs they believe it would bring.

County Councilman Robert Makuakane, who represents the district, said the project is badly needed because the sugar industry, long a major employer in the area, is on its way out.

"I wish sugar would continue forever, but in reality, I know it won't," he said.

"We have people in the community traveling 100 miles to work. Some of them get up at 4 in the morning and get home at 8 o'clock at night."

Brian Baxter, a 23-year-old resident recently out of the Air Force, can't find a job in the area and said the drives to job markets in Hilo or Kona are long and dangerous.

"My wife could get a job here in Kona, but I wouldn't let her," he said.

"It's just too dangerous. It isn't worth it."

Other project supporters include residents whose unimproved lots would benefit from the roads, sewers and water development the resort would bring.

But opposition is fierce, particularly among native Hawaiians and fishermen who still live off the land as their ancestors did hundreds of years ago.

"People out there aren't aware of what they're getting themselves into," said Wilfred Kaopiko, who supports himself by fishing and operating a small store in Milolii. "The resort is only going to increase property values in the area."

He points to Kailua-Kona, the island's answer to Waikiki, as an example of what could happen.

"People are moving out to Kau because they can't afford housing in Kona," he said.

Lombardi told the commission that while the new proposal was scaled back to address concerns about the social impact of such a large project, plans are still alive to build the entire project within 20 years.

But the developers, if they get approval for the scaled-down project, would have to come back to the commission for approval for anything further.

SHAVE ICE

Maui News April 24, 1990

TOM STEVENS

After decades of licking and preening itself into presentability, Maui's "quality growth" industry has coughed up a couple of hairballs.

We speak of the delicious Sokan situation at Waihee and the grotesque collapse of something called VMS Realty Partners out of Chicago.

In the former instance, some jet-setting family of Tokyo golf millionaires who snapped up the old Waihee Dairy is now selling 100 "vacation cottages" to prospective members of the "Waihee Ocean Front Country Club."

The fact that this exclusive club and its 100 cottages haven't been approved yet is of little concern to the developers. They know they can bank on "The County That Says Yes."

You and I can bank on this: The Sokan project will be approved, the memberships sold and the "cottages" built before you can yell "fore!"

When the divots clear at Waihee, Maui will have its first North Shore hotel. And once that baby gets built, Bunky, you can kiss the whole Waihee to Hookipa coastline goodbye.

I know, I know. No condos or hotels are to be built on the North Shore — even ones masquerading as country clubs. That was a long-standing Elmer Cravalho deal that wasn't supposed to bend for C. Brewer, A&B or anybody else.

If you still think things don't bend on this island, check out "Waikapu Mauka." There a snappy new 36-hole golf course and luxury home sites for 100 more golf millionaires are being hewn from land that was supposed to stay in agricultural use.

Hey, no problem. The developers are marketing that little pretty as an "agricultural subdivision" because it's going to have a plant nursery.

Is that chutzpah? You gotta love it.

While these scams at least have a veneer of bleak hilarity, the VMS Partners situation can only be termed unfortunate.

It was unfortunate that the county didn't check for

credentials when this pack of real estate lampreys wriggled up out of Lake Michigan and attached themselves to 670 prime residential acres near Maui Meadows.

The developers trotted their "Maui 670" project and a related Palauea Beach resort hotel around the ring a few times for The County That Says Yes, and savvy local investors swiftly climbed aboard.

The luster left that deal last month when Xerox Corp. came to its senses and scraped VMS from its side after taking a $490 million suck wound from the Chicago-based investment group.

Whether the Maui plungers recover any of their cash remains to be seen.

Meanwhile, we're left to wonder: Why do these mutant development schemes keep thriving on Maui?

For more than 20 years the local government has stamped "Grade A" on every misshapen pork butt of a project that came swinging through the ice house door. In its view, the only bad project was one being developed somewhere else.

"You wanna build huge pink shoreline condominiums shaped like doughnut halves and scrawled with petroglyphs? Sounds very lovely. Sign here . . .

"You say you wanna go 12 stories on Front Street, the project to resemble a grounded paddle-wheel steamer with a scale model of Mystic, Connecticut, alongside? *Love* the concept! Trim five floors and it's yours . . .

"Yo! Talk to me baby! What'd you bring us today? A 413-suite hotel at Honokowai to resemble a Mayan sun king's sarcophagus? Fabulous! Hey Lefty, we got any more beach left at Honokowai? Where is Honokowai, anyway? . . .

"Another mini-mall for Kihei? Sure, we can shoehorn another mall into Kihei. You can never have too many coral shops!"

In the pre-boom years, the county's craven courtship of any developer who could count to 10 and knot his own tie was justified by the fear that all those pink doughnuts and paddle-wheel steamers would beach themselves on some other island.

But after approving 9,999 projects — good, bad and ugly — in a row, fear is no longer a factor. The various local planning commissions, county councils and administrations have made the same Grade A stamping motion so long they can't do anything else.

No wait, that's not true. They did reject a project once. It was a huge "undersea observatory" planned for McGregor Point. They hemmed and hawed for weeks, then finally rejected the thing because its financing was shaky.

But they loved the concept.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

23 July 1990 F/SWC2:GWB

Mr. Goro Hokama
County Council
County of Maui
200 S. High Street
Wailuku, Maui, HI 96793

Dear Mr. Hokama:

As an addendum to the letter send Friday with a number of attachments and information documents, I attach a copy of the 1989 data on strandings of sea turtles. These data are compiled at this laboratory. A total of 13 strandings was reported on Maui last year. You may be aware of the tumor problem evident on Hawaiian green turtles. Ten of the 13 turtles had these tumors, an incidence of 77%. It is possible that the turtles coming out on the beach are ill; this in not uncommon for turtles heavily afflicted with tumors. We would like to be kept abreast of the situation, however, and are in regular contact with Skippy Hau, the HDAR biologist on Maui.

Again, if you have any questions or require additional information, feel free to call.

Sincerely yours,

George W. Boehlert
Director, Honolulu Laboratory

Enclosure

cc: G. Balazs

HONOLULU LABORATORY
Southwest Fisheries Center
2570 Dole Street
Honolulu, HI 96822-2396

Summary of green turtle strandings in the Hawaiian Islands during 1989

Compiled by

George H. Balazs
Southwest Fisheries Center Honolulu Laboratory

In Collaboration with
S. Hau, D. Heacock, P. Hendricks, V. Honda, W. Ishikawa, R. Nishimoto, W. Puleloa, B. Tomaye, H. E. Witham, and others.

	Oahu		Maui		Hawaii		Kauai		Molokai	
Month	No.	No. w/ tumors	No.	No. w/ tumors	No.	No. w/ tumors	No.	No. w/ tumors	No.	No. w/ tumors
January	3	2	2	1	1	1	0	-	0	-
February	5	2	0	-	0	-	3	2	0	-
March	5	1	0	-	1	0	0	-	0	-
April	8	1	1	0	1	0	0	-	0	-
May	6	3	2	2	0	-	0	-	1	0
June	9	2	0	-	0	-	0	-	1	1
July	4	3	3	3	1	0	0	-	0	-
August	13	9	0	-	0	-	0	-	1	1
September	11	7	1	1	0	-	0	-	0	-
October	3	0	2	2	1	-	0	-	0	-
November	9	4	2	1	0	-	1	1	0	-
December	11	5	0	-	0	-	0	-	1	1
Total	87	39	13	10	5	1	4	3	4	3
Percentage w/tumors		(45%)		(77%)		(20%)		(75%)		(75%)
Grand Total		113								
Known w/Tumors		56 (49.6%)								

Note: Strandings of other species during 1989 included two olive ridleys on the Kona Coast of the Big Island.

"It has been moved and seconded that before we begin construction, we offer up a sacrifice to the gods of $50,000 for environmental issues."

Character of Kau to change, says resort consultant

☐ But he tells the land board it's coming regardless of whether the Riviera is built

By Ken Andrade
Star-Bulletin

7/27/90
STAR-Bulletin A3

KEAUHOU, Hawaii — A consultant for the proposed Hawaiian Riviera Resort was asked to gaze into his crystal ball and predict the future of the Big Island's rural Kau district.

"Ten years from now, what is Kau going to look like?" asked Renton Nip, chairman of the state Land Use Commission. "I think people have to understand that, so they can choose."

The answer wasn't crystal clear although it was generally agreed that the character of Kau will definitely change. Nip asked his question yesterday as the commission resumed hearings on the controversial mega-resort.

Palace Development Corp. and the Hawaii Kau Aina partnership envision an ultra-luxury resort complex with a marina and its own airstrip to be built over two decades on some 3,300 acres of land along the Big Island's southwestern coast.

To do all that, the companies need the commission to reclassify 2,400 acres of conservation land and 900 acres of agricultural land to urban.

But the commission, which has considered the change for a year and a half, and attorneys for some parties in the case are concerned that all that glitters in the plans may not turn into gold for the residents of Kau.

John Knox, who prepared the social and economic portions of the developers' 1987 environmental impact statement, was asked how the project would affect Kau's unemployment rate, which is among the highest in the state.

Commissioner Allen Kajioka said most residents who support the project do so because it will create 2,400 jobs by the year 1998, according to the estimates provided by the developer.

Knox said it is difficult to estimate how many jobs would go to Kau residents, partly because the size of the available labor pool is unknown.

There are about 600 people unemployed in the district, which has a population of less than 5,000.

But Knox said other residents, those who have given up looking for work or who commute to jobs outside the district of Kau, might be candidates for jobs at the luxury resort.

According to the developers' estimates, as many as 1,400 of the resort's jobs might have to be filled by workers from outside the district.

Since the overall unemployment rate in Hawaii is so low, those workers might have to come from out of state. Nip said this influx of new workers will affect the area's cultural character.

"The Kau that we know today will be substantially changed in 10 years," Nip said, and then he asked Knox if the area might become like Kihei or West Maui.

Renton Nip

Knox said Kau's experience could be different — for example, the outside workers might come from the Philippines instead of the mainland. But he agreed that "ultimately, what you're talking about will happen."

He added, however, that even if the resort is not built, the area is bound to change.

Commissioner James Shinno said he was concerned the project might create competition for existing homes outside the resort, with affluent buyers squeezing out existing residents.

Knox disagreed. "If (affluent homebuyers) are interested in the area, they are interested primarily in that affluent environment," he said.

Shinno wasn't so sure: "I think the people who will be hurt . . . will be the ordinary people."

Knox said the best remedy to guard against that is the development of enough non-luxury housing in the area.

The developers have pledged to build an on-site "support community" with six affordable units for every 10 hotel units constructed. The project will have 1,050 hotel rooms in its first phase, with the same number to be built in later phases.

The hearings were to continue today with presentations by Hawaii County and the state.

HANA COMMUNITY ASSOCIATION

Dept of Health
State of Hawaii

It has come to our attention that two turtles were found dead on the coastline south of Kauiki Head below the Sea Ranch Cottages, Hotel Hana Maui (TMK 01-04-03-57) Sgt Roback M.P.D., investigated and subsequently reported to DLNR that two decomposed turtles were found. Because of the decomposed state, DLNR did not persue an investigation of the cause of death.

The flora and fauna in this area are extensively used by residents for subsistence. Our concern stems from the possible contamination of these waters as the cause of death to the turtles and if other species might also be contamintated.

This information is being passed on to you for appropriate action.

respectfully submitted,

Francis Jim Kennedy
Committee on Development
Hana Community Association
P.O. Box 202
Hana, Hawaii 96713

cc DLNR
UH ENVIRONMENTAL STUDIES

Prepared by the staff of The Honolulu Advertiser

Spaceport opposed by most

By Hugh Clark
Advertiser Big Island Bureau

HILO, Hawaii — Five congressional candidates from both parties yesterday gave a resounding "no" to the prospect of a spaceport at Ka'u.

Democrats Michael Crozier, Ron Menor and Patsy Mink and Republicans Stanley Monsef and Andrew Poepoe all took turns denouncing the concept of establishing a launching facility near Pahala.

The space proposal is an initiative of Democratic Gov. John Waihee, whose Department of Business and Economic Development has made the project a top priority during his four years in office.

Mufi Hannemann, a Democrat who formerly lived in Ka'u, was the only congressional candidate to urge that a final judgment be delayed until after an environmental impact study on the proposal is finished.

The candidates spoke at an election forum conducted by the Big Island Press Club.

A spokesman for the state business department yesterday said the environmental assessment is not expected to be concluded until late this year.

Ka'u has been seen as a key commercial space player, despite its rural nature, because it would be one of the few places in the United States that could accommodate both polar and equatorial launches.

In a written statement, Menor, who did not attend yesterday's forum, said he is opposed to the space facility because there are "too many unanswered questions."

Menor cited what he called probable negative effects on the lifestyle of the present sugar plantation communities of Pahala and Naalehu, the noise and vapor emissions and the possible use by the military of such a facility.

"I am specifically concerned that the proponents of the spaceport have not been able to adequately answer many of these questions to the satisfaction of the local residents," Menor said.

Hannemann, who was formerly employed by C. Brewer & Co., which joined Waihee in the space initiative, said he agrees there are unanswered questions that he wants fully assessed.

CAMPAIGN '90


Hannemann


Menor

SUNDAY, Aug. 5, 1990
Sunday Star-Bulletin & Advertiser

Congress candidates

But he believes any final determination should await completion of the environmental process, which will study economic and social implications and possible effects on the astronomy facilities on Mauna Kea.

Hannemann, who lived for three years in Naalehu, said: "We owe it to ourselves to explore it to the fullest."

Mink said she shares most of Menor's concerns but that the key point is that "there are no takers" — firms willing to launch from Ka'u.

Crozier said he is most concerned about any possible impact of the rocket fumes on health and the environment.

Poepoe said, "I don't support it (the spaceport) at all" because of what he called the fragile environment of Ka'u and because of what he sees as the doubtful ability of Hawaii, as a state, to support such a technical industry.

Monsef said the infrastructure, such as housing, utilities and roadways, is not in place. The Big Island electric utility is stressed to meet current power demands, he said.

Republican Jose Pillos did not participate in the forum.

Earlier in the day, three state House 1st District (Ka'u-Puna-Keaukaha) candidates — Democrat Ron Phillips and Republicans Lester Brandt and Stewart Waterhouse — started the chorus of naysaying.

Phillips, who is challenging state Rep. Jerry Chang in the Democratic primary, told reporters: "Aerospace doesn't fit into the best interests of Ka'u."

Phillips, a retired engineer who worked in the Apollo program, predicted that space launches would bring "a carnival atmosphere and tons of garbage" to Ka'u with a minimal contribution of new jobs.

But Chang said he would support the proposal if the environmental study shows it to be both economically and environmentally positive.

"Ka'u needs jobs," said Chang.

Waterhouse said a launch site is not needed or wanted in Ka'u.

Brandt said the biggest concern he sees is the release of "cancer-causing" toxins by the rocket launches.

HANNEMANN

ON THE ENVIRONMENT

8/15/90
THA

"Hawaii itself is our most valuable resource. Growth must be tempered with the consciousness to conserve. Our land is precious, including Kaho'olawe, and must be used in ways that benefit the people of Hawaii. Our ocean, too, is sacred and I pledge to protect it from becoming an international dump for hazardous wastes."

Hawaii's voice
Hawaii's choice

Mufi HANNEMANN®
U.S. CONGRESS, 2nd DISTRICT

Paid for by Friends of Mufi Hannemann, Inc. A Committee. Randall Sumida, Treasurer
777 Kapiolani Blvd., Suite A1, Hon., HI 96813

Tropical storm is bringing high surf, wind to Big Isle

9/18/90
THA A3

By Jim Borg
and Hugh Clark
Advertiser Staff Writers

The Big Island braced for a close brush with Tropical Storm Marie this morning while wet weather caused some traffic delays on Oahu.

Marie, which intensified slightly yesterday, was expected to pass 130 miles south of South Point this afternoon, farther than previously expected, the National Weather Service said last night.

A tropical storm warning was issued for the Big Island, with high surf expected along the Puna and Ka'u coasts. A less-urgent tropical storm watch was called for Maui late yesterday afternoon, meaning there is a threat of storm conditions within 36 hours.

On the Big Island, Hilo enjoyed exceptionally clear and dry weather — perhaps the best day in three weeks — though the wind began picking up around nightfall.

Fifteen- to 20-foot waves were reported in Ka'u and Puna where Civil Defense officials urged a halt to boating activities. Nine-foot waves were reported elsewhere, weather service lead forecaster Tim Craig said.

Harry Kim, Hawaii County Civil Defense administrator, ordered the county's park at Punalu'u Black Sand Beach between Pahala and Naalehu closed.

The national park closed the upper reaches of Mauna Loa Strip road and the Chain of Craters Road below the Hilina Pali as precautionary moves.

Air Force hurricane hunters at 8 p.m. located the storm center at 210 miles southeast of the Big Island and moving west-southwest about 9 mph.

It had sustained winds of 70 mph at the center and gusts of 85 mph, which have slowed from 100 mph reported Sunday, but strong winds extended 140 miles from the center.

The warning meant that the Big Island could feel winds ranging from 39 to 73 mph by this morning. Marie was expected to maintain its intensity overnight.

All islands may get heavy rains, Craig said.

While he doesn't expect the tropical storm will cause much damage, Craig cautioned people not to be too confident.

"These storms have a mind of their own," he said. "They can switch directions very quickly. I don't want to give the impression I'm not concerned."

Yesterday morning's rain on Oahu, called "enhanced trade showers," was unrelated to Marie, with the exception that the storm may have put moisture into the air, forecasters said. Heavy showers hit mauka areas and parts of Windward and Central Oahu, but there was little rain at the airport, where official records are kept, a National Weather Service spokesman said.

A traffic accident involving six or seven cars stalled traffic on the Ewa-bound lanes of H-1 Freeway near Palama Street around 11 a.m., but there were no serious injuries.

Hawaiian Electric Co. spokesman Scott Shirai said the weather was not a factor in the explosion of a transformer at 560 Nimitz Highway about 11:15 a.m.

The incident cut power to 30 HECO customers, but all but one had service again by 11:53 a.m., he said. The transformers did not contain toxic polychlorinated biphenyls or PCBs, Shirai added.

Environment, yes or no?

In Mufi Hannemann's political campaign literature he states the environment will be protected, although there is no mention of how he intends to accomplish this promise.

When Mufi arrived in Ka'u four years ago, his stated objective was to push a rocket launching facility, a C. Brewer priority to make its land more valuable. Now Mufi says he needs to wait for the rocket environmental impact statement to make a decision, but still is supporting it conditionally.

Which is it, Mufi? Are you for the environment or are you for rockets blasting off three miles from Naalehu School?

PRIMROSE PAUOLE
Naalehu

Hannemann: environmentalist?

Mufi Hannemann is now touting his position on the environment. Besides working for the massive development of the Big Island, what has this executive ever done about the environment?

DAVID KIMO FRANKEL

PUNALU'U RESORT FACT SHEET

PUNALU'U DEVELOPMENT, INC. • P.O. BOX 85 • PAHALA • HAWAII • 96777

INTRODUCING SAZALE CORPORATION

Punalu'u Development, Inc., a local subsidiary of Sazale Corporation of Tokyo, Japan, acquired the 433-acre SeaMountain Resort at Punalu'u from C. Brewer in August of 1989. Sazale has been in the hotel business in Japan for 95 years where it owns and operates a chain of nine small hotels as well as 14 restaurants and the championship Wingfield Golf Course in Nikko, Japan. The company also owns the famous Hotel Bel Air in Los Angeles, the Hotel du Cap-Ferrat in Nice, France, and is currently involved in a number of hotel and golf course developments worldwide.

PROJECT OVERVIEW

Conceptual plans for the Punalu'u Resort call for changes from the original masterplan as proposed by C. Brewer. The owner visualizes a high quality low density resort with a "timeless Hawaiian" ambiance that embraces the cultural and environmental heritage of Ka'u. When completed the resort will be a *kipuka* or oasis of colorful flowers, mirrored ponds and manicured lawns. Guests arriving at the resort will have the impression of visiting a spacious turn of the century Hawaiian Estate.

Nestled within the grounds will be a 100-room hotel of five-star quality, a Johnny Miller Design championship golf course, a golf clubhouse, tennis and recreation center, a commerical center and condominium residences. The resort proposes to serve an international clientele, with the majority of the guests anticipated from the United States.

TIMETABLE

A Special Management Area (SMA) permit is required from the County of Hawaii for the proposed improvements and revisions to the masterplan. Consultants are currently working on, and will soon be filing, an SMA application with the Hawaii County Planning Commission. Public hearings will be held early next year as part of the application process.

The masterplan calls for development of the resort in phases. Primary elements of the first phase will be completed over a time period of approximately three years. If the approval process proceeds on schedule, construction will begin in mid-1991 with completion of the primary elements of Phase One and the opening of the hotel in mid-1993.

Sazale World • Punalu'u Bay

Illustrative Site Plan

GROUP 70

COMMUNITY RELATIONS

Punalu'u Development is committed to keeping Ka'u residents informed on its plans for the resort. The developers have established a Citizens Advisory Committee which meets regularly. Members of the committee include Bill and Lily Ahia (South Point), Beverly Byouk (Ocean View Estates), Anna Cariaga (Pahala), Bob Fujimoto (Hilo), Marlene Galapir (Na'alehu), Bobby Gomes (Pahala), Chuck Horan (Discovery Harbor), Jeanette Howard (Punalu'u), Councilman Bob Makuakane (Pahala), Claude Onizuka (Kona) and Charlie Sakamoto (Na'alehu).

A Community Update newsletter is currently mailed to approximately 500 residents in the Pahala, Na'alehu and Ocean View communities. Community briefings will also be scheduled in Pahala, Na'alehu and other Ka'u district communities throughout the development process.

MASTERPLAN

Punalu'u Development's masterplan is that of a high-quality, low-density resort that encircles the existing 76 Colony I condominiums, Hokuloa Church and Punalu'u Beach Park. The new masterplan proposes half the number of hotel and housing units of the C. Brewer masterplan which was approved by the County in August 1988. Public access to the shoreline and the Punalu'u Black Sand Beach will, of course, remain open and cultural and archaelogical sites on the resort will be preserved. Details of Phase One of the masterplan are as follows:

HOTEL:	A five-star, 100-room, country-estate style hotel. The two-story reception building will feature a main dining room, specialty dining room, ballroom and special conference facilities. Adjoining this main building will be the guest rooms and suites as well as detached bungalows.
GOLF:	A Johnny Miller Design 18 hole, par 72 championship golf course, offering both public and private play, will replace the existing golf course. A new golf clubhouse, within walking distance of the hotel, will feature a pro shop, restaurant grill and lounge, and a health spa and relaxation center.
TENNIS & RECREATION CENTER:	A complex of tennis courts comprises a "center court," hard-surface courts and paddle tennis courts; a tennis pro shop, juice bar and swimming pool; and a recreation center for active sports and fitness activities.
COMMERCIAL CENTER:	A commerical center with retail space, cultural exhibit space, restaurants, the resort management office, and a resort information center.
RESIDENTIAL:	A combination of 100 single family and multi-family residences.

Future phases may include about 500 additional single and multi-family residences, mauka and makai of the Hawaii Belt Highway, and the possible construction of a modest executive retreat.

THE DEVELOPMENT TEAM

A team of consultants has been assembled to facilitate the development of the resort. Supervising the team is project manager Alan Suwa from HASEKO (Hawaii), Inc., managing agents for the project. Primary consultants are:

Project Management:	HASEKO (Hawaii), Ltd. (Honolulu, HI)
Architects:	Group 70 Limited (Honolulu, HI)
Golf Architects:	Johnny Miller Design, Ltd. (Jupiter, FL)
Civil Engineers:	Wilson Okamoto & Associates (Honolulu, HI)
Landscape Architects:	PBR Hawaii (Honolulu, HI)
Legal Counsel:	Kobayashi Watanabe Sugita Kawashima & Goda (Honolulu, HI) Case & Lynch (Hilo, HI)
Community Relations:	McNeil Wilson Communications (Honolulu, HI)

Project Manager Alan Suwa is available at the resort on a weekly basis. Residents wishing to meet with him, can call Madie Castaneda at 928-6233.

SPECIAL STUDY CONSULTANTS:

Traffic Consultants:	Parsons Brinkerhoff Quade & Douglas Inc. (Honolulu, HI)
Water Quality & Marine Monitoring:	Marine Research Consultants (Honolulu, HI)
Job Training & Affordable Housing:	Community Resources Inc. (Honolulu, HI)
Cultural Resources Management:	Paul Rosendahl Ph.D., Inc. (Hilo, HI)
Flood Study:	Wilson Okamoto & Associates (Honolulu, HI)
Shoreline Management Plan & Pond Management Plan:	Group 70 Limited (Honolulu, HI)

FOR ADDITIONAL INFORMATION, CONTACT

Margo Shiroyama, McNeil Wilson Communications
1001 Bishop Street, Pauahi Tower, Suite 950
Honolulu, HI 96813 Ph: 531-0244, Fax: 521-7163

(September 1990 -- Information contained in this fact sheet is pending government approval and may be subject to modification)

Protect shore, skyline vistas

What makes the magic of Hawaii's scenery? What turns a volcanic scar across the ocean's face into a string of "pearls"? What fills our hotels with tourists during summer months?

R and B — ridges and beaches. These "rhythm and blues" of the islands keep cash registers as well as poets singing.

Preserving R and B is vital to our lifestyle and economy. Why then must we year after year battle to save classics among them? In the last six months alone, Waipio Valley rim, Mt. Olomana and Kaiwa Ridge have been threatened with development.

Let us give the Department of Land and Natural Resources a mandate to aggressively protect our most precious natural resource — shore and skyline vistas. Any other policy is financially and environmentally flawed. Hands off the goose that is laying Hawaii's golden egg!

SPENCER SCOTT
Vice President, Students to Save Waipio Valley Area
ANDREW YANOVIAK
President, Save Mt. Olomana Assn.
TOM CESARE
Vice President, Lanikai Community Assn.
JOHN KELLY
President, Save Our Surf
PHIL ESTERMANN
Chairman, Save Sandy Beach Coalition
DEBRA SHIRAISHI
President, Sierra Club, Honolulu Group
RICHARD SCUDDER
President, Conservation Council for Hawaii
DOUG MILLER
Vice President, Life of the Land

9/27/90
THA
A15

Hannemann: environmentalist?

Mufi Hannemann is now touting his position on the environment. Besides working for the massive development of the Big Island, what has this executive ever done about the environment?

DAVID KIMO FRANKEL

HAWAII CLIPPING SERVICE
P.O. Box 10242
Honolulu, Hawaii 96816
PHONE: 734-8124
Victoria Custer Elaine Stroup

WEST HAWAII TODAY

OCT. 16 1990

Milolii fishermen oppose Riviera Resort marina

By MARY K. KANIHO
West Hawaii Today

Milolii fisbermen on Friday testified how the proposed Hawaiian Riviera Resort project would disrupt their subsistence and commerical fishing lifestyles, especially if plans for a 200-slip marina are approved.

"It's going to be like Waikiki or Kailua-Kona," said Walter Paulo, a former Milolii resident who currently lives in Waianae, Oahu, about the proposed marina near well-known fertile fishing grounds.

Paulo made his comments during the lastest round of a continuing state Land Use Commission hearing regarding Palace Development Corporation and Hawaii Ka'u Aina's request to have several thousand acres of land rezoned for a mega-resort development.

The developers are asking the commission to rezone 2,420 acres from conservation to urban designation and another 900 acres from agriculture to urban designation to build a multi-hotel, 200-slip Mediterranean-style resort in Kahuku, Ka'u.

Recalling his boyhood days spent growing up Milolii, Paulo, who works for the National Fisheries Service and volunteers with the Opelu Project in Waianae, said "he wants to preserve the area" for Hawaii's youth and would discourage a marina development in the area.

Paulo and others who testified on behalf of intervener Pa'a Pono Milolii said the marina development, with its introduction of pleasure craft, would disrupt what they described as a systematic and structured style of fishing.

In addition, they said they're already experiencing problems with fishing boats from Kailua-Kona and could do without additional problems an influx of additional boats could bring.

Palace Development and Hawaiian Riviera attorney Ben Tsukasaki suggested the problems experienced by the Milolii fisherman are caused my other fisherman and therefore would not be intensified by pleasure craft traffic generated by their marina development.

While Paulo said recreational boats in moderation should not adversely affect their fishing lifestyles, he said 200 boats, which is what the marina is capable of accommodating, "surely will" affect their fishing lifestyle.

Shirley Casuga, a life-long Milolii resident, said she opposes the marina *and* resort development. While she shared the others' concerns about disrupting or possibly destroying their fishing lifestyles, she's worried that the hotel development will inflate current land values.

"I'm afraid the land taxes will skyrocket and people will have to give the land back to the state," Casuga said about homes currently being built for Milolii residents on lease-held state land. While lease rents are inexpensive, Casuga said taxes could skyrocket, as has been the case in areas where resort development had taken place, and force the local people from their homes because they can't keep up with escalating property tax bills.

Pa'a Pono will continue its case during the commission's next, as yet unscheduled, Kona meeting. A notice will be published in WHT prior to the meeting.

Expert opposes spaceport

10/24/90 WHT

By MARY K. KANIHO
West Hawaii Today

While the state thinks a rocket-launching facility in Ka'u will be good for the state's economy, one of the country's foremost authorities on space last night said he didn't think so and added the facility wouldn't create jobs for the people in the Ka'u area.

"Let's face it. They're not going to hire the people here who are unemployed," said Dr. Robert M. Bowman, a retired military fighter pilot, about the state's plan to turn South Point into a commercial rocket-launching center. "They will all come from the outside."

Bowman, who directed the country's Strategic Defense Initiative Program (commonly known as "Star Wars") under former Presidents Gerald Ford and Jimmy Carter, said he doesn't favor the proposed Ka'u spaceport and added there "is no commercial viability for this thing."

Bowman made his remarks before about 100 people who had gathered at the Kona Surf Resort's Kamehameha Ballroom to learn more about the high-tech rocket-launching business. The event was sponsored by the West Hawaii Chapter of the Sierra Club.

While Bowman said the complex Star Wars program was created to make nuclear weapons obsolete, he said the opposite has happened. "The real purpose of Star Wars," he said, "is to make nuclear weapons useful again." Bowman said the program "damages national security, increases the likelihood of nuclear war and endangers people."

While the proposed space port is touted by state officials as a commercial enterprise, Bowman said it will probably be used by the military if it fails, which he predicted will eventually happen.

He said the way to keep Hawaii out of the Star Wars business is not to let the military space industry in, in the first place.

Return Receipt Requested

September 8, 1989

Sekitei Kaihatsu Co.
Alan Goda, Lawyer
745 Fort Street Mall. 8th floor
Honolulu, Hawaii 96815

Dear Mr. Goda,

Congratulations on your recent purchase of the Sea Mountain resort in Punaluu Hawaii. We are writing in regards to our involvement with this area for the past 19 years. The University of Hawaii at Hilo, Marine Option program, through the National Marine Fisheries Service (NMFS) has been involved in the study of the endangered Hawaiian Green Sea Turtle (Chelonia Mydas).

George Balazs, the principal investigator for the NMFS, has often said that Punaluu is the best site in the state for the study of the Green Sea Turtle. The benefits from this include not only the data gathered from monitoring the turtle population but the experience gained by our student's involvement. With your blessing, we hope to continue our research at this site. We would also like to welcome you, as the new owners, to become more involved in our work, through a tax deductible grant to the University's Marine Option Program. This funding in your name, would be spent wholly on the study of the Green Sea Turtles at Punaluu.

Again congratulations on your purchase of Punaluu's Sea Mountain Resort. If you have any further questions, please contact George Balazs at 943-1221 in Honolulu, or in Hilo, Dr. Walter Dudley at 933-3411, or myself at 933-3544. Thank you for your time, we look forward to hearing from you in the near future.

Sincerely yours,

John P. Coney,
Coordinator, UH-Hilo MOP

cc George Balazs
Walter Dudley

October 24, 1990

McNeil Wilson Communications
Margo Shiroyama
1001 Bishop Street, Pauahi Tower, Suite 950
Honolulu, Hawaii 96813

Dear Ms. Shiroyama,

Last year I sent the enclosed letter to one of the lawyers handling the purchase of the Sea Mountain Resort at Punalu'u. I did not receive a reply to that letter so I thought I would bring you up to date on the University of Hawaii at Hilo Marine Option Program (UHH-MOP) and the National Marine Fisheries Service (NMFS) involvement at Punalu'u.

For the past 19 years UHH-MOP under the auspices of NMFS, has been involved in the study of the endangered Hawaiian green sea turtle population (*Chelonia mydas*), at Punalu'u. George Balazs, the principle investigator for NMFS, has often said that Punalu'u is the best site for the study of the Hawaiian green sea turtle. The benefits reaped from this study, include not only data gathered for monitoring the endangered Hawaiian green sea turtle, but the experience gained by our students' involvement. As the owner of the Sea Mountain Resort, we respectfully invite you to become involved in our work through a tax deductible contribution to the University of Hawaii Marine Option Program. This funding would be *spent wholly* on the study of the Hawaiian green sea turtles at Punalu'u.

The lack of response to our earlier letter was disappointing, although in the busy transitional period it could have easily been overlooked. We hope to hear from you in the near future in regard to this request. Any assistance you could provide would enhance our efforts to preserve the Hawaiian green sea turtle. If you have any questions, please contact Dr. Walter Dudley at 933-3411, Dr. Leon Hallacher at 933-3364, or myself at 933-3544. Thank you for considering this request.

Sincerely yours,

John P. Coney,
Coordinator, UH-Hilo MOP

Enclosure:

Firm hired to conduct spaceport EIS

By DAN BREEDEN
West Hawaii Today

The environmental impact statement for the proposed rocket launch facility in Ka'u will have to "take a real hard look at how air quality will be affected in Kona," MCM Planning owner Marilynn Metz said yesterday.

A contract for completion of the environmental impact statement for the proposed rocket launch facility in Ka'u has been awarded to MCM Planning, Hawaii Office of Space Industry officials announced over the weekend.

The environmental assessment was started by the international engineering consulting firm CH2M Hill. Their preliminary research concerned archeological sites, and possible impact on plants and wildlife.

MCM, a small Honolulu firm, will be "essentially taking it from there," Metz said.

"None of the real important analysis has been done yet," she said.

Metz said the dispersion of airborne toxics is one of the "real important" areas the EIS must investigate.

"Just safety period is the most crucial issue," she said. "I'm trying not to leave any stone unturned."

The consultant said the completion date of the EIS is still being negotiated with the state but acknowledged that the draft will probably be finished by early summer.

Meanwhile, CH2M Hill will be preparing a master plan for the rocket launch facility, according to state officials.

Adm. Thomas Hayward, chairman of the Hawaii Space Development Authority, said moving the EIS from CH2M Hill to MCM was done with the hope that MCM can provide a more independent evaluation of the effects the spaceport will have on the Big Island.

MCM reportedly has been working with the state on site selection for the spaceport since 1978. They've also conducted environmental studies for Mauna Kea observatories, as well as for the Natural Energy Lab of Hawaii and HOST Park.

"Frankly, all our big projects are on the Big Island," Metz said.

MCM is a very small consulting firm, having no staff other than Metz. She claims this allows the company to handpick a team to suit individual projects, providing better quality control and cost effectiveness.

Hayward was unavailable yesterday to answer questions on the assigment of the EIS contract to Metz.

11-27-90
WHT A9

EXECUTIVE PROFILE

Overseeing Punalu'u Resort

Name: Roy Yokoi
Age: 45
Position: Vice president, secretary and treasurer, Punalu'u Development Inc.
First job: Sale clerk
Favorite pastime: Tennis, time with son

When Roy Yokoi joined Punalu'u Development Inc. last year as director of administration, he had never held a post in the hotel development and management field, but thanks to his past administrative and finance experience the transition went smoothly.

"With regards to the administrative duties, there's not that much difference from distribution and development," said Yokoi, who joined the company at the urging of his college friend, attorney Alan Goda. "Having the background in accounting, finance and administration made things easier."

Yokoi, who recently was promoted to vice president, secretary and treasurer, previously was vice president of Webco Hawaii Inc., where he was employed for 13 years. Prior to that, he was a certified public accountant with the firm now known as Mukai Foo & Co.

In his new positions, he will be in charge of financial matters and day-to-day operations, which includes overseeing the planned 100-room Punalu'u Resort at Ka'u on the Big Island. He will also serve as secretary and treasurer of Makaha Valley Development Corp., a sister company.

Rick Daysog, Star-Bulletin

1-9-91 HSB D1

UH professor says resort would 'devastate' Milolii

By Joan Conrow
Special to the Advertiser

HILO, Hawaii — A University of Hawaii professor yesterday said development of the proposed Hawaiian Riviera resort project would be "totally devastating" for the tiny village of Milolii.

Jon Matsuoka, an assistant professor of social work, surveyed the residents of Milolii and said he found they were overwhelmingly opposed to the project, unconvinced of its economic benefit and certain it would disrupt their fishing and lead to a higher cost of living.

He said his research also caused him to dispute information in the project's environmental impact statement, which claimed fishing was not an important part of the community's economic and social fabric, and Milolii people do not use the area proposed for development.

According to his survey, about 43 percent of those polled feel their economic survival depends on their income from fishing, and that all of the respondents believe fishing is an important part of the community.

Additionally, 85 percent said they use the proposed project area for fishing and gathering.

"I think the fishing economy would be devasted by the development of that 400-slip marina," Matsuoka said. "If that economy is threatened, I think the culture of Milolii will be threatened."

Matsuoka presented his findings to the state Land Use Commission during hearings Wednesday on the proposed resort and residential project in the Ka'u district, and elaborated on them in a phone interview yesterday.

He said a very high percentage of those living in Milolii are native Hawaiians, and that the village represents "the last community of truly subsistence fishermen" in Hawaii.

"The people there rely on the ocean to a degree that no other communities do," Matsuoka said. "If their fishing resources become more and more scarce, you're talking about a community that will slowly slip into despair."

He said the state should create cultural sanctuaries where needed, and that Milolii would be a prime candidate for such protection.

The professor, who has conducted social impact assessments on Lanai and in other rural Hawaiian communities, said his survey indicated Milolii residents do not believe the resort will provide them with jobs and they overwhelmingly believe the project will do them more harm than good.

June 28, 1985 F/SWC2

Mr. Arlen Henderson
President
Maui Electric
P. O. Box 398
Kahului, Maui, HI 96732

Dear Mr. Henderson:

I want to take this opportunity to thank you for the excellent cooperation that Mr. Hele and other workers at your Kahului power plant extended to my staff member George Balazs and his assistants during recent studies of green sea turtles. Nine turtles were captured, tagged, measured, and released during four nights of netting near the warm-water discharge of the Kahului plant. Information was collected on body temperature, food sources, and ectoparasites. A copy of the final report covering this work will be sent to you in the near future.

Again, many thanks for your assistance.

Sincerely,

Richard S. Shomura
Director, Honolulu Laboratory

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C. Brewer says storms damaged

By Rod Thompson
Big Island correspondent

PUNALUU, Hawaii — Four major storms from 1978 to '82, not poor agricultural practices, caused the filling of Kau's 4-acre Ninole Cove, says C. Brewer's vice president for development, B.G. "Pete" Moynihan.

Moynihan was responding to charges by Kona environmentalist Jerry Rothstein that C. Brewer subsidiary Kau Agribusiness Co. placed gravel in and along streams, and the gravel washed into the state-owned cove.

The charges were first raised in 1986 by Punaluu Preservation Inc. They were dismissed then, but they are drawing new attention because the former shoreline of the cove must be identified before a permit can be granted for work on Punaluu Resort.

Sazale Corp. bought the partially developed resort from Brewer in 1989 and needs a shoreline management area permit to start work on a 100-room, lodge-style hotel, 120 condominiums, and upgrading the golf course.

Sazale subsidiary Punaluu Development Inc. asked the Department of Land and Natural Resources for a "shoreline certification" in July, but Rothstein objected, and the department is investigating his charges.

The charges are based in part on an excerpt from a 1988 video made by Kau residents called "Kapu Kau," which shows a gravel roadway about a foot thick crossing a dry stream bed.

It also shows piles of gravel apparently stockpiled on one bank of the stream and a cross-stream roadway with water flowing over it.

In a series of major storms from 1978 to 1982, the gravel washed downstream and filled Ninole Cove, the video charged.

Moynihan said the roads across the streams are "built to an appropriate technological standard" and have stayed in place except in the case of the storms, two of which were so serious they had been expected to occur only once in 100 years.

He said he didn't know about stockpiling gravel next to streams.

Brewer's 1986 environmental impact statement on Punaluu Resort estimates that 30,000 cubic yards of gravel fill the cove.

Pete Moynihan

A 1988 version of the environmental statement said storm run off was so bad it eroded and permanently ruined 62 acres of sugar land, sending enormous amounts of gravel downstream.

But Kau resident Pele Hanoa, president of Punaluu Preservation, charges that another Brewer action resulted in the field destruction. In past decades, the company diverted streams from their natural beds, creating new watercourses that couldn't handle the storm runoff, she said.

Moynihan said there was no evidence that the company had diverted streams, but that runoff in the 1978-82 storms cut new stream beds 50 feet wide and 15 feet deep down to bedrock.

Both sides agree on one thing. Ninole Cove was used as a fish pond in past decades and was a good swimming spot up to about 1975. That was the year a tsunami began the filling of the cove, according to Brewer's environmental study.

Kau cove

Lucky listeners

Editor:

As part-time residents of Kailua-Kona, we must tell you how proud we are to be here where the music and culture of Hawaii are promoted and appreciated.

We along with more than eight attended the free concert this past Sunday of the Hulihee Palace Band and its wonderful company of Hawaiian singers, chanters and hula dancers. The concert on the ocean lanai of the beautiful Hulihee Palace was pure Hawaiiana with the exception of the thrilling patriotic music devoted to our troops.

Where else can you hear and see the music and dance of Hawaii in such a beautiful setting? We feel it is more impressive than the old "Hawaii Calls," and why not? We noticed in your WHT "Coming Up" article of Feb. 13 that Bandmaster Charles Bud Dant was the producer of "Hawaii Calls" the last five years it was on the air. We feel fortunate to be a part of this community where the visitors and the locals can hear and see the music and dance of Hawaii as it was in the 'good old days.'

Barbara and Walter Novak
Kailua-Kona

Geo myth

Editor:

The myth that only one percent of the forest will be affected by geothermal development needs to be laid to rest. Wao Kele O Puna has about 27,000 acres. 500 megawatts (MW) of geothermal will directly destroy a minimum of 1,500-2,500 acres. That's 5-10 percent if all went perfectly, and we've learned that geothermal in Hawaii has been quite imperfect. Add in secondary effects on the forest and the percentage game becomes meaningless. It is shameful for the state to promote such myths as a "one percent sacrifice" when it is recklessly gambling with Hawaii's biological heritage; the stakes

Here's how our dear state government has lied to us on this point. The 300- to 500-acre figure the state likes to quote refers to the first 100 MW only. There can be no 100 MW without the whole 500 MW — the Big Island can't use it and the cable requires megabucks. And, there are not 60,000 relevant acres of Puna forest which the state uses for figuring. The 27,000 acres of lowland Wao Kele are biologically unique, and the state must be counting the lava wasteland for which they traded our forest to get this figure.

What happens when you periodically kill all the birds in the surrounding area with poison gas releases? And drive them away with constant noise? And what if the forest is bird-pollinated? And what if it's the last forest of its kind in the world? Of course, these are just secondary effects, not even reflected in the acres-cleared figures. We can't discuss these, because then it becomes clear that we are destroying the entire native Hawaiian forest and not just some percent, as though it were an acceptable sacrifice.

Words like extinction and biological diversity can also be quantified and made to seem less personal. But to whom else goes the responsibility for the murder of entire species and ecosystems, but to those humans who promoted it, and those who allowed it to happen? Extinctions are forever and believing government propaganda does not release one from this higher responsibility to the earth and our children.

Anne Wheelock
Kurtistown

Editor:

Imagine coming over a hill or rounding a bend and encountering a large truck whose left front tire is almost three feet over the center line into your lane. Although most truck drivers are safe and responsible, there are others who abuse their privilege to drive and hog the road. Given our narrow Kona roads, nearly nonexistent shoulders and increased traffic, this scenario is happening more often.

There is something you can do if you get safely around the truck. Take note of the truck company, date, time, location and if possible a truck number and license plate. Truck companies keep a log of who drives what, where and when.

Call the police with your complaint. The police will visit the company with your complaint. After several complaints, the police will patrol the area where the driver is scheduled to drive. Also call the company as no company wants to employ an unsafe driver.

B. Easley
Kailua-Kona

No Scuds

Editor:

The rocket launching site proposed for Ka'u has often been called a "spaceport" by promoters trying to glamorize something that will violate the environment and pierce the peace of this rural area.

During recent months, a new and evil word has become familiar worldwide. The word is Scud; "Scud" best conveys what is being proposed for Ka'u. "No Scuds for Ka'u, thank you."

George Balazs
Honolulu

HAWAII TRIBUNE HERALD
2-21-91
P8

I only remember Grandma's stories. One story begins with air raid sirens. If it is night all lights must be turned out. Families run for shelter, there is no time to lose. I am strapped to Grandma's back. There is a whirring sound of airplanes and then exploding bombs. The earth is shaking and we draw close together. We are afraid. After planes pass there is a sound like hundreds of people crying, people hurt, people dying. Mothers cry for lost children, brothers die holding onto each other. Night wails.

This is an old story. But always somehwere the Grandma has to carry the child strapped to her back and run with fear, always brothers die together. I wonder how many of us could drop bombs if we knew the hurt we made, the innocent women and children we killed to have our way.

I say loudly now, "No more bombing! No more killing!"

If I keep quite the stones themselves will start to shout.

Leiko Yamada O'Neill
Hilo

Scuds & spaceport

The rocket launcher facility proposed for Ka'u has often been called a "spaceport" by promoters trying to glamorize something that will violate the environment and pierce the peace of this rural area. During recent months, a new and evil word has become familiar worldwide. The word is Scud. Scud best conveys what is being proposed for Ka'u. "No Scuds for Ka'u, Thank you!"

George H. Balazs
Honolulu

Discussion on Kau shoreline resort project turns nasty

HSB A4 10/23/91

By Rod Thompson
Big Island correspondent

HILO — A dispute over shoreline development in Kau turned nasty yesterday with supporters and opponents trading insults and obscenities at a meeting of the Hawaii County Council's Public Works Committee.

The name-calling over the Sazale Black Sands Resort at Punaluu subsided, but two police officers sat through the second half of the 2½-hour meeting.

The issue is whether the county should sell the rock-and-sand, four-wheel-drive "Government Beach Trail," which stretches a half-mile between Punaluu black sand beach and rock-filled Ninole Cove.

Sazale Corp. representatives said they need the area around the beach trail to create a top-quality golf course, which is the key to building a small, 100-room hotel at Punaluu.

Councilwoman Helene Hale objected, stating that the proposed $33,000 payment for the trail amounts to only $1 per square foot, half of what people pay for a rural house lot.

Supporters said they back the plan because it would create about 350 jobs in a district where people fear sugar companies may go out of business.

Opponents said erasing the vehicle trail, leaving shoreline access by foot only, would limit their fishing and food gathering.

Hawaiian activist Palikapu Dedman put the issue in its broadest terms when he told Sazale spokesman David McNeil that Hawaiians have been "kicked off other beaches and they are afraid of being kicked off" the Punaluu shoreline.

The committee voted to send the matter to the full County Council without a recommendation.

Complicating the picture is the fact that endangered hawksbill turtles and threatened green turtles lay eggs along the shore.

Sazale architect Francis Oda said the turtles tend to crawl over sand until they hit something such as vegetation. Then they stop and lay their eggs. The result is that eggs are sometimes found on the beach trail, he said.

Larry Katahira, representing Hawaii Volcanoes National Park, said the park has been designated by the National Marine Fisheries Service to oversee protection of the turtles even though they are not on park land.

The park wants a delay of any action until a turtle protection plan is created by Sazale or the Kau community, preferably the community.

Sazale officials said the park had earlier also recommended restricting vehicle access along the shoreline.

The former owners of the Punaluu resort, C. Brewer & Co., thought they had resolved the problem of the beach trail when they bought it from the state in 1986. But a suit by the Native Hawaiian Legal Corp. resulted in a court consent decree in August, which said the state couldn't sell the trail because the county owns the trail.

10/23/91 THA A3

Roadway sale is latest dispute over Punaluu land

By Hugh Clark
Advertiser Big Island Bureau

HILO, Hawaii — The future of the long-planned SeaMountain Resort at Punaluu in Ka'u is again cloudy as a new dispute has erupted over plans to sell the resort developer a coastal road remnant owned by Hawaii County.

The County Council Public Works Committee discussed the issue at length yesterday but reached no conclusion, electing to toss the whole issue to the full Council.

The road — which runs between portions of an existing golf course and the ocean — was purchased from the state in 1986 by C. Brewer & Co..

But that sale was invalidated by Honolulu Circuit Judge Simeon Acoba in August. Judge Acoba ruled that the state didn't own the road — that the county did.

NEIGHBOR ISLAND NEWS

So Punalu'u Development Inc., a company owned by Salaze Group of Japan, has asked instead that Hawaii County approve the sale of the narrow ¾-mile road. The company would acquire 33,000 square feet of land at $1 a square foot, plus pay for related public improvements.

Those improvements would cost $900,00 to $1.2 million — and would include an expanded public parking lot, an additional public beach pavilion, expanded turnaround areas, and potential conversion of the now rented county beach park to permanent status.

Advertiser graphic by Greg Tay

The proposal has been attacked as unfair, unreasonable and outrageous by Hawaiian, environmental and other groups.

Councilwoman Helene Hale said the sale price sounded unusually low and asked for another appraisal.

The Salaze Group says the land involved — the ¾-mile stretch of narrow roadway — will not be used for any of its buildings.

But opponents contend that if the developer gains control of the road, the public would lose access to the beach and ocean.

The dispute over the building of the Ka'u resort, fought with strong emotions during much of the 1980s, came to an apparent end in 1988, when the Council rezoned the land for resort use.

Now the resort's chief opponent, Punaluu resident Pele Hanoa, has attacked the pending sale of the roadway in a series of written articles.

She is backed by a dozen or more Hawaiian activists from Ka'u and by Kona environmentalist Jerry Rothstein, who said "public access" should not be sold "under any circumstance."

Even the existing golf course — which the developer plans to upgrade as part of its resort project — has come under attack by Rothstein's Public Access Shoreline Hawaii group.

State Sen. Andy Levin and the Native Hawaiian Legal Corp., among others, also urged the Council to reject the proposed sale.

The Volcano Community Association expressed reservations about the sale, saying the ocean area at Punaluu has taken on increasing importance to southeast Hawaii residents, with the destruction a year ago of Kaimu Black Sands Beach, at Kalapana, by the Kilauea eruption's lava flows.

The Council committee, unable to reach a majority opinion on the road sale, agreed to send it to the full Council without recommendation.

State Land Board Chairman Bill Paty had urged Lai yesterday to delay action on the sale.

Council Chairman Russell Kokubun said he wanted Paty to express his reasons in writing before the Council meeting to determine if the state has any legal interest in light of the Acoba ruling.

The County's Public Works Department said the land is not of any further use as a county roadway, but Hale said the issue goes beyond county roads.

"This has polarized the whole community," she warned developer representatives, suggesting that they may be left with a perpetual security problem if they obtain the roadway remnant.

Viewpoint 12/27/91

Resort claims valid, plans

By MILI FERNANDEZ
Punaluu Resort

I would like to express my views about Sazale's development plans for Punaluu at Ka'u.

I am a resident of Ka'u, and a employee of Sazale. These past months, much has been said about the Punaluu Resort development and its developers. At times I cannot believe what is being said and circulated in the communities of Ka'u, or what I read in the newspaper. In fact, it upsets me.

It is hard for an employee, such as myself, to be silent; don't make waves, you live in the area, you have family, don't make trouble, say something and you will get it in the newspaper, make your views known and you will be intimidated. Just be quiet, accept whatever is being said and hope the resort plans go through. No, I will not be quiet. No, I will not accept whatever comes my way, especially statements that are untrue. I refuse to do it.

Sazale has never refused to clean out the Ninole Pond, which is owned by the state. Sazale has offered to be a part of the solution in the clean up of Ninole Pond, once the cause of an responsibility for the filling of the pond has been established. Logically, it would be in the best interest of the resort to have the pond restored.

The other issues of the wetland area, Hawkesbill turtle nesting sites and historic sites are all part of Sazale's preservation plans, before, during and after the development of the resort. This also has been publicly stated.

The continued phrase of "denied access" to the Punaluu shoreline, whether it be from the Ninole area or Punaluu Black Sands Beach are absolutely untrue. This privilege will not be taken away from the people of Ka'u. The proposal by Sazale of constructing a new access road down to the Ninole Cove and beyond, with parking and drop off areas will improve access. The improvement of the existing county beach facilities with its additional parking and land area are pluses for the communities. Time and time again Sazale has publicly stated: public access to the Punaluu shoreline will not be denied to the people of Ka'u. The people of Ka'u still can continue to fish for a living or recreation, bring their family for an outing, to swim or just to take a leisure walk. Sazale welcomes all of this.

I am in a position with Sazale to know, it is absolutely not a "blatant threat" of the possibility for a layoff of the resort employees. This is not idle talk, I can assure you. The employees at Punaluu are fortunate Sazale continues to keep the whole resort in full operation even with the huge losses it experiences. We understand the situation and are thankful for Sazale's sensitivity to our needs. How long this will continue is what worries the employees. I will say this, don't use the employees of Punaluu Resort to make your views of the issues at hand seem like Sazale is just towing their employees and our communities along for a ride to develop this resort. We cannot and do not have that feeling because we all have a lot at stake.

WHT p. 9A

beneficial for community

As a person who has been in the tourist industry for 17 1/2 years, the so called "menial jobs" which the resort offers to the people of Ka'u also needs to be clarified. To say jobs in a resort are "menial jobs" is very out of line and totally disregarding the sensitivity of a industry, which employs thousands of Hawaii residents. Be assured, employees of the tourist industry have a lot going for them. True, there are some hard and lean times, but we stick it out. To put in a honest day's work for honest wages is nothing to be ashamed of, regardless of what kind of resort job one holds. It wants to better themselves. With the right attitude and determination, anyone can have a better position or job in any resort operation, be it here in Hawaii or out of state.

The development of Punaluu Resort is an investment in the future of Ka'u. Ka'u has to move forward and progress has to continue. Economically, the people of Ka'u need this resort. For many, it is survival. One only need to look around the district to realize this.

The people of Ka'u must make an honest effort to know the truth of and the importance of this development before forming a opinion. Many negative statements have been make about the developers and their plans, and it stands to be corrected. To get the true facts, you must attend the public hearings, contact the company officials or contact members of the advisory, shoreline management and cultural resource committees. These committees are made up of local residents, your neighbors. Talk to them.

Viewpoint articles represent the views of individuals in our community and do not necessarily reflect the opinion of the

...Hawaii Visitors Bureau find a few places where tour buses can stop for an hour or two so male and female tourists can follow their separate interests before rejoining their group?

Frank G. Nelson
Hilo

State & Waipio Valley

The state plans to change the image and life style in Waipio Valley.

The state's acquisition of Bishop Museum's 85 percent land holdings will not preserve Waipio Valley and will not protect the taro farmers but will open Waipio Valley to the public, promote tourism and encourage developers.

Bishop Museum made a gentleman's agreement with the tourist industry to enter Waipio Valley and charge $2 per tourist.

The state took advantage of Bishop Museum's gentleman's agreement and without advance written notice to the small land owners. The state allowed our property as a public right of way for tourism, and without accepting responsibilities. Our fence were twice cut open; our no-trespassing signs were taken down; our tenants' house was burned to the ground; our family's grave site damaged; and horse manures are left in our property.

The state's action caused our family much stress, tension and financial depression. We pay taxes, yet the state refused to fulfill our needs.

Waipio Valley is close to nature, unspoiled, peaceful and preserved in our culture. Those who appreciate nature's blessings, let's keep it this way!!!!

Benny Olepau
Waimanalo

...est, development

...e film "Listen to the ...st" in the Hawaii Film Festival was great, and our mayor ...as the theater. Many local residents are missing out on some of the finest and most affordable entertainment anywhere. Having a completely subsidized theater is one of the biggest assets any city can have. Very often such theaters produce writers, directors, actors, and technicians of a very high quality. It is not unrealistic to think of Hilo as the Hollywood of the future. If anyone needs proof that what I am saying holds water, they might consider seeing the most recent production "Little Shop of Horrors," which opened Dec. 20 and runs for three consecutive weekends.

Having seen this production in dress rehearsal, I can say without any doubt that this is one of the most enjoyable shows to come along this or any season. The music is hot, the acting superb, and the set design is incredible. You really will be transferred to another place and time in this play. Hope to see you there, and definitely bring the family and friends.

John Bancroft
Hilo

'Funny letters'

The geothermal boys Wayne Blythe and Bill Cook write funny letters. They'll tell you everything you want to hear about the environment, as long as they can have their deadly, dirty, and costly geothermal. They know they are twisting the truth to protect their pocketbooks. Sure, a few people out there might believe what they are saying for a minute. However, let's remember the words of Abraham Lincoln, "You can fool some of the people some of the time. You can fool all the people some of the time. But you can't fool all the people all the time." Geothermal doesn't have a chance. The people know too much. Please pack up.

Tim Agronsky
Hilo

12/26/91
HAWAII TRIBUNE HERALD
P.10

...was very wrong and uncalled for. Saying "sorry" won't cut it with me for a punch in the face that I didn't deserve. I know that he has suffered some losses but he brought all of that onto himself. He is a Vulcan athlete and should realize that he has more responsibilities than just the average student. To me, his punishment so far is just a slap on the wrist. I sympathize with him in some ways, but when he says that girls who he used to say "Hi" to don't look his way anymore, then all I can say is that it's his own fault. When I feel that Darren Buchanan has suffered all the consequences, maybe then I'll be able to forgive for what he did to me. But for now, there is no way that I'm backing down.

Dorothy F. Salavea
Hilo

Punaluu, shoreline

So who does this John Smith from Captain Cook (sounds like a fake name to me) think he is running down Jerry Rothstein in the paper for helping us preserve the shoreline and road at Punaluu? I was born at Punaluu, and my family has been there since 1850. We asked Jerry Rothstein to come help us because he is an expert on the shoreline. Even developers know this. Is John Smith an expert in anything besides moving where he is not wanted and sticking his nose in things that do not concern him? Why does he try to talk for the people who want the resort? Does he think that locals need a malihini like him to do their talking. No way!!! If John Smith does not like things here he can go back where he came from, or go to Kona where there are lots of resorts; only they are half empty and going bankrupt. We are not going to let Sazale pollute this place like C. Brewer did.

Chris Bangay
Pahala

Hawaii Tribune Herald Feb 27, 1992

Punaluu resort gets OK

❑ Planning panel vote follows large display of support

By Gordon Y.K. Pang
Tribune-Herald

PAHALA — The Sazale Group's plans for a hotel, condominium and golf course complex at the Sea Mountain Resort at Punaluu was unanimously approved by the Planning Commission last night.

The shoreline management area approval, the last legislative check for the project, came following a spirited six-hour meeting attended by an estimated 450 people at a sardine-packed Ka'u High School cafeteria.

Among the 50 people who testified, only five spoke against the project. Sentiment among the rest of the audience appeared even more lopsided in favor, however, judging from the sea of white t-shirts with Punaluu Resort logos.

The overwhelming support was in marked contrast to hearings held earlier in Hilo and Kona where often there were as many opponents as supporters. Several Sazale backers last night said the reason was because those earlier meetings weren't in Ka'u at night.

Sazale supporters spoke of a Ka'u on the brink of losing its longtime economic mainstays — sugar and macadamia nuts — and the need for a new industry.

"We felt sorry for the people of Hamakua when the plan collapsed," said Punaluu Resort employee Marlene Galapir in reference to the multi-million land deal designed to save the beleaguered Hamakua Sugar Co. that was broken in December.

She warned the commission of "too many conditions" placed on land use approvals given to Hamakua Sugar which she feels

See PUNALUU, Page 8

PUNALUU: Ka'u supporters fear sugar's demise

From Page 1

led to that deal's downfall.

Deborah Funai, a Ka'u High sophomore and one of several students who spoke, said the sugar industry will "at some point" leave the region. "What will the people of Ka'u be doing?"

Several residents said they've waited 20 years for the resort to develop. Rezoning for the project was granted to C. Brewer and Co. in 1988. Sazale purchased the property a short time later.

Arthur Ramos, a retired architect from Waiohinu, said residents are "tired of waiting and hoping for something to happen here." He called Sazale's plans "substantial, low key ... pleasing to the eye."

The plans call for a 100-room hotel, up to 600 condominium units and reconfiguration of the existing 18-hole golf course into a new championship scheme, a significant reduction from Brewer's original scheme.

Sazale has promised the county a number of community benefits, including the title transfer of Punaluu Beach Park and a three-acre addition. As a condition of the original rezoning, Sazale will also put up a minimum of 42 on-site housing units for employees.

Not everyone is happy about the project. Five people spoke against the development, questioning the compatability of a golf course close to the shoreline next to Ninole Cove, a popular fishing spot for Ka'u residents.

Mary Ann Kelly, a cultural anthropologist from the University of Hawaii at Manoa, said beachgoers "should not have to dodge golf balls while they search fruitlessly for fish that are no longer there."

Concerns were also raised about the potential danger of development to the Hawksbill turtle who forage in the area and poorer access to the shoreline for fishing enthusiasts. Sazale has promised to address both issues.

Calls for a contested case hearing by Punaluu Preservation Inc. and three individuals were denied by commission members.

Following an explanation of contested case rules by Corporation Counsel Michael Matsukawa, commissioners determined the arguments of PPI and the individuals did not have merit.

Pete Hanoa, the most vocal opponent of the project and the "kuleana" owner of land in the vicinity of the resort, may have passed the adjoining landowner test necessary for a contested case hearing, said commission member Jeanne Comer. However, Comer and the commission ultimately determined that they would not be giving themselves, through a contested case hearing, new information that would be substantially different than what was garnered through the regular process.

Glen Winterbottom, a PPI spokesman, said the group will take the issue up with the county Board of Appeals and, if that recourse fails, through litigation.

3/10/92

The skies smile

By Joan Conrow
Special to The Advertiser

PAHALA, Hawaii — Pahala holds a special place in the heart of Big Island Civil Defense Administrator Harry Kim. He still remembers the first time he saw the plantation town, back in 1951, during the eruption of Mauna Loa.

"The sun was shining, the sky was blue," he said. "I loved the openness, all the way down to the ocean. You feel very close to nature because it's the dominant factor, and not people's things.

"You feel like there's still a chance to keep things good and clean," Kim continued. "There's still a chance for a certain way of life. There's still a chance to be close to people."

Thirty-one years later, Kim's first impression still holds true. And it seems to explain why Pahala's residents love the place, too. Ask them what keeps them there and they'll tell you they treasure the small town feeling, the comfortable familiarity that comes with seeing the same old folks, the same old places.

Whether it's the group of Filipino retirees who meet to talk story at the picnic tables outside Mizuno Superette, or the women who stop to chat outside the post office, relationships seem to be important in Pahala.

Rep. Jerry Chang, who spent the first six years of his life in the plantation town that is now part of his legislative district, shares that sentiment.

"Everybody knows everybody, is friends with everybody," he said. "They take care of

HONOLULU ADVERTISER

at Pahala

each other. Everywhere you go people are always waving because they know each other."

Rodrigo and Mary Evangelista are living proof of Chang's observations. The retired mill handyman and his wife enjoy just sitting on their porch, waving at friends, neighbors and the occasional tourist who wanders through the town.

But tourists and other strangers aren't all that common in Pahala, which may explain why the town has been able to retain its sleepy residential character.

Visitors aren't made to feel unwelcome, but they aren't solicited, either. No tourist attractions lure motorists from the highway; no novelty stores or flashy signs encourage folks to stop.

In fact, everything about Pahala — with the exception of the busy, dusty mill — is low-key, calm and so very quiet. Stately Ka'u Hospital, with its signature monkeypod tree and expanse of well-tended lawn at the entrance to town, seems to set the peaceful tone.

Houses share the traditional plantation-style architecture, and while some are weathered, they are invariably neat. Grass is short, flowers line the drives, hedges of vibrantly colored bougainvillea delight the eye. Bird song pierces the morning silence, cars travel slowly on gently sloping, shady streets.

Pahala feels like a place where people still take the time to care — about their home, their town, each other. And that feeling's so strong, so much an integral part of the community, that it just might persist for another 31 years.

Planning Commission
25 Aupuni Street, Rm. 109 • Hilo, Hawaii 96720 • (808) 961-8288

Lorraine R. Inouye
Mayor

CERTIFIED MAIL

March 16, 1992

Punalu'u Preservation, Inc.
PO Box 472
Naalehu, Hawaii 96772

Ladies and Gentlemen:

Special Management Area Use Permit Application 91-20
Applicant: Punalu'u Development, Inc.
Request: Various
Tax Map Keys:9-5-19:11, 15, 26, 30, 31, 33, 35;
9-6-01:1, 2, 3, 6, 11, 12, 13,
9-6-02:8, 37, 38, 41 and Portion of 45

This is to follow-up on your request for a contested case hearing presented to the Planning Commission at its February 26, 1992 public hearing on the above-referenced Special Management Area (SMA) Use Permit.

The Planning Commission, at its February 26, 1992 meeting, received public testimony and additional information provided by the applicant. The Commission then proceeded to approve SMA Use Permit No. 329 to allow renovations to an existing 18-hole golf course, the construction of a 100-room hotel, golf/tennis/spa facilities, commercial center, resort maintenance center, 3 residential enclaves with a total of 120 units, employee housing, infrastructure and related improvements.

Please be advised that the Commission, at its February 26, 1992 hearing, voted to deny your request for a contested case hearing made at that meeting since Pele Hanoa, Keolalani Hanoa and Chris Bangay, President, Secretary and Director of Punalu'u Preservation, Inc., respectively, do not have property interests in the subject properties, do not have interests in the proceedings that are clearly distinguishable from that of the general public, and that such a request would not result in further information being provided to the Planning Commission that would be essential in its decision on this particular matter.

Should you be aggrieved by the Planning Commission's decision to grant SMA Use Permit No. 397 or the denial of your contested case hearing request, you may appeal this decision to the Third Circuit Court within 30 days of March 12, 1992 , which is the date when this office sent a certified letter to the applicant informing the applicant of the Commission's action.

Should you have any questions on this matter, please feel free to contact Daryn Arai of the Planning Department at 961-8288.

Sincerely,

Mike Luce

Mike Luce, Chairman
Planning Commission

4673D
DSA/jdk

cc: Punalu'u Development, Inc. w/ltr.
George I Atta w/ltr.
Mayor w/ltr.
Planning Director w/ltr.
Corporation Counsel w/ltr.
West Hawaii Office w/ltr.

Pele Hanoa announces council candidacy

W. Pele Bangay Hanoa has announced her candidacy for the Sixth District County Council seat, which covers upper Puna, Ka'u and South Kona.

A Democrat, Hanoa will face Edward Clark and Robert Makuakane for the council seat.

Hanoa, who has lived in Ka'u all her life, said her reasons for running include her concern for the preservation of Hawaiian culture and endangered native species. She said she would also like to see ethics strengthened at the county level.

A retired nurse, Hanoa also wants to see the people of her district "get a fair share" of county services and money.

"The rural areas have long been neglected, though they've paid their fair share in property and excise tax," she said.

Hanoa said Ka'u has much to offer.

"There is so much water here that we could use to get it out to other communities," she said, adding that a pipeline could provide water from Ocean View to Milolii. "There's so much water we could share within this community."

Man arrested for killing green sea turtle

Police arrested a 28-year-old Naalehu man yesterday on suspicion of killing a green sea turtle which is on the endangered species list.

A woman reported to Ka'u police that she saw two men pull a turtle out of the water at Punaluu Beach Park and later kill it, police said.

Police located one of the men but no charges were filed against him and the turtle has not been found.

The case has been turned over to the National Marine Fisheries Service.

Sunrise, Mt. McKinley Ansel Adams

SIERRA CLUB LEGAL DEFENSE FUND, INC.

The Law Firm for the Environmental Movement

212 Merchant Street, Suite 202 Honolulu, Hawaii 96813 (808) 599-2436 FAX (808) 521-6841

March 19, 1992

George Balazs
National Marine Fisheries Service
Honolulu Laboratory
Southwest Fisheries Center
2570 Dole Street
Honolulu, Hawai'i 96822

Dear George,

Enclosed you will find the Draft Monitoring Plan for turtles at Punalu'u, near the Sazale Black Sands Resort. In addition you will find a map which shows the proposed uses of the shoreline area. If this gives you a clearer picture of potential effects on the turtles, please let me know. Thank you for your attention to this issue.

Very truly yours,

Carrie Miller

Carrie Miller

Enclosure

University of Hawaii at Hilo

MARINE OPTION PROGRAM

October 24, 1990

McNeil Wilson Communications
Margo Shiroyama
1001 Bishop Street, Pauahi Tower, Suite 950
Honolulu, Hawaii 96813

Dear Ms. Shiroyama,

Last year I sent the enclosed letter to one of the lawyers handling the purchase of the Sea Mountain Resort at Punalu'u. I did not receive a reply to that letter so I thought I would bring you up to date on the University of Hawaii at Hilo Marine Option Program (UHH-MOP) and the National Marine Fisheries Service (NMFS) involvement at Punalu'u.

For the past 19 years UHH-MOP under the auspices of NMFS, has been involved in the study of the endangered Hawaiian green sea turtle population (*Chelonia mydas*), at Punalu'u. George Balazs, the principle investigator for NMFS, has often said that Punalu'u is the best site for the study of the Hawaiian green sea turtle. The benefits reaped from this study, include not only data gathered for monitoring the endangered Hawaiian green sea turtle, but the experience gained by our students' involvement. As the owner of the Sea Mountain Resort, we respectfully invite you to become involved in our work through a tax deductible contribution to the University of Hawaii Marine Option Program. This funding would be *spent wholly* on the study of the Hawaiian green sea turtles at Punalu'u.

The lack of response to our earlier letter was disappointing, although in the busy transitional period it could have easily been overlooked. We hope to hear from you in the near future in regard to this request. Any assistance you could provide would enhance our efforts to preserve the Hawaiian green sea turtle. If you have any questions, please contact Dr. Walter Dudley at 933-3411, Dr. Leon Hallacher at 933-3364, or myself at 933-3544. Thank you for considering this request.

Sincerely yours,

John P. Coney,
Coordinator, UH-Hilo MOP

Enclosure:

523 W. LANIKAULA ST.
HILO, HAWAII 96720-4091 • TEL: (808) 933-3544

University of Hawaii at Hilo

MARINE OPTION PROGRAM

September 8, 1989

Sekitei Kaihatsu Co.
Alan Goda, Lawyer
745 Fort Street Mall. 8th floor
Honolulu, Hawaii 96815

Dear Mr. Goda,

Congratulations on your recent purchase of the Sea Mountain resort in Punaluu Hawaii. We are writing in regards to our involvement with this area for the past 19 years. The University of Hawaii at Hilo, Marine Option program, through the National Marine Fisheries Service (NMFS) has been involved in the study of the endangered Hawaiian Green Sea Turtle (Chelonia Mydas).

George Balazs, the principal investigator for the NMFS, has often said that Punaluu is the best site in the state for the study of the Green Sea Turtle. The benefits from this include not only the data gathered from monitoring the turtle population but the experience gained by our student's involvement. With your blessing, we hope to continue our research at this site. We would also like to welcome you, as the new owners, to become more involved in our work, through a tax deductible grant to the University's Marine Option Program. This funding in your name, would be spent wholly on the study of the Green Sea Turtles at Punaluu.

Again congratulations on your purchase of Punaluu's Sea Mountain Resort. If you have any further questions, please contact George Balazs at 943-1221 in Honolulu, or in Hilo, Dr. Walter Dudley at 933-3411, or myself at 933-3544. Thank you for your time, we look forward to hearing from you in the near future.

Sincerely yours,

John P. Coney,
Coordinator, UH-Hilo MOP

cc George Balazs
Walter Dudley

523 W. LANIKAULA ST.
HILO, HAWAII 96720-4091 • TEL: (808) 933-3544

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

April 17, 1989 F/SWC2:GHB

Mr. Mufi Hannemann
Punalu'u Resort
P.O. Box 85
Pahala, HI 96777

Dear Mr. Hannemann:

The Marine Option Program (MOP) of the University of Hawaii at Hilo, working in cooperation with our agency, has just completed a 3-day study visit of green turtles (honu) at Punaluu Bay. I want to take this opportunity to send you a summary of results from this trip, as well as information on earlier work conducted at this location by the MOP (see enclosures).

A total of 14 turtles were captured in a harmless manner during this most recent visit. Three of these turtles had been captured and tagged during earlier visits to Punaluu (2 were tagged 5 years ago, and 1 was tagged over 10 years ago). As with past results, these data demonstrate that the turtles are resident to the area. The growth rates for the three turtles ranged from 1.5 cm (5/8 inch) to 3.0 cm (1 1/8 inch) per year in carapace (shell) length. While this rate may appear quite slow, turtles resident to Punaluu have been shown to exhibit faster growth than at most other preferred algae (limu) foraging sites throughout the Hawaiian Islands.

The fourth previously tagged turtle that we captured on this recent trip was an adult male. Our records show that the turtle had been originally tagged 9 years ago during the breeding season at French Frigate Shoals, 800 miles to the northwest of Kau. This documentation of a long-distance migration once again points out that green turtles resident to Kau periodically travel to (and return from) French Frigate shoals for breeding purposes.

Another important finding of our most recent trip was the discovery that turtles are no longer feeding at night inside the bay. Most, if not all, foraging appears to be occurring during the daytime, in contrast with past years. There are several possible explanations for this shift, but additional inquiry will be needed before any firm conclusions can be drawn. An obvious significant benefit derived from the turtles feeding during the day is that it offers quite an attraction for tourists. Visitors arriving on every tour bus while we were at Punaluu were fascinated by seeing the turtles. They flooded us with questions about them and asked for literature that they could take home. In addition to the tourist's interest, video footage was taken of the turtles and our research activities. A school teacher from Naalehu felt that this topic would be excellent to present to her

elementary class, especially with the incorporation of the Hawaiian "turtle lady" legend about Punaluu. I have sent her posters and other teaching aids for sea turtle biology and conservation.

We hope to carry out another study trip to Punaluu within the next 4-6 months. I will give you some advance notice when we know the exact dates. Please feel free to visit with us at that time at the County Park Pavillion so we can describe our research activities and goals in person. If you have any questions in the meantime, you may of course telephone me here in Honolulu at 943-1221.

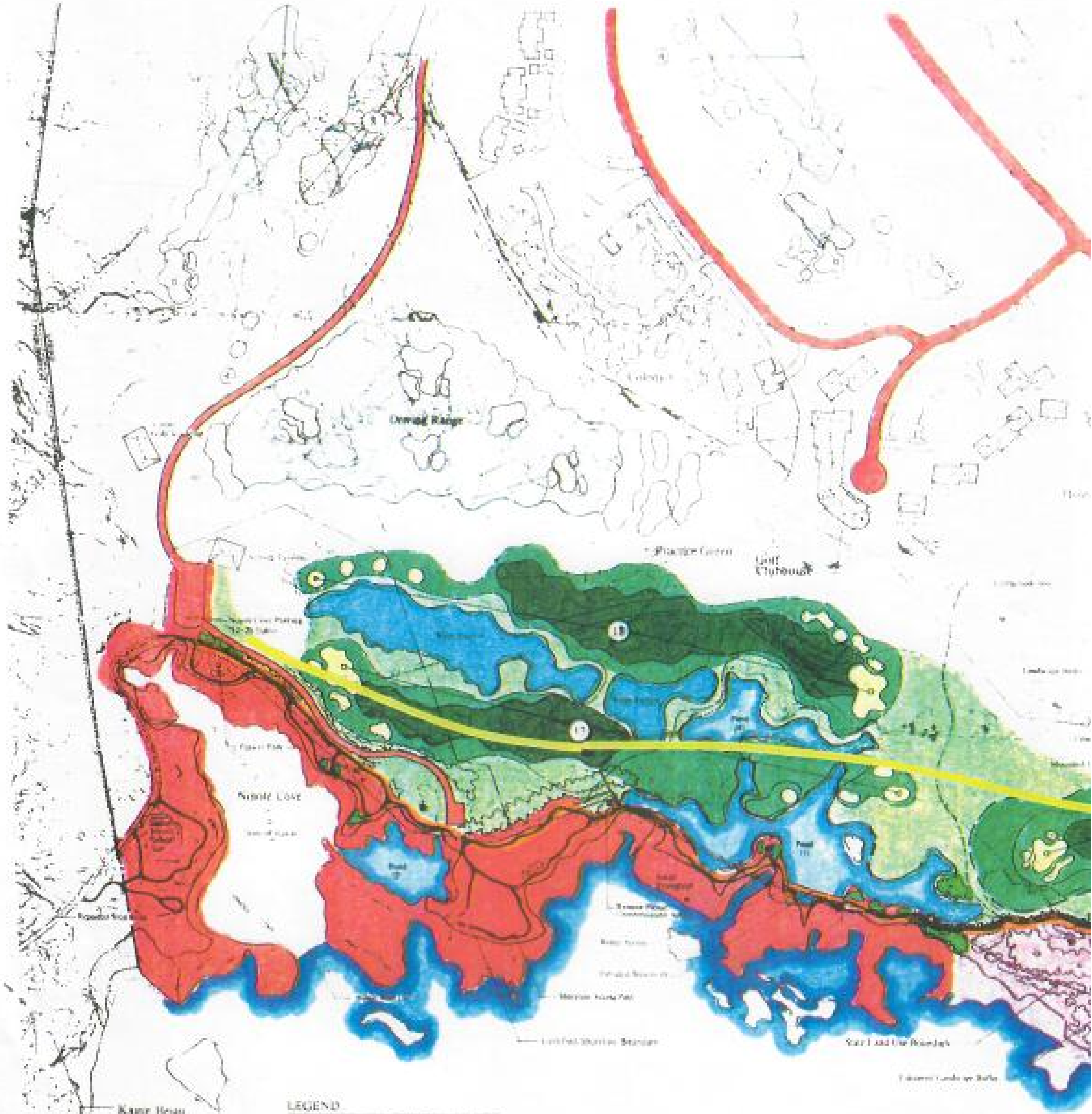
Thank you in advance for taking the time to read the enclosed information.

Sincerely

George H. Balazs
Zoologist

Enclosures

cc: Dr. Walter Dudley
Dr. Leon Hallacker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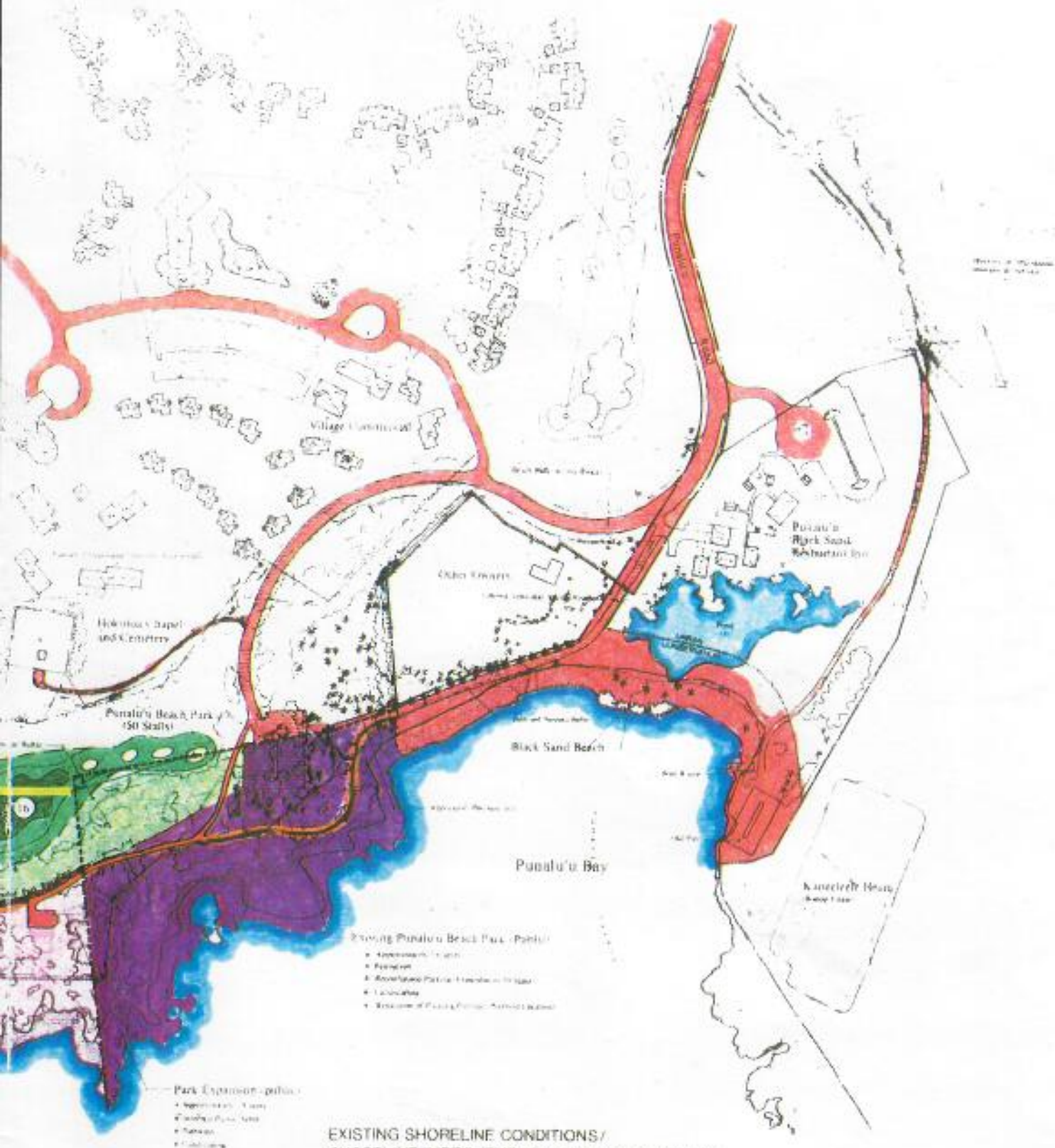

EXISTING SHORELINE CONDITIONS/
SHORELINE IMPROVEMENT PLAN/PUBLIC ACCESS

SAZALE BLACK SANDS RESORT

KA'U, ISLAND OF HAWAII

HAWAII CLIPPING SERVICE
P.O. Box 10242
Honolulu, Hawaii 96816
PHONE: 734-8124
Victoria Custer Elaine Stroup
HAWAII TRIBUNE HERALD
MAR. 9 1992

Man arrested for killing green sea turtle

Police arrested a 28-year-old Naalehu man yesterday on suspicion of killing a green sea turtle which is on the endangered species list.

A woman reported to Ka'u police that she saw two men pull a turtle out of the water at Punaluu Beach Park and later kill it, police said.

Police located one of the men but no charges were filed against him and the turtle has not been found.

The case has been turned over to the National Marine Fisheries Service.

I have always been bothered by Punalu'u. Here is a large developed area, well-groomed and maintained, and useless except for some golf and a restaurant of little gastronomic consequence. The beach itself is a poorly maintained mess. And with the clutter of tour uses and cars and piles of sand, it's an eyesore.

I have reviewed the Sazale's plan and presentation very carefully. This presents a genuine realization of the potential for the area. It is substantial, it is low key, it is pleasing to the eye. Rather that restrict, it appears that it will enhance and thereby attract use by the public.

I urge this Commission to accept this resort as planned and permit Sazale to proceed with construction without further delay.

The local people are tired of waiting and hoping for something to happen here. Employment opportunities are minimal and scarce in this area. Please, Commission Members, give them a break. This is a rare project where everybody can only win and profit. Thank you very much.

(SUBMITTED WRITTEN TESTIMONY INTO THE RECORD.

CHAIRMAN: Thank you. Anna Carriaga, followed by Marion Kelly. Anna is not here, oh, there she is from out of the wings.

CARRIAGA: Mr. Chairman, Members of the Hawaii County Planning Commission, aloha and welcome to Ka'u. We appreciate your every effort in bringing this SMA public hearing to Ka'u. And, as you see, the many people that have turned out. If you had taken it to somewhere else, I don't think many of us could be present.

My name is Anna Carriaga, a resident of Ka'u, born and raised in Ka'u. I'm a member of the Punalu'u Development, Inc. advisory council and also a member of the cultural committee.

I have been with this project from day one on the turn-over from C. Brewer and Company. I have seen the changes from a larger scale of C. Brewer's plan to a smaller low density plan that Sazale has now; and the plan that we have now is a better plan.

The Committee, both committees have spent many, many hours meeting, going over a lot of the concerns. And as we met, we had our public meetings with the community. We acted almost like a liaison between Sazale and the community. And I can truthfully tell you that the community is well versed on what is happening with the project; and I think this is why most of us and the majority of Ka'u are here to support the project, because of the time and efforts they have put into this project.

March 25, 1992

Aloha Geo.

For your Information.

Anna Cariaga, is Vice Chair. for the Police Commissioner. County of Hawaii.

She is wrong I was born & raised in Pahala Punalu'u, I am 69, we also did have Turtle in Punaluu Bay, In fact my family use to eat Turtle. my family are fishermans. Pele

As, you know, the 32 sites, that was a big concern for the cultural committee. It wasn't easy. And we had to take some recommendations from the archaeologist that had done the studies before, and we also made our own recommendations because we have lived in this community for so many years.

The shoreline was another concern for the shoreline committee. We're not only concerned about the passing of that road. We're also concerned about the turtles. Truthfully telling you that, you know, the turtles was never there before. If I could get rid of the turtles, I wish they would have decided to stay some place else instead of Ka'u. And, you know, they decided to stay right in Punalu'u, there's three places. We also have the greenback and the hawkbill turtles. And, you know, as one of our, as the minister prayed at the beginning over here, I did tell them please pray to have them relocate themselves some place else. You know, so now we have to work with the turtles; and if we don't know, you what the Federal can do. And that's really a touchy situation. Now you've heard all the testimonies on the project and why they're supporting it. I'm not going to go into that.

My thing is, my concern was the old government beach trail. And I find that, you know, history is repeating itself.

CHAIRMAN: Anna, you're going to have to hurry up because your three minutes is gone already.

CARRIAGA: Okay, history is repeating itself. Can I use somebody's minutes that they didn't use it up? Anyway, in the past, in the past, like in the 1800s, the Hawaiians, as they took the road, or the tidal wave took the road away, they had replaced another road. And they have done this up till now. What we are doing, too, with that road, we would like to see, you know, that road, if it has to go, which we want it to go, it's like the past. We will not stop the public. Sazale will not stop the public from going and using the beach. You know, go back to the past. And it's been a repeated thing. The government had taken away the road, set up another road, a trail for the people to pass.

CHAIRMAN: Could you conclude, please.

CARRIAGA: Okay, the reason why I'm talking about the road is because I, our family, the Kailiawa, had a property down there. We had to go to Ninole and that's the end of that road. And so we passed that road. Now that road has been relocated, redesigned, reshaped, and everything. And let me tell you, it was a hard road to pass on. So we used it as a family. So I would rather see that that road go.

ALOHA!

Weather details, Pg. A4

TODAY'S WEATHER:
Mostly sunny with clear, cool nights; high in the low 80s

News summary
Page A2

Living:

Tricks to treat overload

— Page B1

Food:

The scoop on pumpkin pickings

— Page B

The Honolulu A

Final Edition A Gannett N

State plan for Ka'u spa

Developer Lockheed pulls out

By Jon Yoshishige and Hugh Clark
Advertiser Staff Writers

The state's proposal for a Big Island commercial spaceport has suffered what could be a mortal blow, state officials said yesterday in making these announcements:

■ Lockheed Missiles and Space Co. has withdrawn from the project, which has already cost Hawaii taxpayers at least $4.5 million.

■ Ken Munechika, director of the state Office of Space Industry, is leaving and his office is concluding its contract with retired Navy Adm. Thomas Hayward, who had been hired as a consultant to lure spaceport developers.

"I wouldn't call it 'dead' — the governor still believes a space industry on the Big Island is necessary for future economic growth, not only for the Big Island, but for the state," said Carolyn Tanaka, spokeswoman for Gov. John Waihee.

But, she added, "We have to be realistic. With the lack of a private developer for the moment, we have to look at where we are."

A Lockheed official wrote to Waihee Monday, saying the company finds the Hawaii project unfeasible because the federal government is leaning toward upgrading existing launch facilities rather than supporting new ones.

"In light of Lockheed's withdrawal, we will be making several changes in the Office of Space Industry," state Business Director Mufi Hannemann said in a written statement.

Among those changes are re-examining the office's priorities and "reassessing our staffing needs and making appropriate changes," he said.

Earlier this year, Lockheed and the state signed non-binding letters of agreement to develop a commercial satellite-launching facility in Ka'u. Two sites, at Palima Point and Kahilipali Point, have been under consideration.

Waihee last week denied published reports from the Big Island that this administration was planning to scut-

Sports:

Charlotte gets NFL expansion

— Page D1

Advertiser Wednesday, Oct. 27, 1993

ewspaper On Oahu 50c

ceport sputters

tle the spaceport project as early as this week.

"There is no plan to pull out state backing," the governor said. "The problem is to find private sector partners."

Waihee has long sought such a project as a way to boost the Big Island's sagging economy. He called for the spaceport in his first State of the State speech in 1987 and has not wavered.

He estimated in 1991 that the project would cost $500 million. But he has said it could generate hundreds of jobs and millions of dollars in tax revenues.

But large numbers of Big Islanders, including Mayor Steve Yamashiro, have opposed the project.

Under terms of its agreement,

See Spaceport, Page A2

Spaceport sites

Spaceport: Lockheed, state space czar out

FROM PAGE ONE

Lockheed was to have done a number of studies, including site evaluations to determine what needs to be done to develop a launch facility and what sort of launch vehicle would be appropriate.

The state, meanwhile, was to complete the environmental impact statement for the facility.

Waihee said work on the statement would continue.

"We need to complete the EIS and finish what we have begun," the governor said in a written statement. "At the same time, we need to continue to assess the level of our support, given the economic realities and other priorities currently facing the state."

Hannemann said the deadline for public response to the spaceport plan is Nov. 22. He expects a final statement will be complete in the spring of next year.

He said his department will re-examine "varied space-related activities," including the Future Flight Hawaii program held each summer at the University of Hawaii-Hilo and two other projects not linked directly to the spaceport.

As of June 30, the state had spent $4.5 million pursuing the spaceport, Hannemann said last night.

Included in that figure was the contract with Hayward, former chief of naval operations who was hired in 1989 to lure aerospace companies to develop the spaceport. He is also a paid consultant for Lockheed's aircraft division, although he says there is no conflict of interest.

As Hawaii's "space czar," Hayward received $10,000 a month for expenses until March 31, when budget cuts forced the state to cut his duties and halve his fee.

Hayward's contract, which was to have expired next spring, will end Dec. 31, Hannemann said.

Hayward could not be reached for comment yesterday.

Tak Yoshihara, the deputy director of the Department of Business, Economic Development & Tourism, will assume Munechika's responsibilities as head of the Office of Space Industry.

The Hawaii County Council, which gave Yoshihara and Munechika a cool reception when they appeared to defend the EIS in August, is to open a subcommittee inquiry Monday on the spaceport proposal.

Sandy Demoruelle of Ka'u, chairwoman of the Informational Network for the Spaceport that strongly opposes the project, said: "They're packing their tent. We are very happy they are wrapping it up."

Mayor Yamashiro said during last year's election campaign that the opportunity for the spaceport had come and gone and that it was lingering only as a device splitting the Ka'u community.

State Sen. Andy Levin, whose district includes Ka'u, said the state was cheated on the EIS because it did not satisfy federal requirements and that all further funding should be suspended.

GETTING IT STRAIGHT

We want to correct any errors we publish. If you spot one, please call the City Desk (525-8090) or write to Managing Editor/News Anne Harpham, The Advertiser, P.O. Box 3110, Honolulu, HI 96802.

Some miscues in feature articles

There were several errors recently in the Living Section:

■ Kool and the Gang appeared last Friday at Casanova in Makawao. An item yesterday said the concerts would be this Friday.

■ The Kaimuki restaurant mentioned Sunday, 3660 on the Rise, was correctly named in the story, but misidentified in an accompanying information box.

■ Tim Jeffryes name was misspelled in a review yesterday of Angel Inc.'s "El Grande de Coca-Cola," playing at the Mews Theatre.

State got 4.5% rate on bonds

The state last week got an interest rate of slightly more than 4.5 percent when it floated $250 million in new bonds and refinanced $320 million in existing bonds. An article yesterday gave an incorrect interest rate.

Honolulu
Star-Bulletin

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A.A. Smyser, *Contributing Editor*

Goodbye spaceport

AT a time when the tourism industry is struggling, the sugar industry is shrinking and the military is facing cutbacks, Hawaii didn't need another dose of bad economic news. The decision of the Lockheed Missiles and Space Co. to pull out of the state's spaceport project on the Big Island puts the program on hold. Its revival is doubtful at best.

Geography made the southern tip of the Big Island uniquely suited among potential U.S. sites for space launches. Seeking to take advantage of that fact, the state has put at least $4.5 million of taxpayer money into the project as a way to diversify the economy. But without a corporate partner, the spaceport can't go forward. However, the Department of Business, Economic Development and Tourism will continue preparation of the project's environmental impact statement.

Lockheed's withdrawal isn't the spaceport's only problem. The project has been vehemently opposed by residents of the Kau district. Mayor Steven Yamashiro and other Big Island political leaders want no part of it.

The spaceport would have provided job opportunities for Hawaii residents, especially those with technical education who would otherwise be forced to leave to find employment. Its environmental impact would be minimal. But without the community's support, the project was probably doomed.

11/2/93 Honolulu STAR-BULLETIN A3

Panel questions spaceport studies

☐ Two answer queries on the environmental and safety concerns

By Chris Loos
Special to Star-Bulletin

HILO — The state has already spent $1.4 million on a draft environmental impact statement for a proposed spaceport in Kau, but that figure will increase considerably if the study is completed.

That's the word from Richard Flagg of the state Office of Space Industry and Marilynn Metz of MCM Planning, which prepared the EIS. They appeared yesterday before a special Hawaii County Council subcommittee looking into the spaceport study.

Flagg and Metz answered questions from a panel of members with environmental, safety and other concerns. They were assisted, via telephone conference calls, by members of Flagg's support staff.

Questions ranged from the potential of nuclear devices to the effect on sea turtles.

Although Gov. John Waihee announced last Tuesday that Lockheed Missiles and Space Co. Inc. had withdrawn from the state's efforts to create a spaceport on the Big Island, he said the state would complete the EIS.

Walt Dudley, head of oceanography at University of Hawaii at Hilo, said the part of the EIS relating to sea turtles is "a very superficial study — none of the sea turtle experts was contacted."

Dudley said his office has tagging studies going back 15 years and more than 60 days of field work. Yet only five days of field work were done for the EIS, he said.

Harry Kim

He said the area surrounding the proposed spaceport site is the principal nesting site for hawksbill turtles in the state. Endangered green sea turtles also rest in the area, and "they're very sensitive to any kind of activity," Dudley said.

County Civil Defense Administrator Harry Kim said people responsible for addressing natural hazards near the launch site "did a very incomplete job of understanding the magnitude of hazards in that area."

If the chemicals being planned for use in the project are stored "in any quantity" at the site — where scientists predict subsidence and a major earthquake eventually will occur — "the area would be condemned for pollution for life of the land . . . ."

"I would not worry that much about turtles. My concern would be the people," Kim added.

Committee Chairman Keola Childs asked how the public can be assured that nuclear devices will be prohibited, when they are being used at other spaceports.

Flagg said the federal government does have the power to pre-empt the spaceport but added that the possibility is unlikely.

"You've got a nice airport here. The first time they wipe out Hickam Field every B-52 in town is going to be over here with nuclear weapons. Does that mean you shouldn't have an airport?" Flagg said.

Pat Tummons from Environment Hawaii asked Alvin Greenberg from Risk Science Associates how his firm came up with a launch failure rate of one failure in a lifetime for projecting the risk of cancer.

Greenberg said toxicologists don't have the expertise to predict launch failure rates.

Greenberg said it was his expectation that, since he didn't know the failure rates, the people who wrote the EIS would make those calculations.

All parties agree that unless the project is scrapped, additional questions must be answered.

"Additional work is going to cost additional money," Flagg said. The first step, after public comment, will be to assess how much additional money must be spent, he said. "And it's going to cost us a little money to find out how much more money it's gonna take."

call Walt

FAX
COVER PAGE *

Sandy - front cover? whole document

Talk to Walt? Loan? Katahira?

FAX DIRECTED TO

Date: Oct. 26, 1993
Time: 12:45 pm
Number of pages Faxed -22-

FAX: 943-1290

Office Phone: 943-1221

Organization: National Marine Fisheries Service

Department: Southwest Fisheries Center Honolulu Laboratory

Name: Mr. George Balazs

Subject: Spaceport EIS

Rocket Launch pad

FAX SENT BY

FAX: 933-3677

Organization: University of Hawaii at Hilo

Department: Marine Option Program

Name: Walter Dudley

Office Phone Number: (808)-933-3411
or Message at 933-3544

Problems with FAX Transmission - Call (808)-933-3411

Special Instructions:

MOP/NMFS project - did he talk to Dudley? Hallacher? marine study? conveniently just outside zone:

George,

Here is the entire pertinent section. I would appreciate any concerns you may have regarding this and will convey them either as yours or as my own to our Councilmen.

We have the Pavilion at Punaluu reserved for the Nov. 30 - Dec. 1 date, so put that firmly on your calendar.

Have a good safe trip to Samoa.

Aloha, Walt

University of Hawaii at Hilo
200 W. Kawili Street
Hilo, HI 96720-4091

ative observations over large areas with clear waters, a diver may be towed behind a support vessel. Because surface waters were much too rough and choppy to allow this, SCUBA diving at a number of locations provided a comprehensive overview of the marine communities present. 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). Communities present within each of these zones were then qualitatively described.

D. Sea Turtle Surveys

The objectives of the sea turtle surveys are to (1) identify sites of major concentrations of sea turtles, (2) determine resting localities and approximate abundance at these locations of major concentrations, (3) if present, identify appropriate subtidal foraging pastures in the vicinity of resting habitats and attempt to determine the use of these pastures by turtles and (4) locate beach areas that may be appropriate for the nesting of hawksbill and green sea turtles in the project site. Because the surf conditions precluded sufficient "in water" work, we were unable to ascertain the extent of resting sites and subtidal foraging pastures and their use in the 1990 surveys, thus in the 1993 studies, we focused on these objectives in the immediate vicinity of the three proposed launch pads.

To meet these objectives we have utilized a number of techniques ranging from a helicopter overflight of the entire coastline (in 1990) to small-scale observations made from discrete points along the shoreline. The helicopter overflight and discussions with local fishermen were used to identify nearshore areas used consistently by sea turtles. These areas as well as most of the remaining coastline were covered on foot, making shoreline observations of local sea turtle abundance. These techniques also were employed in determining the locations of possible nesting beaches. In the 1993 field effort, areas fronting the proposed locations of the three launch pads were examined in the water.

To determine abundance from shoreline vantage points, counts were made of turtles surfacing for air in resting sites over specified time periods. With this technique differentiation of individuals is not an easy task but may be accomplished by censusing several individuals at the surface simultaneously and/or by noting individual differences in shell color, size, etc. Binoculars assist in making these determinations. In all of these efforts if turtles were encountered, estimates on straight line carapace lengths were made and if visually apparent, we

noted the presence of deformities, tumors or tags.

As they were either identified in the field or through questioning of fishermen, areas of sea turtle concentrations were noted on a map. Reconnaissance of some resting areas was carried out using snorkel gear. During all survey work if macrothalloid algae were seen, the species and their abundance were noted. The intent of these qualitative observations was to use them in determining possible sites of turtle foraging. Additionally, a qualitative inspection was made of the intertidal rocky shoreline fronting much of the Palima Point site in an effort to identify possible intertidal forage areas.

RESULTS AND DISCUSSION

A. Anchialine Pools

With the discovery of a number of new caridean shrimp species in the early 1960's, Holthuis (1963, 1973) drew attention to an ecologically distinct habitat in which these shrimp are found. These crustaceans reside in land-locked brackish water pools. These pools have been termed "anchialine" by Holthuis (1973) from the greek "anchialos" meaning near the sea; these pools may be characterized by a lack of surface connections to the sea, yet have measurable salinities and damped tidal fluctuations.

Naturally occurring anchialine ponds are restricted to highly porous substrates such as recent lavas or limestone adjacent to the sea. These unique habitats are widely distributed but the localities with the greatest number of these pools are sites in Fiji, the Ryukyus and Hawaii. Statewide, Hawaii Island has the largest number of anchialine ponds. The majority of these pools occur along the coast from Kawaihae to Kailua-Kona on the west side of the island. Brock (1985) estimated that there were about 630 anchialine ponds on the Hawaii Island coastline; 130 anchialine pools were destroyed with the construction of the Hyatt Resort at Waikoloa. It should however, be noted that the estimate was just that and since that time additional pools have been located. Despite the destruction of pools, the total number for the island presently approaches 600 ponds.

The Hawaiian anchialine pond ecosystem is dominated by a characteristic assemblage of organisms some of which are found nowhere else. This group includes crustaceans (shrimps, amphipods and isopods), fishes, molluska, a hydroid, sponges, polychaetes, tunicates, aquatic insects, algae and aquatic macrophytes. Most striking are a number of red-pigmented caridean shrimp species. These shrimps, as well as many other co-occurring faunal components, utilize the anchialine pond habitat and the rock inter-

D. SEA TURTLES

Because of declining population sizes the green sea turtle (Chelonia mydas) was granted protection as a threatened species under the federally mandated Endangered Species Act in 1977-78. Green turtles as adults are known to forage and rest in the shallow waters around the main Hawaiian Islands. Growth in Hawaiian green turtles is slow; to attain sexual maturity takes about 25 years. Reproduction in the Hawaiian population occurs primarily during the summer months in the Northwest Hawaiian Islands with adults migrating during the late spring and summer to these isolated atolls and returning in late summer or early fall. In the main Hawaiian Islands green turtles rest along ledges or in caves in coastal waters usually from 12 to 24m in depth during the day. Under the cover of darkness turtles travel inshore to shallow subtidal and intertidal habitats to forage on algae or limu (Balazs et al. 1987). The normal range of these daily movements between resting and foraging areas is about one kilometer (Balazs 1980, Balazs et al. 1987). Thus from the present state of knowledge, an ideal green turtle habitat would have the presence of appropriate offshore resting areas (caves, ledges or undercuts) being located within a kilometer or less of a sufficient abundance of appropriate forage algal species situated in shallow water. Selectivity of algal species consumed by Hawaiian green turtles appears to vary with the locality of sampling but stomach content data show Acanthophora spicifera and Amansia glomerata to be quantitatively the most important (Balazs et al. 1987); the preferences may be due to the ubiquitous distributions of these algal species. Interestingly, on Hawaii Island at Punalu'u Bay and environs, Balazs et al. (1987) found that green turtles consume primarily Pterocladia capillacea. This alga is a dominant species in Punalu'u Bay and lower intertidal along nearby cliff areas.

Little life history information exists for the hawksbill turtle (Eretomchelys imbricata; Hughes 1981). Hawksbill turtles apparently feed on sponges (Coston-Clements and Hoss 1983) and the flesh of this species has occasionally been toxic to humans. Hawksbill turtles occasionally rest in the same habitat with green turtles (Wright and Lay 1977), but little else is known of their resting and foraging habits. In the past the shell was an article of commerce. These turtles are known to nest on a few isolated beaches in the main islands; these beaches include Halape and Apua in the Volcanoes National Park, Kamehame near Palima Point, Punalu'u Bay, Ninole Cove and at the mouth of Halawa Valley, Molokai. Hawksbill turtles are on the endangered species list.

Both green and hawksbill turtles are known to occur in the vicinity of Palima Point. Balazs (1980) and Balazs et al. (1987)

note that green turtles are common in the vicinity of Punalu'u Bay and Wright and Lay (1977) state that hawksbill turtles are found in the same resting and foraging pastures.

To assess the abundance of sea turtles along the Palima Point shoreline in the 1990 field effort, we first used a helicopter overflight to identify possible offshore resting areas (as delimited by the presence of turtles surfacing for air) and followed this with an inspection of the coastline along most of the shoreline of the proposed spaceport. The helicopter overflight (made on 29 January 1990) pointed out several areas of aggregation; in the Palima Point Population Control Zone one turtle was seen at Mahuka Bay (near the Volcanoes National Park border), three offshore of Kamehame Hill and one offshore of Nahuluhulu Point (see Figure 2). Additionally the helicopter pilot pointed out one nesting as of August 1989 reputed to be hawksbill at Kamehame Hill. The pilot noted that in his activities he overflies much of the subject coast and nesting by turtles is not common; he had seen this activity only at Kamehame Hill.

Subsequent discussions with fishermen suggested that in the Palima Point study area, turtles are common at Kamehame Hill, in the vicinity of Nahuluhulu Point (locally called Turtle Bay) and offshore of Kane'ele'ele Heiau and at Punalu'u Bay (just outside of the study area).

The helicopter overflight, discussions with fishermen as well as the available literature provided information on where to concentrate our shoreline observations. The strategy we employed was to walk the shoreline, and in areas away from known resting sites, stop approximately every 500m and search the nearshore waters for turtles on the surface. In those areas previously identified as being important to turtles, more effort was expended searching for turtles. Observational data were gathered as numbers counted at the surface per unit time with care being taken as to not count the same individual more than once. This methodology was employed along most of the Palima Point site (i.e., 8.5 of 12km). We covered a section from just north of Punalu'u Bay on the south to Waiapele Bay. Despite the sighting of one turtle at Mahuka Bay in the helicopter overflight (about 2.4km to the north of Waiapele Bay), the presence of high (30m) cliffs over most of the coastline from Waiapele to Punahaha meant that there were no beaches for use by turtles. Discussions with fishermen suggested that in the Palima Point area most turtles are seen between Kamehame Hill and Punalu'u Bay.

The results of the shoreline observations from the 1990 survey are given in Table 5. In total 36 turtles were seen offshore of the Palima Point site. Approximately 140 man-hours were expended in this assessment. Thus at many stops we did not en-

Figure 2. Map depicting the major areas of sea turtle aggregations based on our helicopter overflight, interviews, the literature and the 1990 shoreline survey in the Palima Point study area. These areas are Nahuluhulu Point and vicinity, and Kamehame Hill.

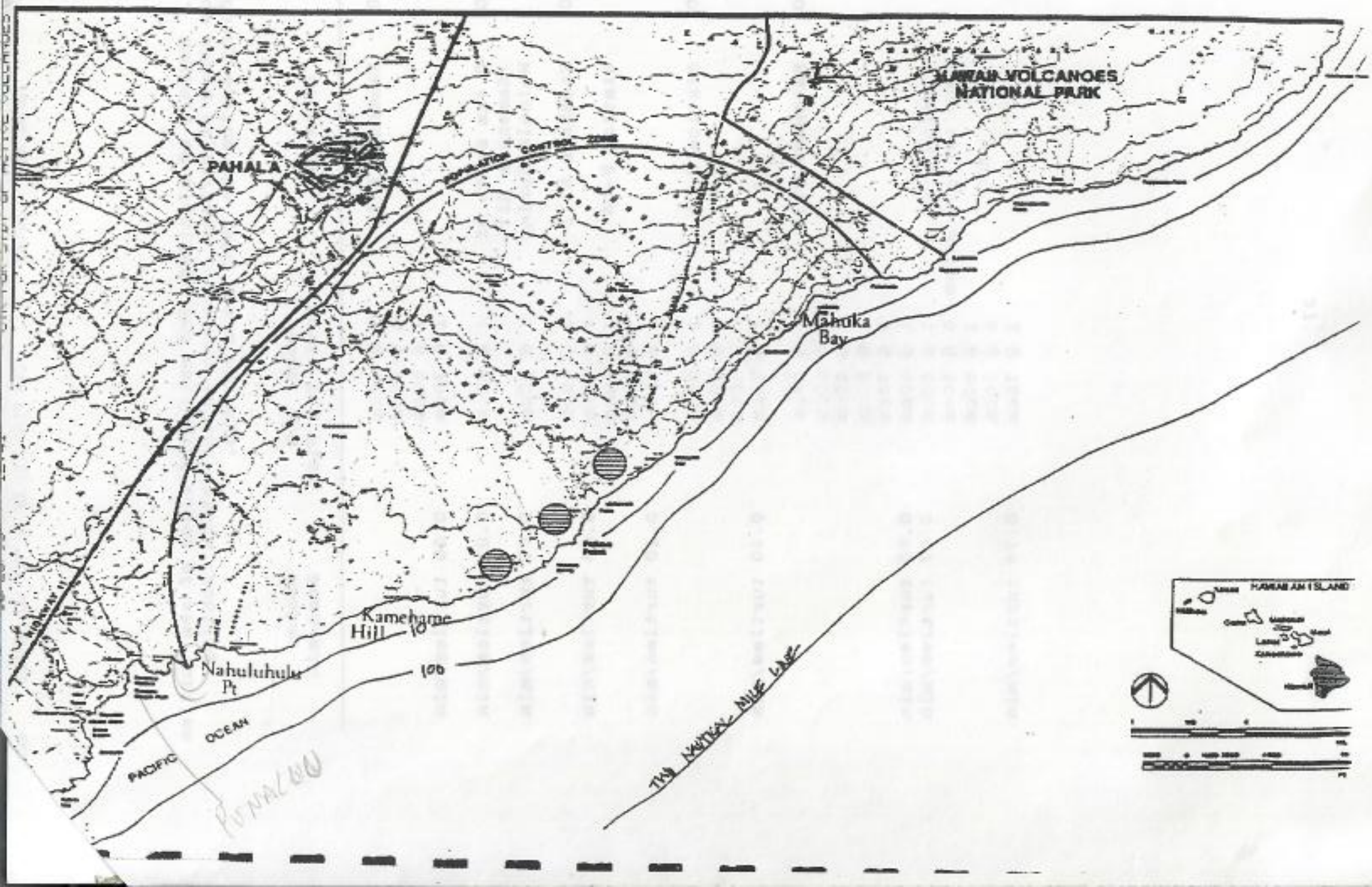

HAWAII VOLCANOES
NATIONAL PARK
PAHALA
POPULATION CONTROL ZONE
Mahuka
Bay
Kamehame
Hill
Nahuluhulu
Pt
100
OCEAN
PACIFIC
THE NAUTICAL MILE LINE
HAWAIIAN ISLAND

Table 5. Summary of sightings and estimated sizes of sea turtles made from shore at various locations in the waters fronting Palima Point during the 1990 field surveys.

Date	Location	Number and Estimated Size	Number Seen/min
01/29/90	Kamehame Hill	1 @ 40cm	
		3 @ 50cm	
		1 @ 60cm	
		1 @ 70cm	0.30 turtles/min
04/25/90	0.4km south of Kamehame Hill	1 @ 50cm	0.07 turtles/min
	Waioala Spring	1 @ 60cm	0.07 turtles/min
04/26/90	Kamehame Hill	1 @ 40cm	
		1 @ 60cm	0.06 turtles/min
	Station P-06	1 @ 40cm	
		1 @ 50cm	
		1 @ 60cm	0.20 turtles/min
05/10/90	Station P-06	1 @ 35cm	
		1 @ 40cm	
		3 @ 50cm	
		1 @ 70cm	0.30 turtles/min
08/04/90	Kamehame Hill	1 @ 35cm	
		1 @ 40cm	
		2 @ 50cm	
		2 @ 60cm	
		2 @ 75cm	
		1 @ 80cm	0.60 turtles/min
	Station P-06	1 @ 50cm	0.07 turtles/min
	Kane'ele'ele Heiau	3 @ 50cm	
		1 @ 60cm	
		2 @ 70cm	
		1 @ 75cm	0.70 turtles/min

counter turtles on the surface for the duration of our observations. Turtles were not encountered fronting any of the proposed launch pad sites. At a minimum, sea turtles must transit all areas that we censused, but time constraints dictated that our sampling efforts were to focus on areas of major aggregation and at launch pad sites. All of the turtles we saw appeared to be green turtles; we did not identify any hawksbill turtles in our shoreline survey. The absence of hawksbill turtles in our counts may be due to our inability to distinguish these two species at a distance. Wright and Lay (1977) did find 6 hawksbill turtles in 161 sightings made over a 92-day period in the Punalu'u area. In another student study, Kam (1978) using turtle nets captured three individuals in Punalu'u Bay and 13 others in Ka'alu'alu Bay over four nights of sampling. The mean capapace length of this sample was 67cm. No hawksbill turtles were caught in the latter survey.

In the 1990 shoreline survey we saw no turtles along much of the coastline we examined on foot. However, in the locations known to be frequented by sea turtles, they were frequently common. Punalu'u Bay is known as a major turtle habitat; it lies 350m south of the southern terminus of the Palima Point Population Control Zone. About 1800 hours on 27 April 1990 at a high tide (+2.2 feet), we counted approximately 40 sea turtles in the bay primarily in the northeast corner. These turtles appeared to be foraging on limu (primarily Pterocladia capillacea) in water from 0.5 to about 3m in depth. The turtles displayed no particular concern for nearby swimmers; however, on the north side of Kane'ele'ele Heiau (400m to the north of Punalu'u Bay) turtles are very wary of any movement on the shore. We noted remains of (probably two) turtles on the shore where they had been butchered sometime in the past at that location. Punalu'u Bay is frequented by a number of visitors and residents such that poaching turtles would be difficult to carry out unnoticed; in more isolated areas this may not be the case. The remains of two turtles (shells tied up in a beach heliotrope tree) were seen at Kamilo in 1990 (Mr. G. Yamagata, personal communication). Despite the illegality, poaching sea turtles probably still occurs in Ka'u and this must have an impact on their local distribution.

In the February 1993 field work turtle observations were restricted to the areas direct fronting the three proposed launch pads at Palima Point. Transiting to and from Punalu'u Bay in this field effort few turtles were seen probably because the vessel traveled in deep water (500m or more offshore). Despite this distance offshore, between Kamehame Hill and the south pad five turtles were seen on the surface (estimated straight line carapace lengths: 40cm, 60cm, 60cm, 75cm and 80cm. Two turtles were encountered in the water fronting the south pad; one of these was estimated to have a straight line carapace length of

60cm and the second, 60cm. One of these turtles was up in the water column and apparently swimming towards the south (Kamehame Hill?) and the second was resting on the bottom under a large basalt boulder. Offshore of the middle pad was seen a single turtle estimated to be about 75cm in straight line carapace length; this turtle and the 80cm individual above appeared to be females. Just north of the middle pad another small turtle was seen on the surface; this individual was estimated to be about 40cm in carapace length. All nine turtles seen in the February 1993 effort were green turtles (no hawksbills) and none were seen with tags or obvious signs of tumors. The mean size of these turtles was 60cm.

The estimated mean size (i.e., straight line carapace length) of the turtles seen in the more extensive 1990 survey was 58cm. Balazs (1980) notes that green turtles up to 65cm in carapace length are juveniles, subadults are in the size range from 65 to 81cm and adults are greater than 81cm in length. Using these criteria, we encountered one possible adult in our 1990 shoreline survey work and none in the 1993 survey. In their study Wright and Lay (1977) captured 39 turtles; the mean size of these measured individuals was 54cm suggesting that our field estimates are probably reasonably accurate. However these authors did find 6 adults in their sample and in their visual size estimates on 161 individuals, 32 or 12 percent of the population was considered to be adult. Although Punalu'u Bay is outside of the study sites, we noted a greater number of larger turtles present (sizes not individually estimated) in our rough census on 27 April 1990.

The submarine topography fronting much of the Palima Point study site is steep with numerous ledges, boulder piles and potholes close to shore which could serve as resting habitat for sea turtles. Both the 1990 and 1993 field surveys found no lack of shelter areas that could serve as resting habitat for sea turtles. However, this may not be the case for algal forage. Subtidal algae appear to be very uncommon outside of Punalu'u Bay. We did find a rather consistent band of intertidal algae in the Palima Point site from Kane'ele'ele Heiau north to Waioala Spring (we found no evidence of a spring at this location during the 1990 field surveys). Species seen in this band include Pterocladia capillacea and above it, 'aki'aki (Ahnfeltia concinna). As noted by Balazs (1980) Pterocladia capillacea is an important forage species for green turtles in the Punalu'u region. North of Waioala Spring intertidal algae were sparse other than in tidepools. Wright and Lay (1977) note several algal species present subtidally in the Punalu'u area including Pterocladia capillacea and Amansia glomerata both of which are known to be important forage species. These authors do not provide any information as to the relative abundance or local

distributions of these algae other than to say that they were present. We suspect that much of the forage seen by Wright and Lay (1977) was present in and immediately adjacent to Punalu'u Bay.

The lack of subtidal algae is probably due to the presence of numerous grazing fishes along most of the Ka'u shoreline. Another factor retarding the growth of high biomass macrothalloid algal communities is wave impact; many species cannot tolerate prolonged periods of high energy conditions (waves). However, some algal species such as Pterocladia capillacea have evolved to live in high energy habitats. Families of fishes that are important algal grazers include the parrotfishes (family Scaridae), surgeonfishes (family Acanthuridae) and the rudder fishes (family Kyphosidae). Members of other fish families common in Ka'u waters that are herbivorous (damselfishes - Pomacentridae, angelfishes - Pomacanthidae and triggerfishes - Balistidae) may also impact local algal resources. The feeding activities of these fishes and certain invertebrate species will keep algal communities grazed down to a mere stubble and if these grazers occur in high density (as is seen in many areas in the study sites) their activities may cause a benthic community succession favoring encrusting coralline red algae and/or corals (Birkeland 1977, Brock 1979). The short algal stubble or "turfs" that result from high grazing pressure (as may be exerted by fishes and sea urchins) can be 3 to 5 times as more productive (i.e., through rapid turnover) than the high biomass algal communities that would exist without this level of grazing pressure (Carpenter 1986). This successional trend allows nearshore benthic communities to support high standing crops of herbivorous fishes and invertebrates but probably does not favor green turtles.

The above situation usually results in little macrothalloid algae being present if the fish community is not heavily impacted by man's activities (i.e., such as by fishing) which is the case offshore of Palima Point. Thus in these situations green turtles must forage elsewhere or feed on cryptic benthic invertebrates such as tunicates and sponges. Only with difficulty can herbivorous fishes graze on intertidal surfaces; hence this is one of the few places that macrothalloid algae will be found. These intertidal algal resources are probably an important source of forage for green turtles on the Ka'u coastline. Turtles utilizing intertidal algal resources must contend with waves impacting the shoreline. As noted by Wright and Lay (1977), many of the turtles captured for tagging in Ka'u showed signs of damage to the shell and plastron which they attributed to wave impact while feeding along the rocky shoreline.

It is surmised that fishing pressure is relatively high in Punalu'u Bay; it is one of the few easy access points to the

coast, has the presence of a sand beach, camping grounds, running freshwater and a park. These features draw the public and fishermen unwilling to hike into more remote areas; the net result is higher fishing pressure, fewer herbivorous fishes and more subtidal algae. Also, Pterocladia capillacea an important turtle forage species in Punalu'u Bay favors areas with groundwater input. Punalu'u is known for its underwater "springs" (Handy and Handy 1978). These features probably account for the large number of turtles encountered in the bay foraging.

NESTING

Nesting by sea turtles in certain localities in Ka'u has been known for some time. The Ka'u coastline is one of the few locations in the high islands where sea turtle nesting has been reported. Beaches of importance include Apua, Halape, Kamehame Hill, Punalu'u Beach and Ninole Cove. The Apua and Halape nesting beaches are in the Hawaii Volcanoes National Park and are thus protected and well outside of our study area. Likewise Punalu'u Beach and Ninole Cove are outside of our study area. One feature in common with these nest sites is that the beaches are comprised of black "sand" or cinders (Balazs 1981). In the period of July through December 1989 the U.S. Park Service noted 8 nests at Apua and one nest at Halape beach; all were hawksbill. The Apua beach site is situated behind a cobble rock coastline which is a barrier to the hatchlings -- Park Service employees found 350 hatchlings dead (from dehydration) and rescued 370 hatchlings which were subsequently released in this July-December period (U.S. Park Service 1990). Apparently hawksbill turtles are responsible for known nestings that occur at Halape, Apua and Kamehame; nesting also occurs on a more infrequent basis at Punalu'u Bay and Ninole Cove. Only the Kamehame Hill site is situated within the boundaries of our study area.

Hornell (1927) provides a descriptive account of the courtship and mating in the hawksbill turtle in the Seychelles Islands. Nesting behavior has been described for this species on Costa Rican beaches (Carr et al. 1966) and the beaches of the Seychelles (Frazier 1984). The clutch size in hawksbill turtles ranges from 146 to 172 eggs (Carr et al. 1966, Prichard 1969 in Prichard 1981, Schultz 1975, Ehrhart 1981) and the renesting interval is usually from two to three years (Carr et al. 1966, Frazier 1984). The interval between clutches within a nesting season is from 12 to 15 days (Moll 1979, Schultz 1975) and they may lay several clutches (Rebel 1974). Tagging of hawksbill turtles has been done primarily as an adjunct to other sea turtle studies (Hughes 1981). Tag recoveries have been low (less than 5 percent - Carr et al. 1966, Carr and Stancyk 1975) and remigrations have occurred after two to six years (see also Diamond

1976).

Hawksbill and green turtles will frequently share the same nesting beaches (Ehrhart 1981) however, nesting is considered to be "diffuse" in the hawksbill (as opposed to the high site fidelity seen in green turtle nesting). Thus hawksbill nesting beaches are scattered, complicating any tagging studies; beach selection is probably related to a lack of disturbance and appropriate physical characteristics of the beach (Carr et al. 1966, Hendrickson 1981). Hawksbill turtles are less selective than green turtles in their nesting beach requirements (see Mortimer 1981). Evidently green turtles select beaches with few obstacles whereas hawksbills will accept beaches with some barriers. Obviously, too many barriers on a beach leads to high mortality in the hatchlings as witnessed at Apua. In the Caribbean hawksbill turtles nest from June to October. Carr et al. (1966) note that nesting occurs on all undisturbed Caribbean shores wherever there is a suitable sand beach. Hornell (1927) reports nesting in the Seychelles by hawksbills to occur from September to November. Hawksbill nests are often located under vegetation (Meylan 1981b).

The diffuse nesting strategy has probably saved many populations from extinction, since turtle fishermen have been unable to concentrate their efforts on rookery aggregations (King 1981). The scattered distribution of adults and nest sites has allowed the species to survive but hampers biological studies.

Carr (1952) reported that hawksbill turtles do not migrate to any great extent; hawksbills are considered to be a parochial nester, using beaches adjacent to foraging grounds (Bustard 1976). Because of their omnivorous feeding and other ecological requirements, hawksbill turtles utilize beaches adjacent to the adult coral reef habitat. Meylan (1981a) cautions that additional tagging data are needed because the diffuse nesting habits of the species hampers the tagging of sufficient numbers of individuals to fully understand the behavior of the species. Some data show that tagged hawksbills have traveled considerable distances over short periods of time (713km in 40 days, DeSilva 1981) suggesting that significant migrations may be a part of the reproductive process in some populations.

As reported above, one nest attributed to a hawksbill was seen by the helicopter pilot in August 1989 at Kamehame Hill. Accompanying this nest was a set of "tracks" left by the female on her ascent and descent to and from the beach. Mr. G. Yamagata showed us a series of photographs taken in February 1989 of hatchlings scampering down the beach at Kamehame; about 20 (?) turtles were visible. These hatchlings were from one nest. A closeup photograph suggested that these were hawksbill turtles.

Discussions with knowledgeable individuals and past available information suggests that no more than three nestings by hawksbills occurs at Kamehame or at Halawa Valley (Molokai) annually.

On the morning of 4 August 1990 we inspected the beach at Kamehame for evidence of nesting. We identified 16 nesting pits and six sets of fresh tracks over a 55m section on the eastern portion of the black sand beach (see Figure 3). We suspect that most of the remaining beach is too narrow and/or steep for turtles to avoid nesting in areas inudated by surf. The beach at Kamehame is between 175 and 200m in length with an approximate east-west orientation. At the western extremity of Kamehame is a flat sand beach where fishermen occasionally camp, but there are a number of basalt boulders between this level area and the ocean which could impede successful entry and exit by both adult and hatchling turtles. At the eastern landward terminus of Kamehame beach is a low, sand substrate cave having a ceiling about 45cm above the substratum and extending back about 1.4m. The entrance of the cave is approximately 6m wide. Besides the five nest pits measured in the cave, we noted a number of other older pits that had been partially obliterated by more recent nesting activity. The diameters of the body pits were all measured and ranged from 60 to 150cm (mean = 103cm). Tracks widths were measured and these ranged from 46 to 110cm (mean = 84cm). These data are presented in Table 6. There were many more older tracks that crossed one another especially in the vicinity of the low cave. Besides the cave, we noted a number of other partially obliterated older pits. These older pits were especially prevalent around pit 7 (about 4 present) and between pits 1 and 2 (at least two additional pits; see Figure 3).

The relatively narrow width of the tracks and small pits seen at Kamehame suggest that the activity was primarily by hawksbill turtles. However, the size of one pit (number 7, Table 6) is suggestive of a larger green turtle. An opihi fisherman related finding a "large" turtle on the mauka (landward) side of Kamehame Hill in August 1989. The turtle appeared to be disoriented and fatigued; he assisted it back to the ocean -- a distance probably exceeding 100m. This large turtle may have been a green turtle attempting to nest.

The use of Kamehame as a nesting site by turtles is well-known. Dr. Hal Hammitt, archaeologist, has surveyed the cultural remains at Kamehame Hill. In informal discussions with us, he related that numerous fragments of eggshells are found in the middens at Kamehame. These eggshells could be from birds (seabirds?) or perhaps from turtle nests on the nearby beach. Evidently, finding eggshells in Hawaiian middens is unusual. In prehistoric times, the possibility exists that sea turtle eggs were an important commodity for those residing at Kamehame to

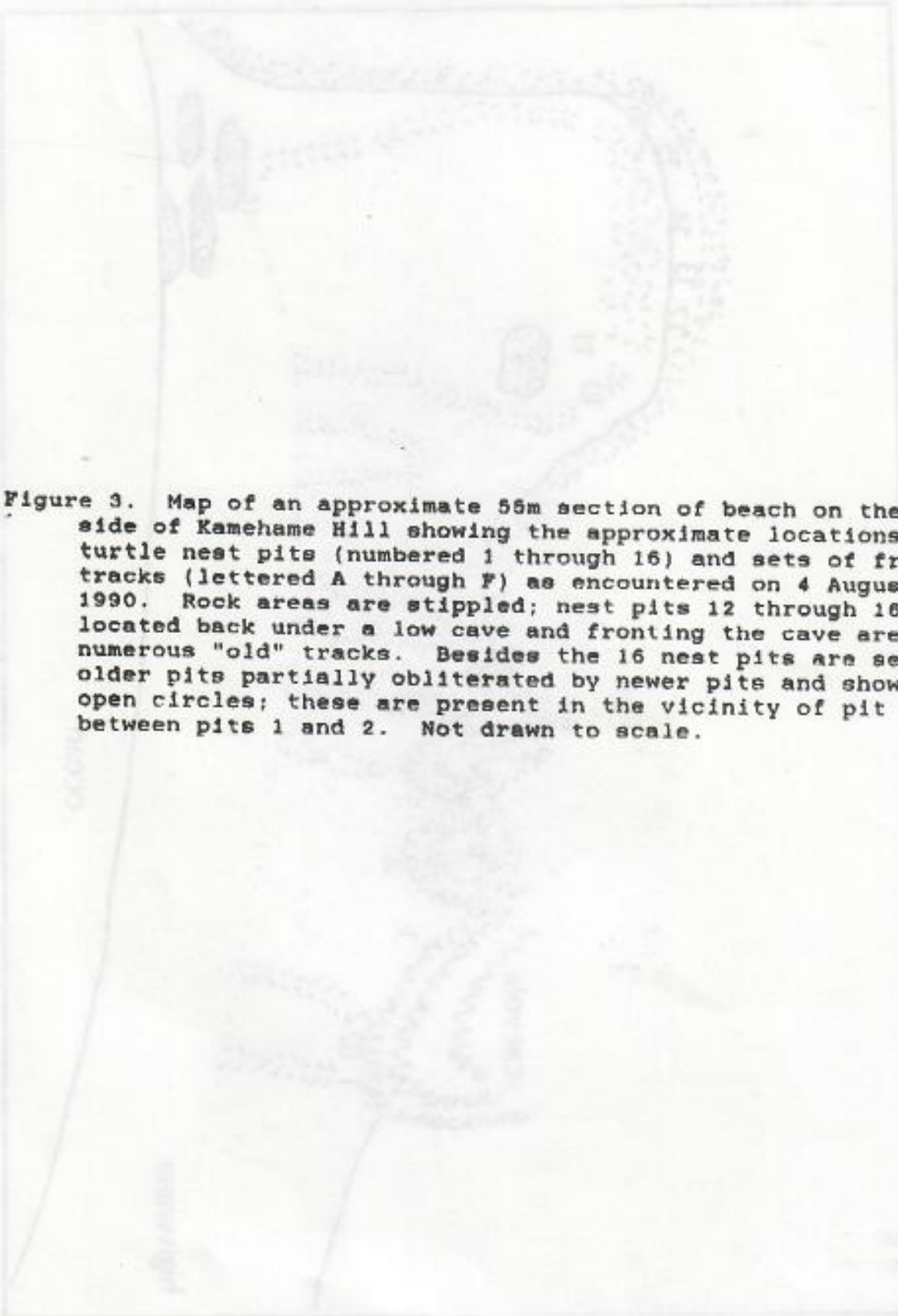
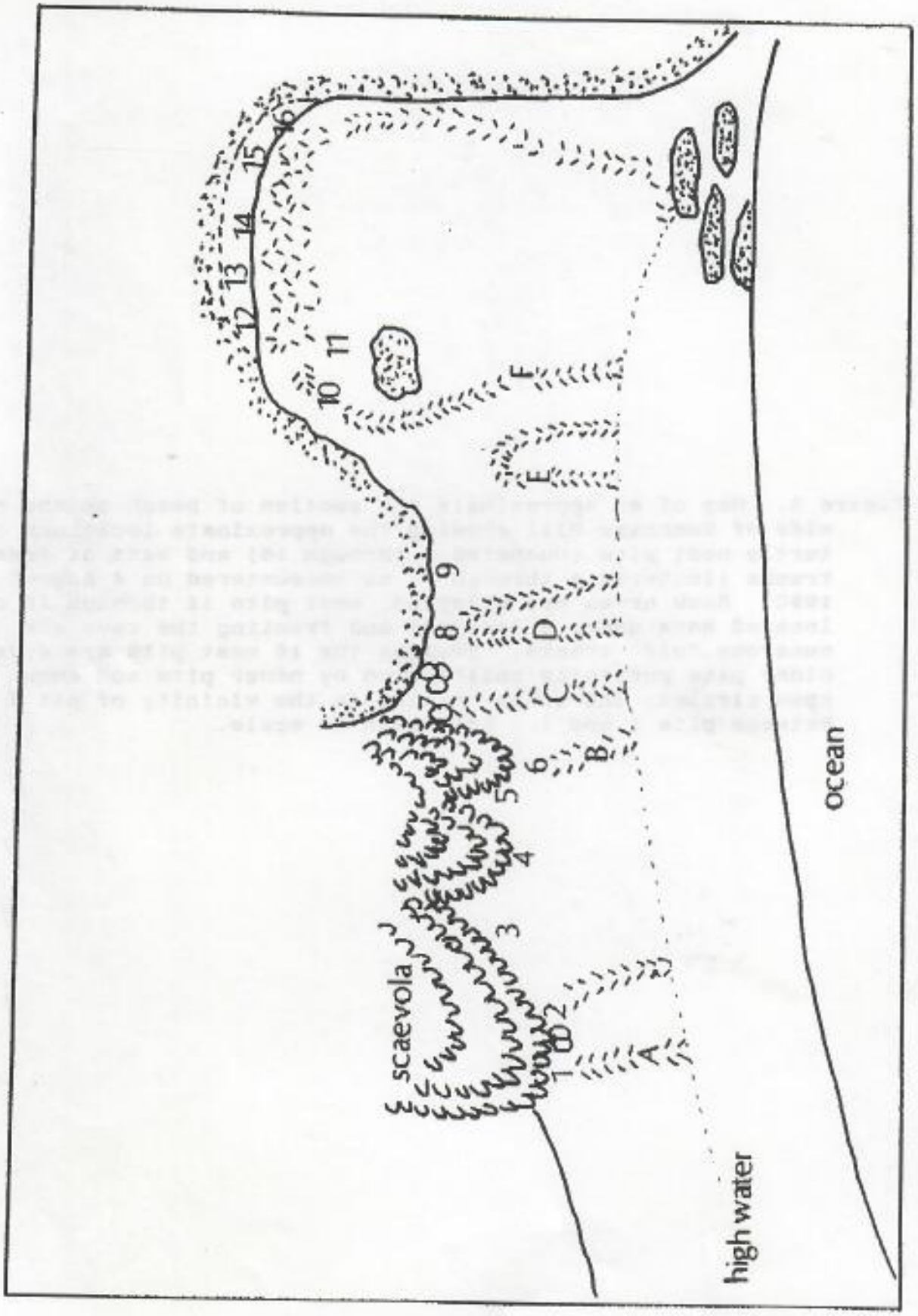


Figure 3. Map of an approximate 55m section of beach on the east side of Kamehame Hill showing the approximate locations of 16 turtle nest pits (numbered 1 through 16) and sets of fresh tracks (lettered A through F) as encountered on 4 August 1990. Rock areas are stippled; nest pits 12 through 16 are located back under a low cave and fronting the cave are numerous "old" tracks. Besides the 16 nest pits are several older pits partially obliterated by newer pits and shown as open circles; these are present in the vicinity of pit 7 and between pits 1 and 2. Not drawn to scale.


scaevola
high water
ocean
A
B
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16

Table 6. Summary of measurement data from nest pits and tracks in the nesting area at Kamehame Hill, 4 August 1990. Site numbers refer to pits as shown in Figure 2.

Site No.	Pit Diameter (cm)	Location
1	120	7m above high watermark, between Scaevola and steep slope of Kamehame Hill; fresh tracks 88cm wide
2	90	Pit about 1.5m east of #1 next to Scaevola
3	130	About 1.8m east of #2 next to Scaevola
4	90	About 3m east of #3 next to Scaevola; some broken glass from old refuse pit present
5	80	About 70cm east of #4 next to Scaevola
6	100	About 50cm east of #5 next to Scaevola; tracks about 100cm wide
7	150	About 3m northeast of #6, very fresh pit overlaying at least 4 old pits (not counted); next to Scaevola and adjacent to pahoehoe cliff, tracks about 110cm
8	130	About 2.5m east of #7 at base of pahoehoe, tracks about 80cm
9	100	About 2.5m east of #8 at base of pahoehoe
Between nos. 9 and 10 were a set of very fresh tracks ascending and descending the beach; width 46cm, no pit dug		
10	90	About 20m northeast of #9 at base of pahoehoe cliff, fresh tracks 82cm wide
11	100	About 5m east of #10 adjacent to pahoehoe cliff and emergent rock in the sand
12	60	About 3m northeast of #11 and about 80cm in and under the low cave
13	80	About 1m into the cave, partially overlapping pit #12
14	100	About 2.5m east of #13 and 80cm into the cave
15	100	About 1m east of #14 and 1m into the cave
16	125	About 60cm southeast of pit #15 just under the lip of the cave

be traded with others living elsewhere.

Besides Kamehame Hill in the Palima Point area, we did not find any other suitable sand beach areas with possible entry and exit for turtle nesting activity nor did we encounter any evidence of turtle nests elsewhere. However, discussions with Mr. G. Yamagata pointed out that fishermen have seen nesting turtles at Kamilo near Kahilipali Point and at the small steep beach developed along the eroding base of Pu'u o Mahana (locally called Green Sand Beach) in Ka'u but outside of the study area. The latter site was not inspected in our surveys.

The endangered humpback whale (Megaptera novaeangliae) is known to frequent island waters in their annual migrations to Hawaiian wintering grounds. They normally arrive in island waters about December and depart by April. In general their distribution in Hawaii appears to be limited to the 180m (100 fathom) isobath and in shallower waters (Nitta and Naughton 1989). The waters offshore of Palima Point are not known to be important humpback resting areas (Nitta and Naughton 1989) and whales were not sighted during the course of the 1990 fieldwork. However, during the underwater work offshore of Palima Point in February 1993 whales could be heard; inspection from the vessel did not reveal any whales present. This is not unexpected given the rough weather conditions during our in-water field work. Mr. G. Yamagata related an interesting incident involving humpback whales in March 1990. Camping above the cliffs at Kahuku (near Kahilipali Point, Ka'u) he noted a single whale come within 100 yards of the cliff face; this individual remained at that location circling in a small area for three days. A similar incident occurred in April 1990 when three humpback whales appeared near the cliffs but moved along shore from Kahuku towards Kii (to the southwest). Mr. Yamagata stated that whales are not common in these "inshore" waters and when seen, they are usually about 0.5 mile offshore heading in a northeast direction towards Hilo (Mr. G. Yamagata, personal communication).

POTENTIAL ADVERSE IMPACTS WITH SPACEPORT FACILITIES DEVELOPMENT AND OPERATION

In a summary form, the marine communities fronting the proposed launch facility at Palima Point are situated in a very high energy area, exposed to the northeast tradewinds. The substratum is comprised of pahoehoe and basalt boulders with very little reef development present. This substratum rapidly drops away such that oceanic waters are within 200-300m of the shoreline. The geologically young lavas at Palima as well as the exposed

nature of the shoreline dictate that the benthic marine community is held at an early successional stage of development. The marine resources present in this area are representative of those found in other isolated, high energy Hawaiian nearshore environments. Exceptional characteristics of these communities are the obvious influence of frequent high energy conditions that impinge on them and the presence of a relatively large number of sea turtles. Also present in the proposed project area is one of the few known sea turtle nesting sites in the high Hawaiian Islands (Kamehame Hill).

The nearshore marine water chemistry is influenced by a relatively large input of low salinity groundwater. The volume of groundwater discharge along this coastline must be high; despite high wave activity during our February 1993 field effort, there was evidence in our data of groundwater overlying the more dense seawater as far as 100m from shore. High wave and wind activity serve to mix groundwater and seawater thus masking the low salinity input; nevertheless, it was evident relatively far from shore suggesting a high volume of discharge. The water chemistry data suggest that the marine and groundwaters are typical of those found along other high energy coastlines in the Hawaiian Islands.

1. Disturbance Today

Today the principal disturbance on the coastal lands surrounding Palima Point is from cattle grazing which could serve as a source for nitrogen to the groundwater. Other sources include inputs from the abundant introduced nitrogen fixing plants haole koa (Leucaena glauca) and kiawe (Proposis pallida) albeit the groundwater nitrogen levels relative to the Kona coast are not high. Other than the impact of waves, disturbance to the marine communities fronting Palima Point is probably in the form of fishing which today is light but will increase with time. In the February 1993 survey several vehicles were seen around the Kamehame Hill area. The probable first major impact of these activities will be to the nesting success of sea turtles using the Kamehame area.

2. Disturbance with Development

a. Exploitation of Resources

The proposed development of launch facilities will probably alter the present coastal resource use patterns; coastal roads will improve access to now isolated areas. If the public is allowed to use these facilities, declines in marine resources can

be expected. The usual high energy conditions along the coast will serve to impede consumptive activities but the extremely narrow shallow shelf on which much of the exploitation occurs facilitates more intense use than would occur on a broader reef platform.

The proposed facility has a boundary defined as the Population Control Zone encompassing more than 11.3km of shoreline centered on Palima Point. If this area has controlled and limited access, then decline in marine resources from the fishing public may not occur. More importantly, disturbance to turtle nesting would probably lessen. By virtue of coastal area closure, the Cape Canaveral Launch Facility in Florida has become an important wildlife/waterbird preserve simply because coastal development (filling of wetlands) in the area was arrested.

b. Impacts with Facilities Construction

There are several possible impacts to marine and anchialine biota due to construction activities. One potential problem is the possible input of terrigeneous material due to heavy rainfall. Site preparation uncovers the soil leaving it vulnerable to erosion if a high rainfall event occurs during the period of time that it is uncovered. Erosion and runoff presently occur following heavy rainfall along this coast in the area between Punalu'u Bay and the anchialine pool (station 7, Figure 1). In the 1990 field effort several areas along the coast appeared to be intermittent streambeds. One area was particularly impressive; recent rains and runoff had left dry grass and branches stuck in trees as much as 2.5m above the ground. The distribution of these materials up off the ground in trees, the presence of freshly moved boulders as well as small trees and grass in a prostrate position indicated the path of the water; at the shoreline this particular swale was estimated to be about 100m wide.

These observations suggest that the marine communities fronting the Palima Point area do receive considerable runoff and erosion in the present undeveloped state. The levels of these impacts to marine communities could increase during the construction of the proposed facility. Without attention given to the appropriate measures (e.g., settlement/retension basins and the development of appropriate drainage systems, etc.) during the development of the site, sediment from the construction areas could be carried to the sea if a high rainfall event were to occur when vegetative cover was low or absent.

Sedimentation has been implicated as a major environmental problem for coral reefs. Increases in turbidity may decrease light levels resulting in a lowering of primary productivity.

Perhaps a greater threat would be the simple burial of benthic communities that may occur with high sediment loading. Many benthic species including corals are capable of removing sediment settling on them but there are threshold levels of deposition where cleaning mechanisms may be overwhelmed and the individual becomes buried. However the impact of sedimentation may be overstated. Dollar and Grigg (1981) studied the fate of benthic communities at French Frigate Shoals in the Northwest Hawaiian Islands following the accidental spill of 2000 tons of kaolin clay. These authors found that after two weeks there was no damage to the reef corals and associated communities except where the organisms were actually buried by the clay deposits for a period of more than two weeks.

The present study of the marine communities offshore of Palima Point found little evidence to suggest that sedimentation is a very important agent in structuring these communities. Considerable freshwater regularly enters the sea as groundwater around the Palima Point area; because of the steep submarine topography and the fact that brackish water usually overlies denser seawater, benthic communities do not appear to be impacted by this low salinity input. Storm water runoff would add to the volume of input. This increased volume would also carry terrigeneous material to the sea. The high energy conditions in the waters fronting the project site probably serve (1) to keep much of the terrigeneous material that has entered the sea in suspension and (2) assist in the advection of this material offshore. Runoff during development would probably behave in the same fashion.

c. Activities Affecting Sea Turtles

Human activities such as urban and industrial development, dredging and commercial fishing potentially pose a threat to turtle populations and their habitat (Shabica 1981). These activities may affect turtles in a variety of ways ranging from direct impacts (such as the physical destruction of nesting beaches and eggs) to more subtle impacts which are chronic in nature. The latter include such things as chemical pollutants impacting the longevity and reproductive capacity of sea turtles.

It is during the reproductive cycle that sea turtles come into closest contact with humans, thus more studies have been conducted during this phase of their life history than on the other phases. Human activities that affect nesting success as well as the survival of adults are addressed below.

The first step in the reproduction of sea turtles is copulation. Green turtles usually copulate in the shallow waters

just offshore of the nesting beach (Hirth 1971, Bustard 1973, Ernst and Barbour 1972, Rebel 1974, Dizon and Balaza 1982). Copulating pairs may float on the surface for hours and are vulnerable to capture by fishermen. Some Central American fishermen use decoy female turtles to attract males which become entangled in the decoy when they attempt copulation (Carr 1967).

It is the destruction or modification of beaches that has had the greatest impact on the ability of turtle populations to sustain their numbers (Coston-Clements and Hoss 1983). Increased artificial illumination may discourage adults from nesting (Worth and Smith 1976, Rainey 1978, Mortimer 1981b, Witham 1981, Hopkins and Richardson 1981). Similarly, artificial illumination may disorient hatchlings as they move across the beach to the ocean (Ehrenfeld 1968, Philibosian 1976, Mrosovsky 1978, Rainey 1978, Towle 1978, Fletemeyer 1979, Van Rhijn 1979, Frazier 1980, Baker 1981). This disorientation may cause hatchlings to move away from the water to ultimately die of desiccation or predation.

Sea turtles nest on the beaches at the Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success, the facility operation has reduced all unnecessary lighting near the beaches and employed low pressure sodium lights with shields. In the event of an evening launch, the operational plan uses only lighting in critical areas as well as in the emergency egress areas. The lighting procedures are inspected by the U.S. Fish and Wildlife Service for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill. The hill itself is situated right on the shoreline and the nesting beach seaward of it; it is probable that Kamehame Hill will serve to block much of the light from inland sources. However, as a precautionary measure, it is suggested that a light management plan similar to the Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built.

Increased recreational use of a beach may destroy nests and eggs; driving vehicles on the beach may leave deep tire tracks in the sand that prevent hatchlings from reaching the ocean (Hosier et al. 1981). Vehicles may crush eggs or pack the sand such that hatchlings are unable to leave the nest (Rainey 1978, Witham 1981).

Besides artificial illumination, noise, increased traffic and construction of buildings adjacent to a nesting beach may serve to alter the temperature of the sand where nests are situated through shading or by the removal of natural vegetative cover. Changes in temperature may alter the incubation time (Bustard and Greenham 1968, Fowler 1979, Mrosovsky 1980, Yntema and Mrosovsky 1980), influence the sex determination in embryos

(Yntema and Mrosovsky 1979, Limpus and Miller 1980, Mrosovsky 1980, Mrosovsky and Yntema 1980, Miller and Limpus 1981, Morreale et al. 1982, Mrosovsky 1982, Yntema and Mrosovsky 1982), or may impact hatchling emergence from the nest (Mrosovsky 1980). Since temperature is an important factor in sex determination and hatching success, even small changes could result in increased mortality, sex ratio imbalance or delays in hatching. Similarly, changes in the natural vegetative cover along a nesting beach to exotic species may increase the shading or create dense root mats which prevent nest excavation.

The beach at Kamehame is steep and short having little room above the high tide mark for turtle nesting. Scrub naupaka (Scaevola taccada) covers much of the steep slope above the high tide mark for turtle nesting. Kamehame Hill and beach are about 1.37km southwest of the site proposed for the southermost launch pad. If the proposed launch facility is developed, the entire area surrounding Kamehame Hill should be established as a sea turtle nesting preserve with no changes made to the surrounding vegetation. This concept should be considered by state coastal resource managers even if the launch facilities are not developed. A rigrous predator (rat, mongoose and feral cat) control program should be established to protect sea turtle nests from these predators.

c. Changes to Ground and Marine Water Chemistry

The potential exists for changes to occur to groundwater chemistry with any coastal development. These changes relative to urban, resort and golf course development have been documented on the porous lava fields of the West Hawaii (Kona) coast (Brock et al. 1988, Brock and Kam 1992, Dollar and Atkinson 1992). In general changes to chemistry of groundwater beneath shallow, highly porous lava are mediated through inputs of treated sewage effluent used as an irrigant on golf courses and other maintained plantings. Examination of groundwater, sediment or biota for pesticides used in these settings has been negative (Brock and Kam 1992).

The potential input to groundwater at the proposed Palima Point launch facility would be through the spillage of liquids used in launching rockets. The porous nature of the natural lava would probably allow spilled materials to quickly reach the watertable just a few meters beneath the surface in the vicinity of the coastal launch pads. Toxicity of anthropogenic materials to organisms residing in the groundwater or anchialine pools is essentially unknown; however, statistically significant increases in inorganic fertilizers (from treated sewage and dry fertiliz-

Why not compare here with Canaveral?

Because he can makes such comparison when it is to the advantage of advocate project!

NEWSWATCH 1/13/94 Star-Bulletin A3

Hawaiian sovereignty march Sunday

Native Hawaiian sovereignty activists announced they are moving up the date of a planned march to commemorate the 101st anniversary of the overthrow of the Hawaiian monarchy.

The theme of the march is "He Hawaii Au" (We are Hawaii), and the event is scheduled to begin at 8 a.m. Sunday from the Aloha Tower falls of Clyde parking lot.

"Originally this march was scheduled for Jan. 17," said A'o Pohaku Rodenhurst, founder of Ku Ho'one'enu'u Pono. "But there are many groups who will be marking the overthrow anniversary date on Monday. And we wanted to give people an opportunity to attend different events."

The estimated 2,000 people expected to attend will proceed through downtown Honolulu and arrive at Iolani Palace, the site of an all-day rally complete with political speakers and musicians, said Ohana Council representative Kawehi Kanui.

The march and rally are free and open to the public. For information, call Kanui at 259-5968.

Unfinished Punaluu resort for sale

PUNALUU, Hawaii — Tokyo-based Sazale Corp. is planning to sell its controversial, partially developed, 433-acre Black Sands Resort at Punaluu on the Big Island.

Deadline for submitting sealed bids for the property is Jan. 31, said Joseph Clark, agent for BDL Investment Banking & Commercial Real Estate, which is handling the sale.

Sazale, owner of a chain of hotels and restaurants in Japan and France, has 10 days to select a bid or reject all of them, Clark said.

"We have to sell," said Rip Collins, vice president of Sazale subsidiary Punaluu Development Inc.

Sazale bought the property — which has a golf course, condominiums and a restaurant but no hotel — from C. Brewer in 1989.

"It was the height of the real estate feeding frenzy," Collins said.

Sazale planned a luxurious 100-room hotel at the site. Since then, Sazale's fortunes have reversed and Japanese banks are demanding that Punaluu be sold to pay the company's debts, Collins said.

The resort had split residents of the undeveloped Kau District.

8th-graders defend A7 Punalu'u petroglyphs

The Honolulu Advertiser 1/14/94

By Hugh Clark
Advertiser Big Island Bureau

HILO, Hawaii — Displaying sensitivity to Hawaiian culture, a group of eighth-graders argued passionately for adults to protect five remaining petroglyphs in the Punalu'u beach area.

Roslyn Fukunaga, president of the eighth grade at Ka'u High School, said: "Perhaps our ancestors never thought their carved drawings would be worth some value. Today they are valuable and should be protected and preserved."

Roslyn and five of her classmates, all students in Jeri Cuddihy's gifted and talented English class, testified this week before the Hawaii County Council's Human Services committee.

They urged Council members to preserve the ancient Hawaiian carvings known as *na ki'i pohaku*.

George Yoshida, Big Island parks chief, said he was not aware that 20 other petroglyphs had been obliterated in the 1970s during construction of a parking lot or that the five surviving petroglyphs are in danger.

Yoshida promised the Council and the students he would look for ways to save the petroglyphs by erecting a fence around them or building a more expensive rock wall, as suggested by committee chairman Robert Rosehill.

"Petroglyphs are not just doodles," said student Charlene Baptista.

"They are non-replaceable," said Joy Yoshina.

Petroglyph expert Ski Kwiatkowski, author of *"Na Ki'i Pohaku*, A Hawaiian Petroglyph Primer," commended the student effort.

"I am every impressed with the concern that these young people have for the preservation of the most important historical things left to us by the ancient Hawaiians — namely our petroglyphs," he said in written testimony.

Star-Bulletin

Big Island spaceport is a worthy project

HAWAII'S WORLD
By A.A. Smyser

HSB
8/14/94 A12

THE cheering crowds and the confetti parades are just a memory. The public was invited through the news media and 1,500 special invitations went out in the name of Governor and Mrs. Waihee, but only 179 people showed up July 24 to meet with, lunch with and hear from Gene Cernan, the last human being to leave a footprint on the moon.

Even the Waihees didn't make it, having been detained at a Korea-Vietnam War Memorial dedication that started two hours earlier. The governor's proxy, Mufi Hannemann, arrived late, spoke and left early, due to more tight scheduling.

A miniature moon lander module was there. So was a dramatic backdrop picture of a blue and white Earth rising like a moon over the lunar horizon. And so was the astronaut hero, Cernan. But the old spirit stayed home.

The silver anniversary luncheon "celebrating" man's biggest space triumph, the Apollo 11 landing on the moon, was depressing, very depressing.

It seemed to say that our love affair with space is over. And it underlined how we in Hawaii have turned our backs on a significant opportunity to be America's only base for launching commercial satellites.

The environmental impact statement for the spaceport near South Point will be completed in a month or two. According to Takeshi Yoshihara, state energy coordinator, it has turned up "absolutely no show-stoppers." But it will probably get dusty on a shelf because the political will to follow through has disappeared.

Governor Waihee says he still has it but he will be out of office Dec. 5, his space adviser is off the payroll and the staff of the Office of Space Technology has been cut from seven to four. I haven't heard many chirps about space from the candidates to succeed Waihee.

The whole situation in its way is as sad as the July 24 lunch. Something over $5 million has been spent, including $1.6 million for the EIS, and it has come to naught.

Good riddance, some will say. Others, who might have been supporters, say the EIS process was badly bungled and have signed off, too — notably the Big Island county council and mayor.

But the Ka'u area, where the spaceport would have been located, needs jobs more than ever now that its sugar plantation is closing.

Despite some residents' opposition to industrial intrusion, the area has quietly accepted a windmill farm near South Point that is rather intrusive on its own and creates little employment. Its backers apparently were better at public relations than the spaceport backers.

Yoshihara said the emotional spaceport opposition reminds him of the old opposition to food irradiation — even though irradiation is safe, effective and used in more than 30 countries.

And John W.A. Buyers, one of the original spaceport enthusiasts, says it reminds him of the early opposition to telescopes on Mauna Kea, which now are one of Hawaii's great sources of pride and world scientific primacy.

Cold War competition drove President Kennedy to decide to put men on the moon. That competition is gone but Yoshihara and Buyers think the day will come when the spaceport plan may be revived. Yoshihara says U.S. industries are beginning to plan for hundreds of commercial satellites and may have to turn to China or France to launch them.

South Point is potentially one of the best launch sites in the world. Its latitude and the vast open ocean areas around it create a rare capability to safely put satellites into either equatorial orbits, as Kennedy Spaceport does, or polar orbits as Vandenberg Air Force Base does.

Farmers near Vandenberg's California launch site are highly tolerant of their spaceport. Their lives go on normally, as could life at South Point.

Barking Sands, Kauai, continues as an occasional launch site for military test rockets. Mauna Kea continues to give science its best space telescope sites.

The governor's former space adviser, Thomas Hayward, says several joint U.S.-Japan Cooperation in Space studies may still go forward on the Big Island, on Maui (which is getting a supercomputer for private industry use) and at Barking Sands.

Jim Crisafulli, the state's space program projects manager, says Future Flight, a popular program to introduce youngsters to space, will still continue on the Hilo campus of the University of Hawaii.

The late U.S. Sen. Spark Matsunaga was one of Hawaii's foremost space dreamers and an original backer of the South Point spaceport. I'm glad, in a way, that he wasn't there July 24. It would have saddened him, too. Or might he have livened it up?

A.A. Smyser is Star-Bulletin contributing editor.

Undersea monitors off Big Isle almost done

■ But federal cuts may delay placement of the equipment

6/26/95 A1

BY HELEN ALTONN
Star-Bulletin

Pioneering work on two undersea observatories is near completion at the University of Hawaii for the first automatic monitoring system on a growing island.

The observatories will be placed on Loihi, about 21 miles off the Big Island, and plugged into a fiber-optic cable linking the seamount with the island.

AT&T plans to put the cable in the water late this year or in February, depending on the weather, said Fred K. Duennebier, UH geology and geophysics chairman.

He has been working about four years on developing a Hawaii Undersea Geo-observatory for Loihi, rising from a hot spot in the Earth's crust that created the Hawaiian Islands.

"The cable is the main part of HUGO," Duennebier said. "We're building an extension cord with a junction box."

Oceanographer Gary McMurtry is developing a smaller Hawaii Chemical Monitoring Station to tap into the line. "It will probably be the first customer for HUGO," McMurtry said.

UH engineers are building the unique equipment, to be placed on Loihi by submersible or a large unmanned vehicle.

Duennebier is worried about federal funding cuts for the Hawaii Undersea Research Labaratory, which operates the submersible Pisces.

"Certainly, if Pisces was to disappear, that would be a big blow to us."

Hawaii scientists would have to wait in a long line to use another submersible, such as the Woods Hole Observatory's Alvin, or a large, remotely operated vehicle, Duennebier said.

McMurtry expects his $80,000 monitoring station to be ready next month for shallow water tests off Oahu.

He hopes to put it on Loihi in mid-1996 at Pele's Vents, the most active hydrothermal area on the summit, about 3,160 feet below the

SEE LOIHI, PAGE A-6

BY KEN IGE, Star-Bulletin

Left to right, machinist Dan Kokubun; oceanographer Gary McMurtry; project engineer Dave Copson; graduate assistant Max Cremer, and electrical engineer Jim Jolly show off a 600-pound observation unit that will be able to work at depths of 6,000 feet.

LOIHI: Station can hold 100 experiments

FROM PAGE A-1

ocean surface.

Once the Big Island-Loihi cable is in, McMurtry said, "The whole summit can be wired."

More than 100 experiments will be able to plug into the junction box, Duennebier said. "The observatory will be open to anybody who can put an instrument in, including students in high schools — anybody who can come up with the necessary money."

Data will be transmitted via the cable so scientists can examine it at their desks instead of waiting for a submersible to retrieve it.

"We can dial it up and take a look . . . basically in real time," McMurtry said. If there are trends or changes, the instruments can be commanded to do other tasks, he said.

McMurtry has been studying gas composition on the seamount since 1987. He believes the hydrothermal vents are a conduit to a magma chamber below because of highly enriched gases.

With the monitoring equipment, he said, "it will be like having a stethoscope on the magma chamber to monitor breathing and changes."

The chemical station will be capable of working at 6,000-foot depths, measuring levels of radon, carbon dioxide, pH (alkalinity and acidity) and dissolved oxygen, he said.

Studying how magma evolved will help predict when an eruption will occur, McMurtry said. Stress on the rocks increases radon, which may tip off seismic activity, he said.

Duennebier, primarily interested in Loihi's earthquakes, said a seismometer package will be the first connected to the junction box from HUGO.

The data will go to him at the School of Ocean and Earth Sciences and Technology, UH-Manoa, and to the Hawaii Volcano Observatory.

The first package also will contain a pressure gauge to measure ocean depth for tsunami information and a hydrophone or underwater microphone to listen to whales, ships or anything else going by, Duennebier said.

"It's going to be a lot of fun," Duennebier said.

But he said roughly $500,000 is needed "real quick" to complete HUGO, which so far has cost about $1 million. He's seeking help from the National Science Foundation, but it's also having funding problems.

State auditor: Halt all space industry work

1/10/95 HSBA3

■ Criticism over contract letting also nails DBEDT

BY MARY ADAMSKI
Star-Bulletin

The state auditor says government efforts to launch a space industry in Hawaii should be grounded until private business shows more interest.

Gov. Ben Cayetano was quick to agree.

"It's time the state stopped spending money on this project and moved on to other things," he said yesterday.

The state has spent more than $8 million to pursue a commercial launching facility on the Big Island, with little benefit, Auditor Marion Higa said in a report released yesterday.

The money included more than $2.5 million paid to two firms that, after six years, have yet to complete a master plan or environmental impact statement for a launch facility at Kahilipali or Palima point. And more than $600,000 has been paid to retired Adm. Thomas Hayward during his four years as special adviser for space to former Gov. John Waihee.

The report to the state Legislature was critical not just of the contracts with Hayward, mainland consultant CH2M Hill and local contractor MCM Planning, but with overall contracting procedures with the state Department of Business, Economic Development & Tourism. The department spent more than $150 million on consultants' contracts between 1990 and 1993, the audited period.

Cayetano indicated that planning is already under way to implement Higa's recommendation that functions of the Office of Space Industry be transferred to the High Technology Development Corp.

The Legislature created the Office of Space Industry in 1988 to develop a strategic plan for Hawaii's space industry. Efforts centered on building a commercial launch site and were widely opposed by Big Island community and environmental groups.

Some thought the state space industry died in October 1993 when Lockheed Missiles and Space Co. backed out as a prospective partner based on a U.S. government decision to upgrade existing launch sites for commercial use. At that same time, Hayward left and Ken Munechika resigned as executive director of the Office of Space Industry.

"The Office of Space Industry's pursuit of a space launch facility was slapdash, resulting in costly missteps," Higa said.

"Overall, we found that DBEDT has not used contracts effectively to accomplish its mission of economic development," Higa said. It paid contractors up front before work was done, reimbursed them for work that was not performed and didn't always start with a clear view of what it wanted a contractor to accomplish.

Of a sampling of 72 contracts granted, 34 were not subjected to a bidding process. "Consequently there is no assurance that the state obtained the best service or the best price," Higa said.

The governor said it is clear that the state "needs to be more judicious in the use of consultants."

"We have come to the conclusion that in the past — I guess maybe because there was a lot of money — the departments were quick to call for consultants' studies, work that I feel could have been done in-house," Cayetano said.

The deficiencies the auditor found existed four to six years ago and have been corrected, said former department Director Jeanne Schultz. "The findings and recommendations . . . failed to acknowledge the steps DBEDT has already taken during the past 2½-year period, to address shortcomings in its contracting practices," Schultz said in a written response.

During the four-year period covered by the audit, the department was headed by Roger Ulveling, Murray Towill and Mufi Hannemann, who resigned last July to run for City Council.

9/14/87

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REMARKS So that we may include any additional comments or suggested revisions to the above prior to publishing the Draft EIS, we would greatly appreciate your input by October 8. Thank you.

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PUNALU'U RESORT

ENVIRONMENTAL PROTECTION PLAN

September 9, 1987

I. INTRODUCTION/PURPOSE

Punalu'u Resort (formerly known as SeaMountain at Punalu'u), established in 1972, is located in Ka'u District on the island of Hawaii. Ka'u in general, and specifically Punalu'u, are rich in Hawaiian history, archaeological sites and environmentally sensitive areas and species. C. Brewer Properties, Inc. (CBP), in conformance with its overall corporate policies and objectives, has proposed the completion of Punalu'u Resort (Resort) to be a significant component of the visitor industry in East Hawaii and to provide needed stability to East Hawaii's economy. The specific objectives of the proposed Resort are: (1) to develop a high quality, low to medium density resort community at Punalu'u which is economically viable and integrated into the overall Ka'u community; (2) to continue to provide a range of employment opportunities within the community; and (3) to improve the overall eco-

nomic and social well-being of the community. Further, it is CBP's intent to preserve and protect the significant cultural, social, recreational and ecological resources of the area.

The purpose of this Environmental Protection Plan is to provide the framework for and guidelines within which the desired environmental protection would be accomplished; to identify those elements of the Resort area environment that will be protected and preserved; to identify and to describe the methods and procedures that will be used to provide the level of protection and preservation required; and to identify the governmental and private agencies and groups that will be involved with and contribute to the desired level of environmental protection and preservation and the formulization of specific plans to accomplish the desired level of environmental protection and preservation. It is recognized that the level of environmental protection desired may involve conflict between state and federal policies and local residents' past usage of the Punalu'u shoreline areas and may necessitate compromises by all affected groups and agencies. The primary goal of this Environmental Protection Plan will be to protect and preserve, to the greatest extent possible, without detrimentally affecting the economic viability of the Resort, those significant recreational and ecological features (including protection of endangered species) of the Resort area as determined and defined by recognized qualified and experienced professional environmental protection and resource management agencies, groups and individuals.

II. SOCIAL CONCERNS, ISSUES AND VALUES

Environmental protection and social/cultural practices generally result in conflicts that require compromises to be made by all concerned groups and agencies. At Punalu'u, for example, present coastal pond fishing practices create an ecological imbalance in the ponds in that the population levels of the herbivorous species (fish and shellfish) are reduced to the point that (1) the algae, which flourishes in the naturally nutrient-rich waters, grows rapidly to create an imbalance in the pond's flora and fauna and (2) results in nothing being left for the next fisherman.

As noted in the Punalu'u Resort EIS text, the owner recognizes the need to protect and preserve present and traditional fishing and food gathering practices, as well as the need to protect and preserve the natural environment of the Resort area, without either adversely affecting the economic viability of the Resort. On one hand, protecting and preserving present and traditional fishing and food gathering practices benefits local residents now because these activities supplement food supplies while providing pleasant family outings and recreation. On the other hand, protecting and preserving the natural environment, and specifically the coastal ponds and shoreline of the Resort, is a longer term benefit that will accrue to future generations and it is not an immediately seen or perceived benefit. As such, this benefit is generally more difficult to comprehend and appreciate, and leads to conflicts between what should be done for now and

what should be done for the future. Based on historical and archaeological investigations and surveys, Punalu'u was, at least prior to the seismic and tsunami activities experienced in 1868, an active and relatively large Hawaiian community. Evidence presented by Kelly (1972) and others (see Barrera and Hommon, 1972 and Crozier, 1972) suggests that following the earthquake and tsunami experienced in 1868, the majority of the Punalu'u community moved inland to higher elevations to escape future tsunamis and stormwave actions. It is likely that fishing and limu gathering, and probably turtle harvesting, were continued to be practiced. Given the conservation ethic generally known to be practiced by the early Hawaiians, it is thought that fishing and food gathering were limited to only that which was needed at the time. That is, the quantity and size of the species taken were limited and fishing and food gathering rotated between ponds and offshore areas so that population stocks could regenerate fairly quickly and perpetuate themselves without going through the wide ranges in population levels currently experienced. These are the practices that the owner seeks to protect and preserve through conservation programs and, if necessary, a series of specifically marked trails and pathways through the coastal areas. Public access to the shoreline will be maintained. However, to provide the level of environmental protection necessary to preserve and protect the coastal and strand plants and animals, and to provide the level of safety necessary to protect residents and visitors, access must be

limited to pedestrians and access to some areas, which are on private property, must be limited. Public access to public areas will be retained and maintained and public area recreational facilities, such as Punalu'u Beach Park, will be enlarged and improved.

The resolution of apparent and perceived cultural/social/environmental issues and concerns is expected to be a major task during the development of the Final Environmental Protection Plan as provided in Section III below. Further, the Cultural Resources Management Plan that will be developed in concert with the Final Environmental Protection Plan will be designed to protect and preserve the significant archaeological and cultural resources of the Punalu'u area. In addition, the Cultural Resources Management Plan will contain educational program guidelines necessary to develop programs that will inform residents and visitors of the value of the archaeological, historical and cultural resources of the area and the need to protect those resources as much as the need to protect and preserve the natural resources of the area.

III. ENVIRONMENTAL PROTECTION PLAN OBJECTIVES

In consideration of the environmentally sensitive features, areas and species found at Punalu'u, this Environmental Protection Plan has the following objectives:

1. Maintain and/or improve the environmental integrity and habitat value of the coastal ponds, shoreline and offshore waters at Punalu'u Resort for the aquatic and terrestrial species (including protected species) presently or potentially inhabiting or utilizing those areas;

2. Improve, through active or passive management, the habitat value of the coastal ponds and shoreline areas of Punalu'u for migratory and resident waterbirds;

3. Expand the scientific understanding of the coastal pond, shoreline and coastal water ecosystems and the effects of increased urban development on them.

4. Protect and actively or passively manage the habitat resources to provide increased educational and interpretive opportunities to the public regarding the unique nature and value of the wetland habitat, coastal pond, shoreline and coastal waters at Punalu'u Resort.

5. Provide a landscape setting that compliments the aesthetic character of the coastal ponds and shoreline and provide adequate buffers to protect and preserve the environmental resources of Punalu'u from Resort and recreational uses.

6. Control and monitor construction and Resort operation activities at Punalu'u so that any primary, secondary or cumulative impacts may be identified and mitigated to avoid any detrimental impacts to the coastal ponds, shoreline and coastal waters;

7. Provide for a responsible, qualified, experienced resource protection manager to implement the Environmental Protection Plan and conduct scientific monitoring programs.

The Final Environmental Protection Plan to be developed and the designation of a manager will be accomplished prior to any construction and/or development activities that may adversely affect the environmentally sensitive areas described herein. The final Environmental Protection Plan will be prepared by CBP in cooperation with technical, social/cultural input from appropriate federal, state, county and private agencies and groups, including the U.S. National Marine Fisheries Service, U.S. Fish and Wildlife Service, State Department of Land and Natural Resources, County Planning Department, County Department of Parks and Recreation and Ka'u district community associations and other concerned Ka'u district community groups that are requested by CBP to participate.

IV. DEFINITIONS

1. Adjacent Sites. Those parcels that share a common border with Punalu'u Resort as shown on and defined by official tax and property ownership maps.

2. Owner. C. Brewer Properties, Inc. (CBP), and their authorized representatives and their successors.

3. Sensitive Environmental Areas and/or Sites. Those coastal ponds, shoreline and offshore waters described below (See Section V) and/or in the Punalu'u Resort Environmental Impact Statement (See Figures 1 and 2 attached hereto and Section V below).

4. Policing. The collection and carrying away of trash and other refuse and implementation of the Environmental Protection Plan.

5. Manager. That person, organization or agency designated by the owner as being responsible for management duties contained herein of the environmentally sensitive areas and/or sites. The Manager will be an individual, organization or governmental agency with a record of experience in the protection and preservation of environmentally sensitive areas and/or sites, wildlife conservation and management, environmental awareness, education and public relations.

V. ENVIRONMENTALLY SENSITIVE AREAS AND/OR SITES

The environmentally sensitive areas of Punalu'u Resort are described below and shown on Figure 1 attached hereto. These areas and/or sites are variously referred to as "environmentally sensitive areas and/or sites", "environmentally sensitive areas", "Management Area" and "Management Area Buffer Zone." Specifically excluded from these areas are sites and/or other features that are not located within the Resort property boundaries or under the direct control of C. Brewer Properties, Inc. with the exception of items 1 through 4 as described below.

1. Coastal Ponds: Coastal Ponds Nos. 1, 2 and 3 as described in the Punalu'u Resort Environmental Impact Statement, October, 1987. Coastal Pond No. 1 includes the dry "mauka" pond as described in the Environmental Impact Statement. Coastal Pond No. 2 will be unaffected by the proposed project, but will remain as an environmentally sensitive area. Pond No. 3 (Punalu'u Lagoon) will be cleaned of debris and periodically maintained.

2. Shoreline: The environmentally sensitive shoreline includes the shoreline and areas extending from the existing boat launch ramp to Ninole Cove. Included herein is the area from the low water mark to the proposed landscape buffer along the 8th and 9th golf hole fairways, the seaward (makai) boundary of Pond No. 1, the inland (mauka) shoreline of Ninole Cove

and the black sand beach from the low water mark to the point inland where the black sand terminates and the vegetation begins, including the inland extent of Pond No. 3.

3. Coastal Waters: The environmentally sensitive coastal waters of the Punalu'u Resort area are defined as those waters inshore of a straight line drawn from Nahuluhulu Point to Kohaahu Point to the low water mark along the shoreline.

4. Sites: The environmentally sensitive sites include those significant archaeological, cultural and historical sites within the Punalu'u Resort property as defined and described by the Resort's consulting archaeologist in the Full Archaeological Reconnaissance Survey report included as Appendix A to the Punalu'u Resort Environmental Impact Statement, October, 1987. The protection and preservation of these sites will be the subject of a separate Cultural Resources Management Plan to be developed in concert with this Environmental Protection Plan.

VI. DEVELOPMENT AND CONSTRUCTION IN AND/OR AROUND THE MANAGEMENT AREA

1. Notification: The Owner shall notify the Manager at least two weeks prior to the start of any new major development and/or construction activities or earth moving within the Resort property. Specifically excluded from this provision are standard golf course and Resort operation and maintenance activities and necessary emergency cleanup or restoration activities that may be associated with storms or other natural causes.

2. Management Area Buffer Zone: A Management Area Buffer Zone shall be established and maintained adjacent to the Management Area. The width of the Management Area Buffer Zone shall be determined by the preparers of the Final Environmental Protection Plan via on-site inspection of the various edge conditions and may vary in width depending on natural site features and adjacent land use and development activities. The width shall be measured from the perpendicular plane of the Management Area boundary. The specific purpose of the Management Area Buffer Zone shall be to provide adequate protection to environmentally sensitive areas and/or sites located within and/or adjacent to the development or construction area.

3. Construction within the Management Area Buffer Zone: The following guidelines shall apply to construction within the Management Area Buffer Zone:

(a) Major above grade structures, such as hotel, condominium units, restaurants or snack bars, single family residential units and shops are not allowed within the Management Area Buffer Zone.

(b) Walkways, bench areas, trash receptacles, drinking fountains, picnic pavilions and areas, restrooms, outdoor showers, landscaping, utility lines and other necessary utilities, display areas and other similar necessary facilities and improvements are allowed within the Management Area Buffer Zone.

(c) Landscaping within the Management Area Buffer Zone shall utilize a preponderance of native or naturally occuring vegetation.

4. Other Construction and Design Restrictions: The following guidelines shall apply:

(a) Site grading shall be such that stormwater drainage from walkways, roadways, buildings and other covered areas shall not flow into the Management Area or Management Area Buffer Zone except that which is directed to specifically designed retention basins or ponds within the Resort golf course.

(b) The wastewater collection, treatment and disposal system shall be designed to prevent overflow during power outages or other emergencies from entering into the Management Area or Management Area Buffer Zone except that which is directed towards specifically designed retention basins or ponds within the Resort golf course.

(c) All structures, whether above or below grade, used for the storage of chemicals and petroleum products shall be designed to prevent spillage or leakage from entering the Management Area or Management Area Buffer Zone.

VII. MANAGEMENT AREA USE RESTRICTIONS

1. Activities specifically prohibited within the Management Area and/or Management Area Buffer Zone include:

(a) Disposal of trash, stormwater (except as described above) or other unauthorized material of any kind.

(b) Introduction of organisms of any kind into the coastal ponds, shoreline or coastal waters without the express written consent of the Manager.

(c) Unauthorized feeding of coastal pond, shoreline or coastal organisms or terrestrial wildlife.

(d) Unauthorized removal, including fishing (for purposes other than recreation or substantiated subsistence), gathering, collecting or netting of coastal pond, shoreline or coastal organisms or terrestrial wildlife without the express written consent of the Manager.

(e) Unauthorized use of coastal pond, shoreline or coastal organisms or terrestrial wildlife.

(f) Any physical, biological or hydrological modification in the Management Area or Management Area Buffer Zone without the express written consent of the Manager.

2. Controlled scientific collecting shall be limited to those experiments and/or monitoring determined necessary for understanding the coastal pond, shoreline and coastal water ecosystems and organism life cycle requirements as determined and authorized by the Manager.

VIII. RESPONSIBILITIES OF THE MANAGER

1. Management:

(a) The Manager shall manage the coastal ponds, shoreline and coastal waters fronting Punalu'u Resort.

(b) The Manager may contract services to accomplish its responsibilities and duties.

(c) In the event that the Manager is unable to fulfill its management responsibilities and duties, following consultation with appropriate agencies, a replacement individual, organization or governmental agency with a record of experience in wildlife conservation and management, environmental awareness and environmental education and public relations will be designated by the Owner.

2. Duties:

(a) Implement the programs required under the Environmental Protection Plan, including the Management Area use restrictions described herein.

(b) Initiate programs to communicate the management objectives and use restrictions to adjacent land owners and their employees, users of adjacent lands and residents and visitors to Punalu'u Resort.

(c) Develop, schedule and conduct resident and visitor education seminars, tours and other programs to achieve the management objectives.

(d) Monitor groundkeeping activities by the applicable hotel, condominium, commercial, golf course and other Resort

recreational areas grounds keepers and maintenance personnel in the Management Area or Management Area Buffer Zone to insure that their activities do not adversely affect the Management Area or Management Area Buffer Zone and to enforce the use restrictions.

(e) Conduct surveillance programs to monitor the presence or absence of exotic (introduced) fish and other marine organisms and birds in the coastal ponds, shoreline, coastal waters and wetlands and, if exotic fish or other marine organisms or bird species are found that are determined to be detrimental to the ecology of the area, formulate and execute corrective measures as appropriate and necessary.

(f) Monitor and regulate human activities in the Management Area and Management Area Buffer Zone to prevent human disruption of the wetland, coastal pond, shoreline and coastal waters and the unauthorized introduction of organisms.

(g) Conduct or assist in carrying out the monitoring programs described in this plan.

(h) Conduct, assist, facilitate, schedule or coordinate scientific or educational activities in the Management Area and Management Area Buffer Zone.

(i) Provide semi-annual update and annual status reports concerning activities undertaken and actions occurring in the Management Area and Management Area Buffer Zone and provide results of the monitoring programs to the Owner.

(j) Notify the Owner of any unforeseen, deleterious events or occurrences in the Management Area or Management Area Buffer Zone.

(k) After all contemplated development or construction within Punalu'u Resort has been completed, the Manager will:

(1) Assume maintenance and replacement responsibility for signs or educational displays posted.

(2) Undertake and administer the policing of the Management Area and Management Area Buffer Zone. Provide all equipment and consumable supplies required for such activities.

IX. RESPONSIBILITIES OF THE OWNER

The Owner shall carry out or cause to be carried out the following duties:

1. Through completion of development and construction of the Resort, the Owner shall post and maintain signs around the Management Area and Management Area Buffer Zone informing

viewers of the intent of the Management Area and Management Area Buffer Zone, use restrictions and the availability of educational materials, seminars and tours presented by the Manager. The design of the signs shall be consistent with signage to be used elsewhere within Punalu'u Resort. Their informational content will be determined in consultation with the Manager.

2. The Owner shall cooperate with the Manager's efforts to assure that Resort employees are made aware of the value and environmentally sensitive nature of the Management Area and Management Area Buffer Zone.

3. The Owner shall be responsible for providing funding support for the Environmental Protection Plan to the extent stipulated in Section XII below.

4. The Owner shall provide all notifications required from the Owner by this Environmental Protection Plan, including advance notification of intended development and construction activity.

X. MONITORING REQUIREMENTS

The general and construction period environmental monitoring described below shall be carried out or caused to be carried out by the Manager.

1. General. The Manager shall monitor water quality and faunal assemblages within the Management Area and Management Area Buffer Zone on a periodic basis to assess the ecological viability and conditions of the ecosystems and wetland habitat.

2. Construction Monitoring Requirements.

(a) Prior to beginning substantial new development or construction within the Resort, the Owner shall notify the Manager of the nature of the proposed development or construction activity. This information will be used by the Manager to determine the need for and the appropriate duration of additional monitoring needed to establish baseline conditions and to detect and characterize variations.

(b) During the course of development and construction on land within the Resort, the coastal ponds, shoreline, coastal waters and archaeological, cultural and historical sites shall be monitored at a frequency necessary to detect any adverse impacts.

(c) The Management Area and Management Area Buffer Zone shall be monitored at least once every calendar quarter for a period of two years following completion of a development or construction project within the Resort. The monitoring frequency shall then be reduced to a frequency necessary to detect any long-term trends in coastal pond, shoreline and coastal water quality, faunal assemblages or conditions as applicable.

3. Parameters to be Monitored by the Manager.

(a) Physical parameters to be monitored shall include, but are not limited to: salinity, temperature, water clarity and dissolved oxygen profiles.

(b) Chemical parameters to be monitored shall include, but are not limited to: nitrates, nitrites, phosphates, ammonia, petrochemicals, chlorinated hydrocarbons and biocides.

(c) Physical and chemical water quality measurements shall be taken during various tidal cycles and lunar phases to detect any correlation between physical and chemical parameters and tidal/lunar influences.

(d) Wildlife surveys of protected species shall be conducted seasonally to determine the use of the Punalu'u Resort Management Area and Management Area Buffer Zone by those species.

(e) Other plant and animal populations shall be inventoried to develop detailed species lists and to calculate population biomass density, distribution and frequency of occurrence. These inventories will be used as necessary to detect short- and long-term changes in habitat characteristics and population biomass density, distribution and frequency of occurrence.

(f) Chlorophyll levels will be measured to monitor phytoplankton growth in the coastal ponds.

4. Data Analysis. The data gathered in the monitoring program shall be used to further the scientific understanding of coastal pond, shoreline, coastal waters and wetland habitat ecology.

XI. REMEDIAL AND CORRECTIVE MEASURES

1. If there is the occurrence of an unforeseen deleterious event, the Manager shall determine the need for remedial and corrective action and shall undertake such action using monies provided for in Section XII herein following notification to the Owner that such action will be taken.

2. The Manager shall be responsible for implementing any corrective action or measures when any unforeseen deleterious event or occurrence impacts the ecological viability of the Management Area or Management Area Buffer Zone.

3. Notwithstanding any further permit or regulatory approval conditions dealing with liability or responsibility of the Owner, the Owner shall be liable for funding any corrective work directed by the Manager when an unauthorized action by the Owner or its employees or agents, within the scope of employment, which may harm the ecological viability or integrity of habitats within the Management Area or Management Area Buffer Zone occurs.

XII. FINANCIAL OBLIGATIONS

The purpose of this section is to provide sufficient money to administer the procedures contemplated under this Environmental Protection Plan.

1. The Owner shall contribute the initial funding required and pay annual costs, in accordance with the following schedule subject to adjustments based on the Consumer Price Index, to administer the procedures contemplated under this Environmetal Protection Plan:

(a) Initial Funding $_____

(b) Estimated Annual Costs $_____/year

2. The Manager shall become knowledgeable of public and/or private funding programs, grants, etc. applicable to the management and implementation of environmental protection programs or specific elements of this Environmental Protection Plan and apply as appropriate for such public and/or private funds for supplemental funding of this Environmental Protection Plan.

3. The administration of the funds contributed by the Owner under this section shall be determined during the preparation of the Final Environmental Protection Plan and shall be used to conduct the affairs of this Environmental Protection Plan as set forth herein. The funds shall be managed under the doctrine of cy pres.

4. Office Facilities. Because of the necessity for the Manager to be on-site for extended periods during monitoring, the Owner will provide, without cost to the Manager, space within Punalu'u Resort, suitable for use by the Manager on a non-exclusive basis, an office and equipment storage area. The Manager shall also be granted ready access to available toilet facilities maintained by the Owner.

PROPOSAL TO THE UNIVERSITY OF HAWAII AT HILO

MARINE OPTION PROGRAM

BEHAVIOR OF ONE GREEN TURTLE EQUIPPED WITH A TIME DEPTH RECORDER IN PUNALU'U BAY, HAWAII

By:

Kimberly J. Krusell

Advisors:

George H. Balazs, National Marine Fisheries Service

Dr. Karla McDermid, University of Hawaii at Hilo

Dr. Leon Hallacher, University of Hawaii at Hilo

January 30, 1997

Final Report: May 17, 1997

INTRODUCTION

The green turtle, *Chelonia mydas*, inhabits many resident foraging grounds around the shallow, coastal waters of the main Hawaiian Islands (Balazs et al 1994a, Balazs et al 1996b). Individuals of a particular foraging area exhibit a strong site fidelity to a particular feeding location (Balazs et al 1996b). Tag and recapture studies at different established Hawaiian feeding grounds have supported this observation (Balazs et al 1994b, Balazs et al 1996b).

Since the green turtle has been afforded protection under the Endangered Species Act of 1978, some behavioral changes have occurred within this species (Balazs 1996, Balazs et al 1994b, Balazs et al 1996b). The most noticeable is a shift from nocturnal to diurnal foraging (Balazs 1996, Balazs et al 1994b) and an increase in terrestrial emergence for basking (Balazs 1996, Balazs et al 1996b). In addition, the younger sea turtles no longer flee at the sight of human beings (Balazs 1996). These behavioral changes facilitate observing foraging behavior.

The green turtles feeding in the Hawaiian Islands originate exclusively from nesting grounds in the French Frigate Shoals (Balazs et al 1994a, Balazs et al 1996b). Satellite tracking techniques have shown the migratory routes of different female green turtles traveling from the nesting beaches in the Northwest

Hawaiian Islands to the resident foraging grounds of the main Hawaiian Island chain (Balazs et al 1994a).

While satellite tracking has proven effective in determining position over long range migratory journeys, the amount of error associated with satellite telemetry can make actual position verification of turtle's position within near shore waters rather difficult (Balazs et al 1996a). Readings sometimes place the turtle's position within the center of the island (Balazs et al 1996a).

Currently, one individual green turtle in Punalu'u Bay on the island of Hawaii has been equipped with a TDR data logger, model MK5 manufactured by Wildlife Computers of Seattle, WA for a project headed by George Balazs of the National Marine Fisheries Service. This device records temperature, depth, and contains a wet-dry function to show if the turtle is in or out of the water. The TDR samples the turtle once every minute and can store data for about a 60 day period. The data can be stored in the device for up to one year. This ongoing project is in conjunction with Marc Rice of the Hawaii Preparatory Academy, Dr. Leon Hallacher, Dr. Walter Dudley, and the Marine Option Program of the University of Hawaii at Hilo.

Punalu'u Bay is an established green turtle foraging ground (Balazs et al 1994b). At this foraging ground, the turtles are reported to feed almost exclusively on the red marine algae,

Pterocladia capillacea (Balazs et al 1994b).

This study will verify position and behavior of the green turtle in Punalu'u Bay equipped with a data logger. This information will be used in conjunction with the temperature, depth, and in/out of water data to make future predictions about the turtle's position and behavior for periods of time when only information from the data logger is available. This information is necessary since it is not feasible to observe any individual sea turtle for the entire sixty day data logging period. The data obtained in this project can also be applied to a past data recording period, as no position verifications currently exist for this time.

MATERIALS AND METHODS

Observations will be made on a weekly basis over the sixty day data logger recording period. The turtle (TDR36933) will be located by swimming parallel to the shore until it is sighted. Sightings will be facilitated by the presence of the data logger on the turtle's left side and a small, bright, green fiberglass patch on the turtle's right side. For safety reasons, another student will always be present during the observations.

In water observations will last for a one hour period.

Position will be recorded into subdivided areas on the map of Punalu'u Bay. In addition, behavioral observations will be made and recorded into the different categories as follows: foraging, active swimming, passive swimming, resting, and basking. The time of each breath will also be recorded.

Algal collections will be made from places where turtle foraging is observed. The algal specimens will be pressed and identified as part of an herbarium collection for Punalu'u Bay.

Photographs will be taken with a 35mm camera of the turtle's position from shore. The influx of freshwater into the bay inhibits successful underwater photography. Photographs will also be taken when the turtle is basking.

The results of this study will be written into a report and submitted to the Marine Options Program of the University of Hawaii at Hilo. In addition, the results will be presented at a student seminar at the University of Hawaii at Hilo.

Works Cited

Balazs, G.H. 1996. Behavioral changes within the recovering Hawaiian green turtle population. Proceedings of the 15th Annual Symposium on Sea Turtle Biology and Conservation. U.S. Dept. of Commer., NOAA Tech. Memo. NMFS-SEFSC-387:16-21.

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Balazs, G.H., Dudley, W.C., Hallacher, L.E., Coney, J.P., Koga, S.K. 1994b. Ecology and cultural significance of sea turtles at Punalu'u, Hawaii. Proceedings of the 14th Annual Sympoium on Sea Turtle Biology and Conservation. U.S. Dept. of Commer., NOAA Tech. Memo. NMS-SEFSC-351:10-13.

Balazs, G.H. and Ellis, D.M. 1996. Satellite telemetry of migrant male and female green turtles breeding in the Hawaiian Islands. Proceedings of the 16th Annual Symposium on Sea Turtle Biology and Conservation. In Press.

Balazs, G.H., Katahira, L.K., Ellis, D.M. 1996a. Satellite tracking of hawksbill turtles nesting in the Haaiian Islands. Proceedings of the 16th Annual Symposium on Sea Turtle Biology and Conservation. In Press.

Balazs, G.H., Rice, M., Murakawa, S.K.K., Watson, G. 1996b. Growth rates and residency of immature green turtles at Kiholo Bay, Hawaii. Proceedings of the 16th Annual Symposium on Sea Turtle Biology and Conservation. In Press.

MATERIALS BUDGET

Snorkeling gear	provided by participants in project
35mm camera	provided by the Marine Option Program
film developing 2 rolls @$8/roll	$ 16
stipend @$50/month for two months	$100
Miscellaneous supplies	$ 50
Total cost of project	$156

Schedule

Data collection	February 1st-March 31st
Presentation	before May 17, 1997
Final Report	by May 17, 1997

Kimberly Krusell
124 Alahelenui St.
Hilo, HI 96720

Ka'u is a place of open spaces and solitude

OFF-ISLAND

Special to The Advertiser

Signs mark the boundaries of the Big Island's Ka'u District, but they really aren't needed.

Heading south on Highway 11, the transition is obvious the moment your car crests the hill before the entrance to Hawaii Volcanoes National Park.

If the day is fine and you're lucky, you'll be rewarded with a glimpse of Mauna Loa, stately guardian of the district.

Once past the floating mists that often shroud the park, you may be able, for the first time since leaving Hilo, to turn off your windshield wipers.

The radio reception disappears of its own accord, leaving you with a luxurious silence broken only occasionally by another car or more frequently the wind.

Wide open spaces dominate here, where nature exists on a grandly subtle scale.

Colors are intense, but still pastel — yellows, violet-blues, soft greens and grays randomly streaked with the charcoal black of recent lava flows. Smooth, graceful lines shape the landscape, from the rounded summit of Mauna Loa to crescent coves carved by the sea.

Travelers won't find many shops and restaurants here or any luxury hotels.

Some will hurry through the district, seeing it as mere distance to be covered on their way to somewhere else. But those who take their time, who cherish unbroken vistas and empty places, will find that Ka'u casts a potent spell.

It's a district of great diversity, a distinction afforded by its vast size, which is roughly equivalent to Oahu.

Within its borders are colored sands of all different hues, rain-soaked native forests and

See Ka'u, Page 4

Advertiser file photo

Early morning fishermen at South Point on the Big Island

Ka'u: A peaceful, spacious corner of the Big Island

FROM PAGE 1

parched desert. Cattle pastures, sugar cane and mac nut trees climb the long, gentle slopes of Mauna Loa, and rocky bluffs plunge abruptly into the sea.

It's also a place of great cultural significance.

Many archaeological sites, including those at Ka Lae (South Point), the ancient point of departure for Tahiti-bound canoes, still exist here, protected by their isolated location and the stewardship of native Hawaiian groups.

The best way to experience this special district is by allotting plenty of time away from the car.

Recreational opportunities abound in Ka'u, which is bordered on either side by parks. In between are many rugged and remote beaches well-suited to fishing, camping and picnicking.

On the east side, Hawaii Volcanoes National Park offers a stunning introduction to the diverse splendors of Ka'u. The striking mauka-makai contrasts are most noticeable to those who walk the Mauna Loa and Ka'u desert trails.

Both hikes, if taken to their completion, are long, strenuous and require at least one night of camping. But visitors who spend even a few hours on either trail will be rewarded with solitude and the beauty of native plants and stark pahoehoe lava.

Once out of the park, the native ohia lehua gives way to Christmas berry, silky oak with its distinctive red blossoms, yellow guava and other vegetation typical of pasture land.

Pahala, a sleepy, tidy old plantation town, has a couple of small stores where travelers can buy refreshments and listen to the old timers talk story at the picnic tables out front.

By the 62-mile marker, the scenery has become drier, the air outside hotter.

Visually, the area here is dominated by broad sweeping views of a tumultuous sea. The wind reigns supreme, tossing the ocean into foaming white caps and deforming trees that struggle against its nearly constant onslaught.

Since the sea is so irresistible in these parts, it's fortunate that two beach parks — Punaluu and Withington — offer easy access.

Punaluu is broken up into two sections. The east side is very popular with tourists, and those seeking privacy won't be pleased with the small, crowded beach, even though the coarse black sand is very striking and fresh water springs bubble up along the shore.

On the west end are pavilions, restrooms and camping spots tucked among the naupaka. Fishermen and those seeking a quiet spot to picnic will probably find this side more to their liking.

Withington Beach Park at Honuapo Bay was a thriving port in the late 1800s, but the facilities were largely destroyed in the 1946 tsunami. Besides pavilions, showers and picnic tables, the park offers some fun little swimming holes in among the adjacent ponds and wetlands. The brackish water, which is a mixture of salt and fresh, is very refreshing.

The quiet, shady streets of Naalehu, the southernmost town in the United States, stand in sharp contrast to the rugged coast. Life here harkens back to simplier times. Kids still sit on the lava rock walls, watching the world go by, and movies are screened in an ancient theater.

Weary travelers can relax at the landmark Shirakawa Hotel, which is aging gracefully among the monkeypod trees.

Bed and breakfasts also are a byproduct of the district's new arrivals, and a number of rural homes in Waiohinu and Naalehu offer lodging and advice on how to reach the olivine sands of Mahana Beach and other remote spots accessible by foot or four-wheel-drive along the rugged coast.

Ka Lae, or South Point, is about 11 miles from the highway on a narrow road and is frequented by fishermen and those keen on standing at the southernmost spot of the United States. But aside from a small, unimproved public park, the land belongs to the Department of Hawaiian Homelands and visitors are urged to treat the area and its archaeological sites with respect.

The historical features at Ka Lae include canoe mooring holes, salt pans, Kalalea heiau, burials and other evidence of its ancient inhabitants. A group of Hawaiians serve as curators of the sites, and are working on educational programs.

Returning to the highway, the road cuts through the wide open spaces around Hawaiian Ocean View Estates, Hawaiian Ranchos and other subdivisions carved from recent lava flows on the flanks of still-active Mauna Loa.

At the westernmost end of Hawaiian Ocean View Estates is the 7-mile-long Road to the Sea, a rough cinder road culminating at Humuhumu and Awili points, where ulua fishers and sunbathers will find black sand beaches generously sprinkled with olivine.

Manuka State Wayside Park is located just off the highway in a natural area reserve that borders the South Kona district. The small, shady botanical park is a natural for picnics and a bit of lazing around before bidding farewell to the peaceful, rugged beauty that is Ka'u.

4/97 Look at the old pics! I love the pillow!

Dear George,

I got the tuition waiver! Thank you so very much for squeezing in time for me in your busy schedule.

Your effort has already paid for next semester. 1,000 Thank yous! (One for every dollar tuition would have costed!)

I apologize for not responding to your e-mail.



MALIA LABER

I just gave Kahea your e-mail address. Here's how to get in touch with him:

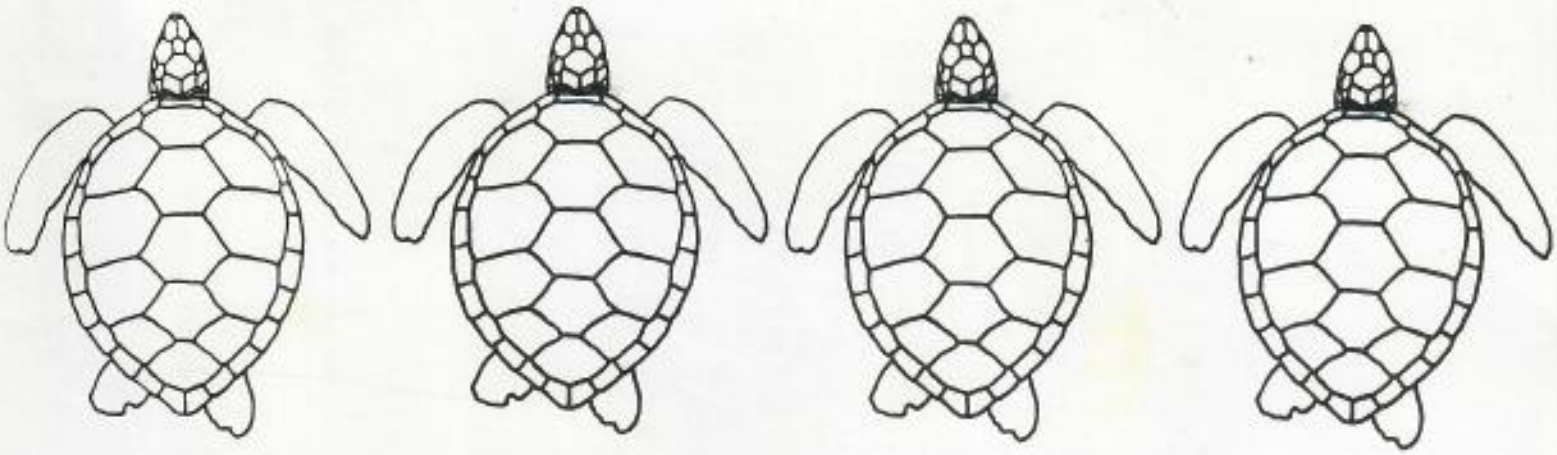
e-mail : thronas@hawaii.edu

phone : 885-2742, Kamuela (weekend & spring break)

phone : 935-1901, Hilo (schoolnights)

I believe he is going back to Tulane next semester. Is your son a good boy? PARTY ZONE CENTRAL, especially during Mardi Gras! Just trying to scare you, but don't worry, any college could be just as raging!

Much Mahalo & Aloha, Malia



REWARD

FOR INFORMATION LEADING TO THE APPREHENSION AND CONVICTION OF THE PERSONS WHO CAUSED THE DEATH OF A PACIFIC GREEN SEA TURTLE. DISCOVERED ON JULY 1, 1991, THE 250 LB. SEA TURTLE WAS REMOVED FROM THE OCEAN AND ABANDONED -- ALIVE -- IN A VACANT AREA OFF SHOWER DRIVE IN HAWAIIAN PARADISE PARK SUBDIVISION, PUNA. THE SEA TURTLE WAS TAGGED AND HAD BEEN OBSERVED FROM 1984 THROUGH 1989 BASKING IN THE SUN AND TWICE NESTING AT FRENCH FRIGATE SHOALS. WITH ESTIMATES OF ONLY 750 MATURE FEMALES IN THE STATE, THE LOSS OF THIS NESTING FEMALE IS PARTICULARLY DEVASTATING.

THE GREEN SEA TURTLE LIVES IN THE OCEAN WATERS SURROUNDING HAWAII AND IS FULLY PROTECTED BY STATE AND FEDERAL LAWS. HARMING A TURTLE IS A VIOLATION OF THE ENDANGERED SPECIES ACT WITH PENALTIES OF UP TO $25,000. AND/OR ONE YEAR IN JAIL.

IF YOU HAVE INFORMATION REGARDING THIS INCIDENT OR SEE SOMEONE TAKING OR HARMING A SEA TURTLE,

PLEASE CALL:

STATE DEPT. OF CONSERVATION & RESOURCE ENFORCEMENT	933-4291
NATIONAL MARINE FISHERIES SERVICE (HONOLULU)	1-541-2727
U.S. FISH & WILDLIFE SERVICE (HONOLULU)	1-541-2682
GREENPEACE HAWAII	935-0770

SOURCES WILL BE TREATED CONFIDENTIALLY.

This poster is distributed by Greenpeace Hawaii, P.O. Box 10909, Hilo 96721

Endangered turtle found dead in lot

An endangered species of sea turtle, found dead in a vacant lot in Puna earlier this month, has caused outrage and the offer of a reward for whoever is responsible for the death.

The 250-pound female, Pacific green sea turtle was apparently abandoned alive in a vacant area off Shower Drive in Hawaiian Paradise Park on July 1, according to a spokesman for the environmental group Greenpeace Hawaii, which is offering to pay up to $2,500 for information about the killing.

The Pacific green sea turtle is a threatened species fully protected under state and federal laws, said Denver E. Leaman, executive director of Greenpeace Hawaii, an independent organization based in Hilo.

It is illegal to take, harrass or impact a sea turtle in any manner, according to the law. Even grabbing onto their shells while swimming or diving is a violation of state and federal laws, Leaman said.

Under the federal Endangered Species Act, a person found guilty of harming a turtle is subject to penalties of up to $25,000 and/or one year in jail.

The turtle found earlier this month had been tagged and observed at various times from 1984 to 1989 at French Frigate Shoals where it nested twice. And because this turtle was a proven breeder, Leaman said its death is "particularly devastating."

The female turtle could have laid up to 100 eggs three separate times per nesting season for the rest of its life, Leaman said. Only 750 mature females of this turtle species exist in the state.

"The turtle was very healthy," said Leaman. Recently, many turtles of the same species have been plagued with a tumor-causing disease. The dead turtle had not been afflicted with the disease, however, and had no apparent injuries, Leaman added.

From flipper marks, state officials deduced the sea turtle had been alive when it was abandoned miles from the ocean.

There are no leads as to who may have been responsible for taking it. Because of the turtle's weight, Leaman

See TURTLE, Page 12

TURTLE: Endangered species found dead

From Page 1

said no one person would have been able to carry or drag it without help.

"I'm just appalled that somebody would do this," he said. The turtle was just left there to rot and was not even used for sub. istence, he added.

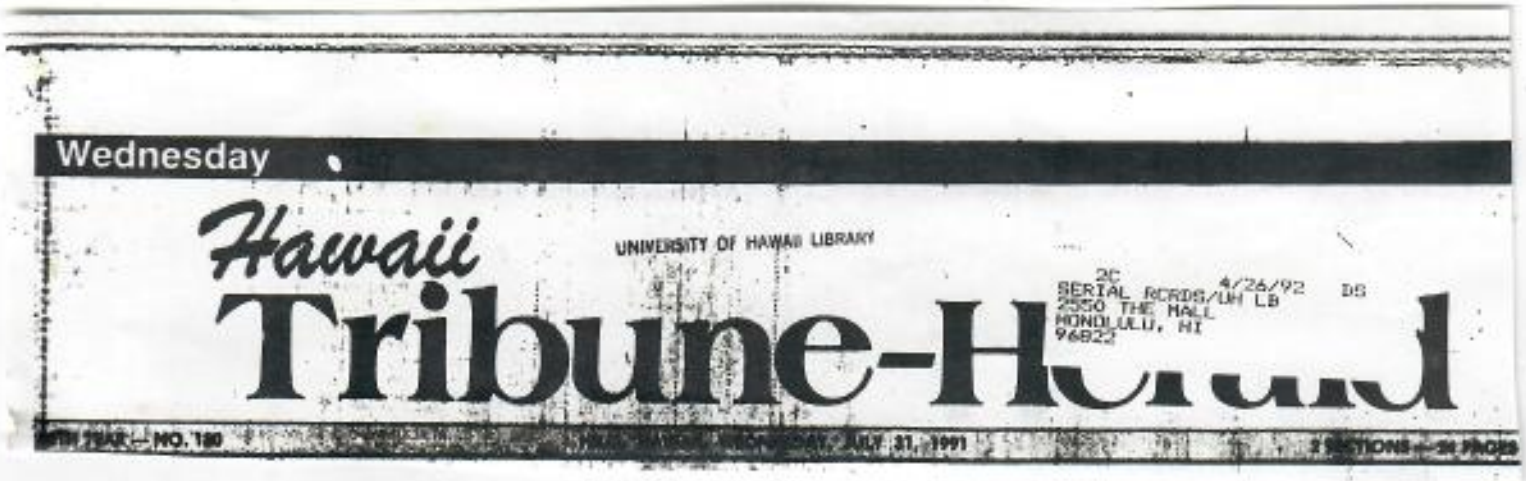
Collecting the turtle's shell could have been a motive for removing the turtle from the ocean, Lehman said. However, the turtle was discovered intact.

The state Division of Conservation and Resource Enforcement, provided Greenpeace with information concerning the turtle, Leaman said.

After talking with state officials, Greenpeace Hawaii learned that two smaller green sea turtles were found dead in April on the side of Kahakai Boulevard in Hawaiian Beaches. The turtles also had no visible signs of injury.

If anyone is convicted of th latest incident of violenc against the protected turtle 10 percent of the fine assesse will be allocated toward th Greenpeace reward, Leama said.

State officials could not b reached for comment.



Star-Bulletin & Advertiser
Final Edition
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falling on Big Island

Volcano's fumes taint water and shrivel plants

By Jan TenBruggencate
Advertiser Staff Writer

Kilauea Volcano pumps hundreds of tons of noxious gases daily into the atmosphere, and much of it comes back to earth as corrosive fumes and acid rain.

It poisons water supplies, irritates lungs and burns plants.

Many Big Islanders are very concerned. In one test of five Kona water-catchment systems, two were found to have lead contents exceeding state and federal standards.

Studies by the state, Hawaii County and private agencies are proposed or under way to get hard data. But for many folks, the effects are plain enough.

Much of the state still thinks of the Kona coast as a place of crystal waters and crystal skies. But, while the water remains clear, Kona's skies on trade-wind days for the past two years often haven't been.

"It looks like L.A. over here," said one resident. Another complained of being unable to see other islands or even distant points on the Big Island that were once clearly visible.

At Kalapana, lava flows into the sea, and immense clouds of steam roll up out of the convergence. The clouds carry dense concentrations of pollutants. They blow down the coast, and the coast suffers.

"It is obvious to anyone who works in the area. At Wahaula (downwind from the flows) almost all the vegetation is being burned from the sulfur," said Harry Kim, Hawaii County's director of Civil Defense.

Kim is more concerned with the estimated 4,000 Big Island households that collect their water from catchment systems, and the effects of acid rain on metals within those systems. Officials fear the acid will dissolve lead from roofing paint, lead-headed nails, flashing and copper pipe solder, and place some of the estimated more than 10,000 residents with catchment systems in danger of chronic lead poisoning.

"We literally have thousands of persons on the island that live on catchment systems. In the Paradise Park subdivision alone, we have 900 or more homes on catchment," Kim said.

"The vast majority of these homes have lead in some part of the roof system. We feel it is important to know the problem and tell people what the situation is," Kim said.

"We're not expressing any kind of dramatic alarm, but we need more study on this subject and we want to try to alert people that have water-catchment systems," said state Health Director John Lewin.

County and state health officials are holding community meetings in Ka'u, Kona and Puna this month, and inspectors plan to sample the water in 50 to 80 catchment systems and to look for building materials that are potentially hazardous.

If there is lead at hazardous levels, residents will be told

See Acid on Page A-4

Sunday
Honolulu

Aloha!
Today is Sunday, June 12, 1988

Acid rain

→ [Barbara Segal

Honolulu ADVERTISER
Letters 4/3/93 A9

Spaceport, Wai

Forget about a spaceport

Many people think that after 10 years of promotion by the Department of Business, Economic Development and Tourism, the spaceport in Ka'u is a dead idea.

After more than $6 million being poured into the Office of Space Industry, with at least $5 million used to service spaceport contracts over the past five years, it is apparent that no tangible benefits are going to accrue to the community from this mega-project. Yet, though it may seem like a dead project, it still receives government funding each year.

It is time for Hawaii to stop wasting scarce tax dollars on studies that have yet to produce an environmental impact statement or master plan for the project. More than $3.75 million has gone to favored contractors since the agency's inception in 1988, which includes sums as high as $1 million per year from 1988 to the present.

Isn't it time to stop spending our tax dollars on a boondoggle like the spaceport?

Urge your legislator to trim out this useless agency and its expensive project, the spaceport.

SANDRA L. DEMORUELLE
Naalehu

At Kalapana, lava flows into the sea and immense clouds of steam roil up. The clouds carry dense concentrations of pollutants. They blow down the coast, and the coast suffers. The sulfur fumes "burn" vegetation downwind.

Advertiser file photo

Acid rain

From Page One

how to change things. For many, it will be a costly process, such as reroofing the house or replacing the piping, Kim said.

Tom Arizumi, state Department of Health drinking-water branch chief, said it is also possible, but normally very expensive, to remove lead from drinking water using deionization or reverse osmosis. A federal Environmental Protection Agency report says carbon, sand and cartridge filters sold to purify water do not remove lead.

The state's allowed maximum lead content for drinking water is .05 part per million; based on new evidence of health effects, that standard is expected shortly to be tightened to .02 part per million.

Harold Matsuura, the Department of Health's chief sanitarian on Hawaii, said the department tested five Kona catchment systems. It found two with unsafe lead levels. Lead contents at the faucet were .12 part per million in one home and .07 part per million in another.

The home with the higher level had lead flashing on the roof and both had lead solder in water pipes, Matsuura said.

Lead is a poison that can affect the nervous system, the red blood cells and the kidneys. It is most commonly a problem for young children, who absorb more lead than adults through their intestines and whose nervous systems are developing rapidly. Recent studies have found that even low levels of lead may cause learning disabilities and behavioral disorders, said Bruce Anderson, the De-

Vog can be very dangerous to those with lung disease

A chronic complaint on Hawaii, and sometimes on other islands, is lung and eye irritation from volcanic fumes.

For those with respiratory problems, it's potentially life threatening.

The American Lung Association of Hawaii's statewide environmental health director, Jim Morrow, said he is concerned that the state doesn't have a good way of telling when a risk is present for those with respiratory ailments.

"We may not be able to control the volcano, but we certainly ought to know what the pollution levels are so we can tell whether lung patients should be moved out of an area. Now, it's only guesswork," Morrow said.

The Big Island has about 50 asthma sufferers per 1,000 population, or a total of about 5,000, said Amy Maeda of the Lung Association's Hilo office. The island has 16 bronchitis and emphysema sufferers per 1,000. Both figures are higher than the state average of 38 and 15 per 1,000, respectively.

"We know respiratory problems are exaggerated by volcanic haze, and recently the poor folks in Hilo have had some heavy dosing. And it's not only Hawaii. Maui is also suffering," said state Health Director John Lewin.

"I think we're going to have to make a more aggressive presence felt" but will need more funding to conduct the increased air-quality surveillance, he said. State Rep. Virginia Isbell of Kona said the state's new budget includes $125,000 to establish five air-quality monitoring stations on Hawaii, to be operated by the Department of Health and the University of Hawaii.

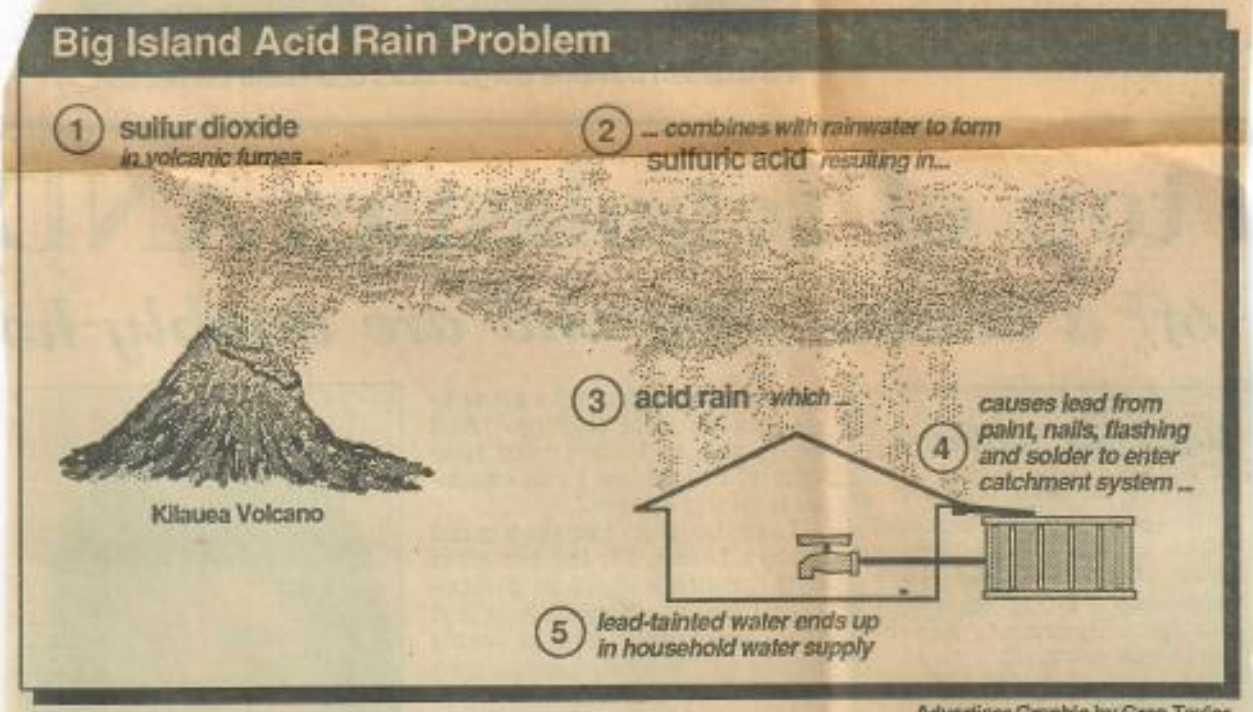
Morrow said the sulfur in the atmosphere is in a constant state of chemical reaction, but that any of the compounds in vog containing sulfur is potentially irritating to the lungs.

In the initial atmospheric reaction, in the presence of sunlight and metal particles in the air, sulfur dioxide is oxidized to sulfur trioxide or sulfite.

This fairly quickly combines with water to form sulfuric acid.

The sulfuric acid forms sulfates, which combine to form salts such as sodium sulfate and calcium sulfate.

falling on Big Island



Advertiser Graphic by Greg Taylor

partment of Health's deputy director for environmental health.

Since lead accumulates in the body and is only slowly removed, repeated exposure to small amounts of lead over many months may produce elevated levels in the body, Anderson said.

Lead isn't the only problem, and many of the Big Islanders with catchment systems have been aware for years that something strange is going on. Blond kids whose hair turns greenish are evidence that some copper is also leaching out of pipes and into the water, said Rep. Virginia Isbell, a Kona Democrat.

Anthurium farmers report purple spots on their bright red blossoms when the volcanic smog, or vog, blows in. Dwight Sato, Hilo flower expert with the University of Hawaii Extension Service, said short-term spotting can clear up, but if the vog stays around for an extended period, the flowers brown and burn. Then they can't be sold.

Isbell said the hard scientific link may not have been made, but that plenty of farmers are convinced the vog is responsible for a range of ills: avocado fruits dropping before they are ripe; coffee not doing well generally; macadamia nuts falling off before they are ready.

Civil Defense Director Kim said he is aware of the sulfur burns on anthuriums and the reduced yields of some truck farmers' crops, particularly cucumbers, but he said the economic cost to agriculture has not been measured.

Hawaii farmers have not expressed serious concern about the problem, said Ned Kefford, dean of the University of Hawaii's College of Tropical Agriculture and Human Resources. If they do, the university will develop a research program on the vog, he said.

Residents have plenty of other non-scientific evidence suggesting the vog is having effects.

"My two-year-old car dissolved (rusted badly), although I can't prove what it came from. My asthma bothers me more, and I wake up sometimes with my eyes red and swollen," said one.

March Taylor, of Kona-based Auto Body Hawaii, said he can't attribute to acid rain any clear cases of damage to paint, body or glass on cars. Partly, that's because the salt air is so hard on cars, it would be impossible to separate its effects from those of the volcano, he said.

The source of all this is something no government agency can do anything about: the vol-

cano.

Barry Stokes, of the geochemistry department of Hawaiian Volcano Observatory, said sulfur dioxide is by far the most injurious component of Kilauea's gases. Most of the visible gas is water vapor, ranging from 75 to 83 percent, Stokes said. Carbon dioxide represents 3 to 5 percent. Most of the rest, 11 to 15 percent, is sulfur dioxide.

The Kilauea summit, the Pu'u 'O'o vent and the Kupaianaha vent are steadily releasing 1,300 to 1,700 tons of sulfur dioxide daily. That's up from a pre-eruption level of just 140 to 165 tons daily, Stokes said.

During huge eruption outbreaks lasting a day or two, the levels were as high as 38,000 tons a day, but the dense clouds would blow away when the eruption stopped. The present level has been steady since July 1986, Stokes said.

During normal trade-wind conditions, the plumes of gas blow to the southwest and get trapped in the lee of Mauna Loa. The vog can sit for days along the broad sweep from Kailua-Kona down to South Point, Stokes said.

But what you see isn't all that's causing concern. The bluish-gray or brownish vog is mainly water vapor, sulphate particles and tiny particles of ash. The sulfur dioxide is invisible, Stokes said.

Sunday

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Honolulu Star Bulletin

Waihee denounced as 'arrogant' in spaceport accord

5/28/93 A2

By Rod Thompson
Big Island correspondent

HILO — Councilwoman Keiko Bonk-Abramson has denounced Gov. John Waihee and others as "arrogant" for agreeing with Lockheed Missiles and Space Co. to the development of a commercial spaceport in Kau.

"I am the elected county representative from Kau, and I and the community I represent both strongly oppose this proposal," Bonk-Abramson said in a statement sent from Los Angeles where she is attending an environmental conference.

Waihee announced Wednesday that Lockheed and the state had exchanged nonbinding letters of agreement to develop the facility.

The state has been pursuing the idea of a spaceport since C. Brewer president J.W.A. "Doc" Buyers proposed it in 1986. Buyers took the idea from a smaller launch facility proposed for South Point in 1962 but never built.

Keiko Bonk-Abramson

The state plans to put the spaceport either at Palima Point, near Pahala, or at Kahilipali Point, near Naalehu.

Bonk-Abramson accused Waihee of trying to "pull the wool over our eyes" by saying the spaceport would provide jobs.

Waihee said 270 full-time resident jobs would be created. Bonk-Abramson said there is no indication the jobs will go to local people. "Expecting a high-tech industry like Lockheed to hire anyone but highly trained technicians with security clearance is ludicrous," she said.

Big Island Mayor Stephen Yamashiro said while there is a lot of agreement between the governor and Lockheed, there is nothing binding as yet.

"Looking at the correspondence between the two, it's really premature," Yamashiro said.

The mayor added he is very disapointed with the state because the project has lingered for seven years and divided the Big Island community. He added that the issue is no longer the merits of the project.

"The state should take steps to halt the division in the community and go on to something else," he said. Waihee said the project would generate $10 million in taxes a year.

Bonk-Abramson questioned whether the tax money would be enough to cover the cost of new public improvements, such as roads, and the cost of environmental and cultural disruption.

She also complained that the state-funded environmental impact statement on a spaceport is three years overdue. "What is the point of an EIS if you have already made up your mind about this project?"

Bonk-Abramson said, "The state could be assisting my district in many much more constructive ways, by financing a regional plan and by providing resources to help us investigate more feasible and less destructive economic options."

Letters

The Honolulu Advertiser 6/5/93 A9

Spaceport pro

Rocket launches offer nothing

The state of Hawaii, Department of Business, and Economic Development and Tourism and Gov. John Waihee put out a press release saying that rocket-launching is a done deal. The release was written in such a way as to sound like the state had gotten Lockheed to in invest and run the project. They based this statement on non-legal, non-binding letters.

When interested people and reporters asked if this were true, they were told by the governor's spokesperson that no clarification was needed. Lockheed agreed to do some studies, but not to invest any money in the project.

Once again the state has put out a statement about rocket launching that upon investigation has proven to be untrue.

From the very beginning I've tried to find out about this project. I have traveled to Florida and looked at its rocket-launching area. It's very spooky; for safety reasons people lost their homes and were moved out. The rocket-launching zone they talked about on the Big Island is very small. If it is just enlarged a bit, the town of Pahala or Naalehu will have to be abandoned.

For safety reasons all personnel dealing directly with the high-tech rocket launches must have a great deal of experience and be certified. The state says all these people would come from present rocket-launching areas. Therefore, in essence, no high-tech positions will be for Hawai'i's people.

Just think of what $7 million could have done for the Ka'u district, if economics of the community were the real objective.

Instead, most of this money was spent out of state so it didn't even help our economy.

It's time for rocket-launching promotion to end. No money. No promotion. No jobs. No nothing. Stop throwing money away. Maybe there should be an investigation of this whole thing. Stop it now!

JIM SIMPSON
Waiohinu

Helene Hale joins chorus deriding spaceport deal

By Rod Thompson
Big Island correspondent

HILO — Another public official has added her voice to those opposing a spaceport in Kau.

In a letter to Gov. John Waihee, County Councilwoman Helene Hale accuses the governor of "contemptuous disregard for proper procedure" in agreeing with Lockheed Missiles and Space Co. to work on the spaceport before an environmental impact statement is done.

Waihee announced the nonbinding agreement last week and added that the impact study, now three years overdue, will be completed.

Kau Councilwoman Keiko Bonk-Abramson last week blasted Waihee for "arrogance" in making the agreement, and Mayor Stephen Yamashiro questioned the wisdom of it, saying the spaceport could divide the community the way geothermal development has.

Helene Hale

Four years ago, Hawaii Volcanoes National Park officials opposed Palima Point, one of two proposed launch sites, because it is close to the park's boundary. Hale said she and others had been willing until now to weigh findings of an impact statement before opposing the project.

"I can assure you that if you continue to pursue this project you will meet with determined and persistent opposition," Hale told Waihee. "The people in our county have consistently voiced their disapproval of a spaceport. We do not want it, and now we are not even willing to wait to pick apart an EIS, should one ever be forthcoming."

A state survey in the late 1980s of residents of East Hawaii, including Hilo, found 55 percent supported a spaceport, 37 percent opposed it, and 8 percent were undecided.

But public comments at meetings in Kau have been overwhelmingly opposed, and University of Hawaii professor Richard Pratt, also doing research in Kau in the late 1980s, found no "silent majority" in favor of it. The governor's announcement did not include an agreement by Lockheed to build the spaceport.

Stephen Yamashiro

"Lockheed intends to support the development of a spaceport by performing technical and financial studies, providing launch vehicle and other technical data, preparing implementation strategies and schedules, and taking the lead in forming a U.S./international spaceport consortium," it said.

Star-Bulletin Thursday, August 26, 1993 □ A-5

Spaceport greeted with doubts at county meeting

By Rod Thompson
Big Island correspondent

HILO — State space officials ran into a wall of skepticism as they outlined the state's spaceport to the Hawaii County Council yesterday.

Receiving the criticism were Tak Yoshihara, deputy director of the Department of Business, Economic Development and Tourism, and Ken Munechika, director of the office of space industry.

Two polls have shown 65 percent of the public opposed to a spaceport, Councilman Jim Rath said. "That kind of flies in the face of democracy," he said.

Councilman Robert Rosehill, a Bishop Estate land manager, said, "We (Bishop Estate) do definitely have plans that may fly right in the face of the spaceport." S&S Dairy wants to expand into the area proposed for the spaceport, said Councilwoman Keiko Bonk-Abramson.

A spaceport authority, if approved by the Legislature, would strip the county of control over the facility," warned Councilwoman Helene Hale.

Councilman Keola Childs objected to the meeting as too short to cover the 10-volume spaceport environmental study.

"This is not a briefing," he said. "If you're going to log it as one, I would like to protest."

Munechika said most of the impacts of the spaceport would be insignificant or could be mitigated.

He dismissed the danger of lava flows, saying lava is found all over the island. The spaceport would be in the highest lava hazard zone, higher than Kalapana which was almost completely covered by lava in 1990.

He said rocket noise would be as loud as a motorcycle, lasting only 30 seconds.

The environmental study says noise at nearby Pahala and Punaluu would last several minutes and would indeed be as noisy as a loud motorcycle or a rock 'n' roll band.

Even at Hawaii Volcanoes National Park headquarters, 20 miles away, the noise would be as loud as a busy freeway.

Munechika said gasoline is more dangerous than some rocket fuels. The environmental study says some of the fuels explode on contact with each other, and people within 66 feet of some fuel spills could suffer "severe adverse health effects."

Munechika got snickers from the audience when he said, "We'll certainly try to get community involvement."

He conceded authorities had not publicized advisory committee meetings. The environmental study says people "whose positions are predictable" should be excluded from a proposed citizens committee.

Dangers of Big Isle spaceport outweigh negligible benefits

A7

9/11/93 Honolulu Star-Bulletin

ALTHOUGH a rocket-launching facility on the Big Island may be "cool" and exciting to Star-Bulletin writer Burl Burlingame ("My Turn," Aug. 14), thousands of Big Island residents are bitterly opposed to turning the rural area of Kau into a huge industrial complex. Opponents raise a number of objections:

■ **No economic justification** — There is no demonstrated market of paying commercial or military customers in sight despite six years of looking. The Department of Business, Economic Development and Tourism's own reports acknowledge that existing worldwide facilities already greatly exceed any anticipated demand for commercial launches at least until the year 2000.

New technology has made the proposed facility obsolete. Miniaturization is reducing the size and weight of satellites. Any unit weighing less than 1,000 pounds can be placed in orbit by a vastly less costly "Pegasus" airplane launching vehicle.

Other economic disadvantages are the high cost of living and doing business in Hawaii, its great distance from suppliers and potential customers and services and the lack of a skilled labor pool.

No wonder that in six years, despite intensive lobbying that has cost $7 million in tax money, the Office of Space Industries has been unable to secure even one penny of private investment in this scheme.

■ **Jobs for whom?** — The argument about "creating jobs" is a shibai. Nearly all the permanent jobs created by this rocket facility would go to off-island scientists and technicians, not local residents.

■ **Environmental disaster** — The state's draft Environmental Impact Statement reveals enormous risks to human, plant and fish life, both from the transportation of highly dangerous chemicals and fuels, and from rocket launches themselves.

Dr. Robert Bowman, space program director under Presidents Ford and Carter, has said launchings will be disastrous to the island ecology. The shoreline and reefs will be contaminated by tons of aluminum hydroxide and hydrogen chloride released above the site after every launch. "This becomes hydrochloric acid on contact with the ocean water. Enormous fish kills will occur immediately after each launch. The life cycle of the reefs will come to an end . . . I am witness to this occurrence at Cape Canaveral."

Launchings would cause serious problems for observatories located atop Mauna Kea. Astronomers are "specifically concerned about light, pollution, radio frequency interference and the release of particulates and contaminants into the upper atmosphere," worries the director of the UH Institute for Astronomy.

■ **Human safety and health** — The operation of a launching facility poses significant risks to Hilo, Puna and Kau residents. Patricia Tummons, editor of Environment Hawaii, has concluded that "dire risk" is involved in transporting tanks of hazardous compounds used as rocket propellants from Hilo to Kau, a 70-mile journey. Should liquid fuels spill at the launch site, the "consequences can be deadly." Normal launches also spew out huge quantities of aluminum oxide and hydrogen chloride, which can severely affect nearby residents' health.

The site offers insufficient space for safe operation or expansion. It is only three miles to nearby communities. This location will force residents of Pahala or Naalehu to abandon their homes if an accident occurs.

Is it any wonder that residents are incensed at the arrogance of state officials who are imposing this project top-down without citizen participation and despite intense opposition from the affected communities?

Kau's future lies in its clean air, diversified agriculture, fertile fishing grounds and tourism based on an unspoiled environment. Tourists come to Hawaii island for its natural beauty and open spaces, not to see huge industrial complexes. Will Hawaii continue to be known for its pristine vistas, its volcanic natural wonders, its white, green and black sand beaches, its small towns and wide open spaces, its aloha spirit?

Or will it become just another extension of the mainland, with familiar industrial complexes and imported businesses?

Iru Rohter
Co-chairman, Hawaii Green Party

The Honolulu Advertiser Tuesday, November 16, 1993 A5

Month in prison for turtle killing

A federal magistrate yesterday sentenced a Big Island man to a month in prison for capturing and later killing a green sea turtle, which is protected under the Endangered Species Act.

Anthony Barro, 35, of Naalehu had pleaded guilty to pulling the turtle from water near the Big Island's Punaluu Beach Park in March 1992.

A witness reported that Barro and a co-defendant, Clyde Agres Jr., carried the turtle to a pavilion at the park. Another co-defendant, John Quintal, admitting taking it away from the park in a pickup truck.

Although the turtle was never found, Barro admitted in court that he later killed it.

Two Big Islanders plead guilty to seizing sea turtle

Two Big Island men who pleaded guilty to capturing a federally protected green sea turtle will be sentenced Nov. 15.

Anthony Lee Barro and Clyde Agres Jr. face a maximum penalty of six months in prison and fines up to $25,000, the U.S. Attorney's Office said.

Barro and Agres entered their plea Monday before U.S. Magistrate Francis Yamashita. They admitted taking the turtle from water near the Big Island's Punaluu Beach Park in March 1992, said U.S. Attorney Elliot Enoki.

Another Big Island man, John Quintal, admitted he transported the turtle from the park in his pickup truck. Quintal was sentenced immediately to six months' probation and a $750 fine.

The turtle was never recovered.

Green sea turtles are protected by law because they are threatened with extinction.

Hon. Advertiser 11 Nov 1993 A-9

U.S. Department of Justice

United States Attorney
District of Hawaii

300 Ala Moana Blvd., Box 50183
Honolulu, Hawaii 96850

(808) 541-2850
FAX (808) 541-2958

September 20, 1993

George Balas
National Marine Fisheries
2570 Dole Street
Honolulu, HI. 96822-2396

Re: United States v. Anthony Barro, et al.
Cr. No. 93-0611 MY

Dear George:

Sentencing of the two main defendants (Anthony Barro and Clyde Agres) in this case is set for November 15, 1993 before Magistrate Judge Francis Yamashita. These are the two men who actually carried the turtle from the water.

I think it would be very helpful to the judge if you could write a letter describing your reaction to this incident. You may want to give the judge some sense of the history of turtle research at the Punaluu area, the positive results which enforcement of the Endangered Species Act appears to have had on the turtle population, and the problems which can result from criminals such this passing themselves off as "researchers." Also, it would be helpful if you could discuss the factors that led you to conclude that this was probably not the first time that these individuals took turtles from the water there.

Please send your letter to:

Magistrate Judge Francis Yamashita
United States District Court
P.O. Box 50122
Honolulu, HI. 96850

Your letter should reference the case name and number set forth above. I would appreciate it if you could send me a carbon copy.

The address for the woman who reported this incident is as follows:

Carolyn Martin
614 North M Street
Lake Worth, FL. 33460

I have set included her original statement to police, which sets forth some of the defendants' statements about being researchers.

Thank you for your willingness to assist in the prosecution of these defendants. Please do not hesitate to call me if you have any questions.

Very truly yours,

Mark Recktenwald

Mark E. Recktenwald

encl.

ASSIGNMENT/ARRIVAL

03-08-92: 1154 hrs.: Assigned by WBX 321 to this investigation and arrived at the scene at 1217 hrs.

REPORTING PARTIES STATEMENT

03-08-92: 1217 hrs.: Interviewed the following at Punaluu Beach, Punaluu, HI:

Carolyn L. MARTIN, F-49, Cauc.
614 North M Street
Lake Worth, FL 33460
Res. Ph.: (407) 582-1204
DOB: 08-28-42
SSN: 426-80-7740
Professor/Palm Beach Comm. College
Bus. Ph.: (407) 439-8137

MARTIN stated that on 03-07-92 between 1800/1815 hrs., she and her daughter were seated on a bench at the rear of pavilion #1 at Punaluu Beach Park. She said that two males, one (1) Hawaiian and one (1) Caucasian walked passed them towards the rocky shore area.

Further, that the Hawaiian entered the water where the turtles (2) were feeding. The Hawaiian then took a turtle out of the water and the Caucasian helped him. They then dragged the turtle, which was still alive, around pavilion #1, down the slope towards the rear of pavilion #2, and finally dragged it between pavilions #2 and #3.

She then said that she could no longer see them. After a few minutes she again saw two males, the Caucasian and another Caucasian, carry the turtle and placing it in the bed of a NIssan pick up truck. They then drove off heading in the Naalehu direction. They returned about 15 minutes later.

She said that when they were dragging the turtle pass them, she asked them "what are you doing?" She said that the Hawaiian replied, "we're tagging it." She then asked a lady who appeared to be Oriental, "what did he say?" and she replied that they were going to tag it.

Further, that both men were dragging the turtle by the front flipper, one on each side. She said that later, the Hawai who stated that his name was "Tony" and another Hawaiian who sai that his name was "Sammy" approached her and her daughter, Danea At that time, they offered them beer. Further, that both men were drinking Budweiser beer (bottle type). She said that they were trying to explain what they did and that Sammy told her tha they needed the turtle for survival (as food) and that it was a delicacy. He also said they knew it was illegal but that it couldn't be helped. He also said that the people at the univers use the turtle meat in their studies of turtles.

03-08-92: 1217 hrs.: Interviewed the following at Punaluu Beach, Punaluu, HI:

Danea C. LEIGH, F-20, Cauc.
92-726 Anipeahi St.
Ewa Beach, HI 96707
Res. Ph.: 672-8048
DOB: 06-11-71
SSN: 522-13-6416
Student/Leeward Comm. College
Employee/Pizza Hut
Barber's Point
Bus. Ph.: 682-2461

LEIGH stated that she and her mother, MARTIN, were at Punaluu Beach on 03-07-92 when a Hawaiian male and a "hapa" loc ing male began to drag a turtle pass them. Her mother asked th what they were doing and the Hawaiian replied that they were go to tag it. Further, that the Oriental looking woman replied th they were going to tag it. Further, that she believes this wom to be the wife of Sammy. She also said that they had 2 daught one of them named Shantele.

She said that she saw them dragging the turtle and l saw the "Hapa" looking male and another "bleach blond" Caucasi driving away in a gray Nissan pick up truck.

She also said that the Hawaiian named "Tony" and ano Hawaiian named "Sammy" came to talk to them later. That they to explain why they did what they did by saying that it was fo survival and that it was a delicacy. Further, that they knew was illegal and also the university uses the turtle meat in th studies.

SCENE

The scene is located at Punaluu Beach, Punaluu, HI.

Big Island report

Three plead guilty in turtle case

Three men charged with capturing a green sea turtle on the Big Island pleaded guilty yesterday before U.S. Magistrate Judge Francis Yamashita to charges under the federal Endangered Species Act.

United States Attorney Elliot Enoki said that defendants Anthony Lee Barro and Clyde Agres Jr., both of the Big Island, admitted taking the turtle from waters near Punaluu Beach Park in March, 1992. Defendant John Quintal, also of the Big Island, admitted that he transported the turtle away from the park in his pickup truck and left it at another location nearby. The turtle was never recovered.

Green sea turtles are protected by law since they have been designated as a species threatened with extinction.

Yamashita set sentencing for Barro and Agres for Nov. 15. They face maximum penalties of six months in jail and fines of up to $25,000. Quintal, who was sentenced immediately, received a sentence of six months probation and a $750 fine.

Man fined $3,000 for lobster catch

STATE Court

Associated Press

A fisherman has been fined $3,000 for taking spiny lobsters out of season with a spear.

District Judge David Fong imposed the fine on Albert Balderama, a serviceman who was cited by state conservation enforcement officers.

Balderama was fishing in waters in the Kahuku area when he was cited by enforcement officers on a routine night patrol.

He was charged with illegal possession of four spiny lobsters during closed season and unlawful fishing with a spear.

Ronald Kama, chief of the Oahu branch of the Division of Conservation and Resources Enforcement, said it was the highest fine ever for a fish and game violation in Hawaii.

"We hope this will inspire others to learn the laws and protect our limited ocean resources," he said.

STATE / IN BRIEF

Wright's attorney, Myles Breiner, told the court Wright was sexually assaulted, given drugs and abused in other ways by family members, including her uncle, Todd Paaaina, who has been convicted in the bank robbery.

Breiner said Paaaina was the mastermind behind the bank robbery and introduced Wright to drugs.

Wright, against her attorney's advice, pleaded guilty in to the crime.

In addition to the prison term, she must pay the bank $5,000 in restitution and, after her release, remain on supervised release for three years.

Escape artist forces exhibit changes

HONOLULU — Officials at the Honolulu Zoo said Monday they are making changes to the African Savannah exhibit after a cheetah cub escaped Sunday.

The 7-month-old cheetah Kalima jumped up on an electrified wire, then climbed over a ledge to escape from the savannah exhibit.

The cub was spotted a short time later by zoo security crouching in bushes near the exhibit. They opened the gate to the cub's sleeping quarters, and the cub returned to her mother and three siblings on her own.

Zoo visitors were removed from the area to keep the animal from getting too nervous, said zoo curator Tom Higashino.

The exhibit will be equipped with more electrified wire to prevent another escape, Higashino said. Until the changes are made, the cheetahs will remain in their sleeping quarters.

School van, car collide; 1 killed, 5 injured

WAIKOLOA, Hawaii — The Big Island recorded its 28th traffic fatality of the year Monday when a 31-year-old Waikoloa man's car was struck by a school van.

Five schoolchildren suffered minor injuries in the crash which occurred near the 10-mile marker on the Mamalahoa Highway.

Killed in the accident was Pedro Alaska. Investigators said Alaska was making a U-turn and was hit broadside by the van.

Governor's group receives literacy grant

HONOLULU — The Governor's Council for Literacy and Lifelong Learning has been awarded a $200,000 grant by the National Institute for Literacy.

The council will use the funds to develop a common performance measurement and reporting system to measure the effectiveness of literacy programs.

Video system replaces travel to court

HONOLULU — The state Judiciary this week begins video arraignment for defendents being held at the Oahu Community Correctional Center.

The new procedure means people accused of crimes will not have to be taken to court for their arraignment and plea.

A Judiciary announcement said defendents will be arraigned via a two-way audio-video linkup between the Circuit Court and OCCC.

Judge Marcia Waldorf, a prosecuting attorney and a public defender will be in the court and a second public defender and the defendant will be in the prison's multi-use room.

The first video arraignment cases are scheduled for Thursday morning.

One month in jail given to turtle slayer

HILO — A Big Island man received a one-month jail term Monday for killing an endangered green sea turtle.

Anthony Barro, 35, of Naalehu admitted taking the turtle from waters off Punaluu Beach in March 1992 and later killing him at a beach pavilion. The turtle never was found.

Green sea turtles are protected by the federal Endangered Species Act.

Pig-farm search continues for sixth day

HONOLULU — Police searched a Nanakuli pig farm for the sixth straight day on Monday, still looking for the body of a man who they believe was murdered and dumped in a pond of pig manure.

Police used heavy machinery to help look for the unidentified man, and city wastewater crews have completed draining a pond of manure where police think the body was dumped.

No human remains have been found, but some animal bones have been discovered, police said. They said last week they had found some evidence in connection with the case but didn't say what that evidence is.

The search of the Y.K. Hog Farm will continue today.

Around the state

Turtle kill nets month in prison

HILO (AP) — A Big Island man received a one-month jail term Monday for killing an endangered green sea turtle.

Anthony Barro, 35, of Naalehu admitted taking the turtle from waters off Punaluu Beach in March 1992 and later killing him at a beach pavilion. The turtle never was found.

Hawaii Reps. Patsy Mink and Neil Abercrombie were among the 156 Democrats who case "nay" votes.

Edward Sultan III, whose company makes fine jewelry, said he plans to target resort areas in Mexico.

Edward Sultan III, whose company makes fine jewelry, said he plans to target resort areas in Mexico.

Professor James Moncur said the bill would benefit Hawaii by stimulating California's economic climate, which, in turn, would generate more travel to Hawaii.

University of Hawaii economics professor James Moncur said the bill would benefit Hawaii by stimulating California's economic climate, which, in turn, would generate more travel to Hawaii.

The agreement also might have some indirect impact on Hawaii.

3

U.S. Department of Justice

United States Attorney
District of Hawaii

300 Ala Moana Blvd., Box 50183
Honolulu, Hawaii 96850

(808) 541-2850
FAX (808) 541-2958

September 20, 1993

George Balas
National Marine Fisheries
2570 Dole Street
Honolulu, HI. 96822-2396

Re: United States v. Anthony Barro, et al.
Cr. No. 93-0611 MY

Dear George:

Sentencing of the two main defendants (Anthony Barro and Clyde Agres) in this case is set for November 15, 1993 before Magistrate Judge Francis Yamashita. These are the two men who actually carried the turtle from the water.

I think it would be very helpful to the judge if you could write a letter describing your reaction to this incident. You may want to give the judge some sense of the history of turtle research at the Punaluu area, the positive results which enforcement of the Endangered Species Act appears to have had on the turtle population, and the problems which can result from criminals such this passing themselves off as "researchers." Also, it would be helpful if you could discuss the factors that led you to conclude that this was probably not the first time that these individuals took turtles from the water there.

Please send your letter to:

Magistrate Judge Francis Yamashita
United States District Court
P.O. Box 50122
Honolulu, HI. 96850

Your letter should reference the case name and number set forth above. I would appreciate it if you could send me a carbon copy.

The address for the woman who reported this incident is as follows:

Carolyn Martin
614 North M Street
Lake Worth, FL. 33460

I have set included her original statement to police, which sets forth some of the defendants' statements about being researchers.

Thank you for your willingness to assist in the prosecution of these defendants. Please do not hesitate to call me if you have any questions.

Very truly yours,

Mark Recktenwald

Mark E. Recktenwald

encl.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

October 20, 1993

Magistrate Judge Francis Yamashita
United States District Court
P.O. Box 50122
Honolulu, Hawaii 96850

Re: United States v. Anthony Barro. et al.
Cr. No. 93-0611 MY

Dear Judge Yamashita:

I am writing in regard to sentencing in the above referenced case. My name is George Balazs and I oversee the Marine Turtle Research Program at the National Marine Fisheries Service here in Hawaii. Our agency has joint responsibilities for the research, recovery, and protection of threatened and endangered sea turtles listed under the U.S. Endangered Species Act.

At the request of the U.S. Attorney, I had planned to testify as an expert witness on sea turtles if the referenced case was heard in court. I have been professionally involved in the research and conservation of Hawaiian sea turtles since 1972, initially for 9 years with the University of Hawaii at Manoa and, since 1981, with the National Marine Fisheries Service. As part of my research program, since 1983 I have conducted a biannual turtle tagging project at Punaluu Bay, Kau District, Hawaii, in cooperation with the Marine Option Program of the University of Hawaii at Hilo. These study trips, under my direct supervision, are carried out with science professors and their students from the University. Usually two days are spent at Punaluu capturing, measuring, tagging, and examining resident green turtles, Chelonia mydas. An article has been enclosed that provides general information on our small but highly successful project at this location.

In view of the background described above, I would like to offer the following points for your consideration.

1) Our tagging and research activities at Punaluu are strictly controlled by Federal regulations, as well as a scientific permit issued by the State of Hawaii. The fact that we are authorized researchers is always made known by displaying temporary signs at our work site. We also distribute informational handbills about our activities to all persons (including tourists) that are in the vicinity.

2) According to original statements recorded in the police report, when asked what they were going to do with the turtle being dragged away, one of the defendants answered- "we're tagging it". I want to state, for your records, that these individuals were in no way associated with our official tagging

project. Our research team was not present at Punaluu when this incident occurred. Furthermore, I find it highly disturbing, and damaging to the integrity of our research efforts, that someone would falsify their activities under the guise of scientific research ("tagging") in order to illegally take wildlife protected under the U.S. Endangered Species Act. The possibility of copycat "researchers" using this tactic in the future at Punaluu and elsewhere, without getting caught, gives me cause for concern. I also can't help wondering how many times in the past such a ploy may already have been successfully used without being detected.

3) According to the police report, the defendants stated "..that they knew it was illegal [to take the turtle] and also the university uses the turtle meat in their studies". Again, I want to state for your records that neither my agency, nor our cooperators at the University of Hawaii, ever take turtles at Punaluu to use "meat" in our studies. Turtles found dead from boat collisions, fishing line entanglement, attempted poaching (i.e., spear wounds), and numerous other causes that impact Hawaii's turtle population are frequently salvaged for scientific investigation. However, no live turtles are ever taken for such purposes. The statement in the police report by the defendants has no basis in fact.

4) Metal signs warning that sea turtles and marine mammals are protected by federal and state laws were bolted to fixtures at Punaluu Bay two years ago. Some of these signs have been stolen. However, at least one of them is still present at a prominent site immediately in front of the gift stands at the center of the beach.

5) The fact that sea turtles at Punaluu Bay (and elsewhere throughout Hawaii and the rest of the U.S.A.) are legally protected should be well-known to residents of the Kau District. Turtles were designated under the U.S. Endangered Species Act in 1978. Punaluu Bay is perhaps the most prominent site for turtles on the Island of Hawaii. Many turtles were killed there for commercial purposes during the 1960's. In the early Hawaiian culture, Punaluu is the birthplace and home of "Kauila the turtle girl". This supernatural turtle is said to have regularly changed into human form to protect children when they came to swim and play around the bay.

6) In spite of protection under the U.S. Endangered Species Act, there is evidence that periodic killing and serious harassment of turtles regularly occurred at Punaluu Bay until 1985. In that year a blatant case occurred in which a turtle was caught and its throat slit right on the beach in front of hundreds of tourists. The turtle was thrown into a pick-up truck and taken away. A person who witnessed the event was able to take photographs, record the license plate number, and immediately notify federal enforcement agents. The suspects were subsequently apprehended

and found guilty. In the process, other crimes by one of the defendants were uncovered. The news of this case became widely known to residents of the Kau District. As a result, violations against turtles are believed to have diminished significantly. Evidence to support this view has been manifested over the years by the increasing tameness by the turtles at Punaluu when in the presence of humans using the beach or swimming. Residents and tourists alike now regularly enjoy watching the turtles forage and swim in the bay right along the shoreline.

7) Green turtles in Hawaii and elsewhere worldwide exhibit slow growth and delayed sexual maturity. They are long-lived, herbivorous reptiles that are obligated to graze in the shallows on marine vegetation. An average green turtle in Hawaiian waters takes about 25 years to become an adult. Once this size has been reached (175-300 lbs), the turtles undertake round-trip migrations every several years to mate and lay eggs at distant ancestral breeding sites. For example, green turtles living and feeding at Punaluu have been documented by our research program migrating to breed at French Frigate Shoals, 400 miles to the northwest of Kauai. These biological factors and others serve to constrain the recovery of depleted green turtle populations. Many decades are needed for full replenishment to occur. Hawaii's turtles have made a step in that direction, but their long-term viability is dependent upon the continuation of effective protection against exploitation.

8) It is my professional opinion that penalties firmly but fairly imposed by the court for violations of wildlife laws can serve as effective future deterrents, both for the ones being sentenced as well as other persons engaged in or contemplating similar illegal activities. However, a key component to deterrent is that the penalties handed down be widely publicized, both at the time of sentencing and periodically in the future.

Thank you for taking the time to consider the information I have assembled in this letter.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research Program

cc
U.S. Attorney
NMFS Law Enforcement Office

Spaceport

It didn't fly, so pull the plug

Last year, impatient with the small return for the millions being spent by the state Office of Space Industry, lawmakers put it under the wing of the Department of Business, Economic Development and Tourism.

At the same time, the Legislature asked state Auditor Marion Higa, already busy with an examination of the department, to take an especially close look at the space office.

Higa's report, released last week, confirms lawmakers' fears about the space office, but suggests that just moving it around wasn't the answer — they should have pulled the plug on it.

Her blistering report on the business department's own contracting practices suggests it was hardly qualified to turn the space office around.

Meanwhile, Higa wrote, the space office for years wasted time and money with loosely-worded contracts. And she detailed flaws in the hiring of Adm. Thomas Hayward as the state's "space czar," a job so poorly defined, she added, that Hayward received about $600,000 over a four-year period essentially for nothing.

The present computer and communications functions in the space office, in fact, have little to do with the spaceport idea. We agree with Higa: They belong in the state High Technology Development Corp.

We continue to think that a spaceport would be a tremendous asset for Hawaii. But Big Island residents continue to oppose it, and there's no sign of private investment interest. So for now, Higa is right: The state should quit spending money on it.

...should be abolished.

WEST HAWAII TODAY NOV 16, 1993 PG 4A

Man jailed in turtle death

HILO (AP) — A Big Island man received a one-month jail term Monday for killing an endangered green sea turtle.

Anthony Barro, 35, of Naalehu admitted taking the turtle from waters off Punaluu Beach in March 1992 and later killing it at a beach pavilion. The turtle never was found.

Green sea turtles are protected by the federal Endangered Species Act.

EDITORIALS

The Honolulu Advertiser Monday, January 16, 1995

Campaign finance

Mixed menu of reforms

Robert Watada, the executive secretary of the state Campaign Spending Commission, is right about one thing:

The "climate is right for change" in the way Hawaii finances its political campaigns.

The general public knows that. Whether those on the inside of the fund-raising game (politicians and their benefactors) do is another question, however.

Undaunted, Watada will press for reform at the 1995 Legislature. Overall, his ideas would bring some order to the convoluted campaign financing system.

One proposal, however, sounds good but would actually represent backsliding. Watada would outlaw corporate contributions in Hawaii as they are at the national level.

In federal races, the corporate ban has simply created a massive system of subterfuge where money comes through political action committees and other second parties.

It was just this pattern of concealed giving that led Hawaii to legalize direct corporate and union contributions in the 1970s. The theory: These guys are going to give anyway, why not make it legal so at least the giving will be out in the open?

The system hasn't worked perfectly. Watada, in fact, has identified and sensibly wants to eliminate one ruse: "bundling," in which closely connected groups of donors each give the maximum when in truth the money comes from the same source.

If it passes constitutional muster, Watada's proposal to ban contributions from government contractors makes sense. Honolulu is already testing this.

Also solid is his proposal to require campaigns to file reports on standardized computer discs, so that analysis of their "disclosures" will be easier.

Reform of campaign financing is a tricky business. The best route is an emphasis on full disclosure and strong and swift sanctions against those who are found cheating on the system.

Ruling on space offices puts agencies on notice

By Rod Thompson
Big Island correspondent

HILO — State agencies are on notice that they must open their business to the public, says Paul Atchitoff, an attorney with the Sierra Club Legal Defense Fund.

The state Supreme Court has ruled that a lower court must reconsider whether a state spaceport program violated the Sunshine Law by holding secret meetings.

Atchitoff noted the effect on other agencies because the space program has gone out of business.

The state Supreme Court says a lower court must consider whether the Space Development Authority and its related bodies violated the state Sunshine Law.

The case was filed in 1993 by three organizations and two Big Island individuals against the Hawaii Space Development Authority, the Office of Space Industry, several Space Advisory Committees and the Department of Business, Economic Development and Tourism.

The Supreme Court said a Circuit Court abused its discretion when it struck certain parts of the citizens' suit, and it erred in dismissing the suit.

Atchitoff said the ruling means the state space agencies had to follow the Sunshine Law, if the basic facts presented by the plaintiffs are accurate.

A lower court trial would determine the basic facts.

The plaintiffs were Green Sands Community Association (near the two proposed launch sites in the Kau district), the Sierra Club and Greenpeace Foundation-Hawaii, as well as individuals Sandra Demoruelle and Russell Turcote.

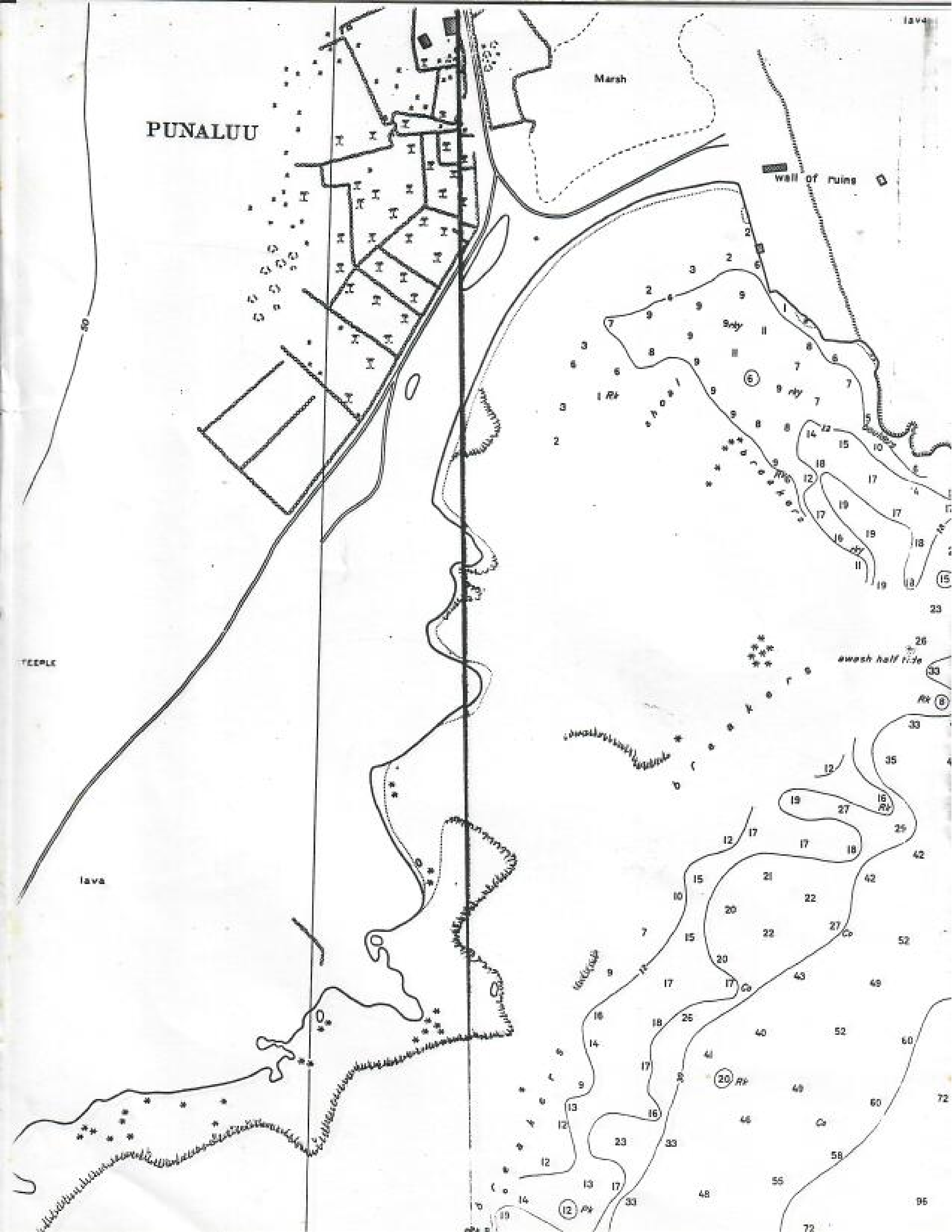
Those plaintiffs alleged the space agencies, plus former development authority head Thomas Hayward, former space office head Kenneth Munechika and former state business department head Mufi Hannemann, violated the law by failing to announce meetings, closing the meetings to the public and failing to keep minutes of the meetings.

Hayward and Munechika left the government in 1993 about the same time that Lockheed Missiles and Space Co. announced it was no longer interested in a Big Island launch site. Hannemann is now a Honolulu councilman.

The state officially closed its space agencies in 1995.

But a key Hawaii businessman, J.W.A. "Doc" Buyers of C. Brewer & Co., says a spaceport in Kau, where Brewer has large land holdings, is still a good idea. Noting earlier Kau resident opposition, he said, "I don't want to push the spaceport if the people don't want it." But he noted a long list of technological advances that didn't exist when a spaceport was proposed in the 1980s, including faxes, cell phones, the Internet, e-mail, fiber-optic cables "and no stones from Mars."

Some of them increase the value of satellites, he said, adding, "I do think we're missing a great opportunity."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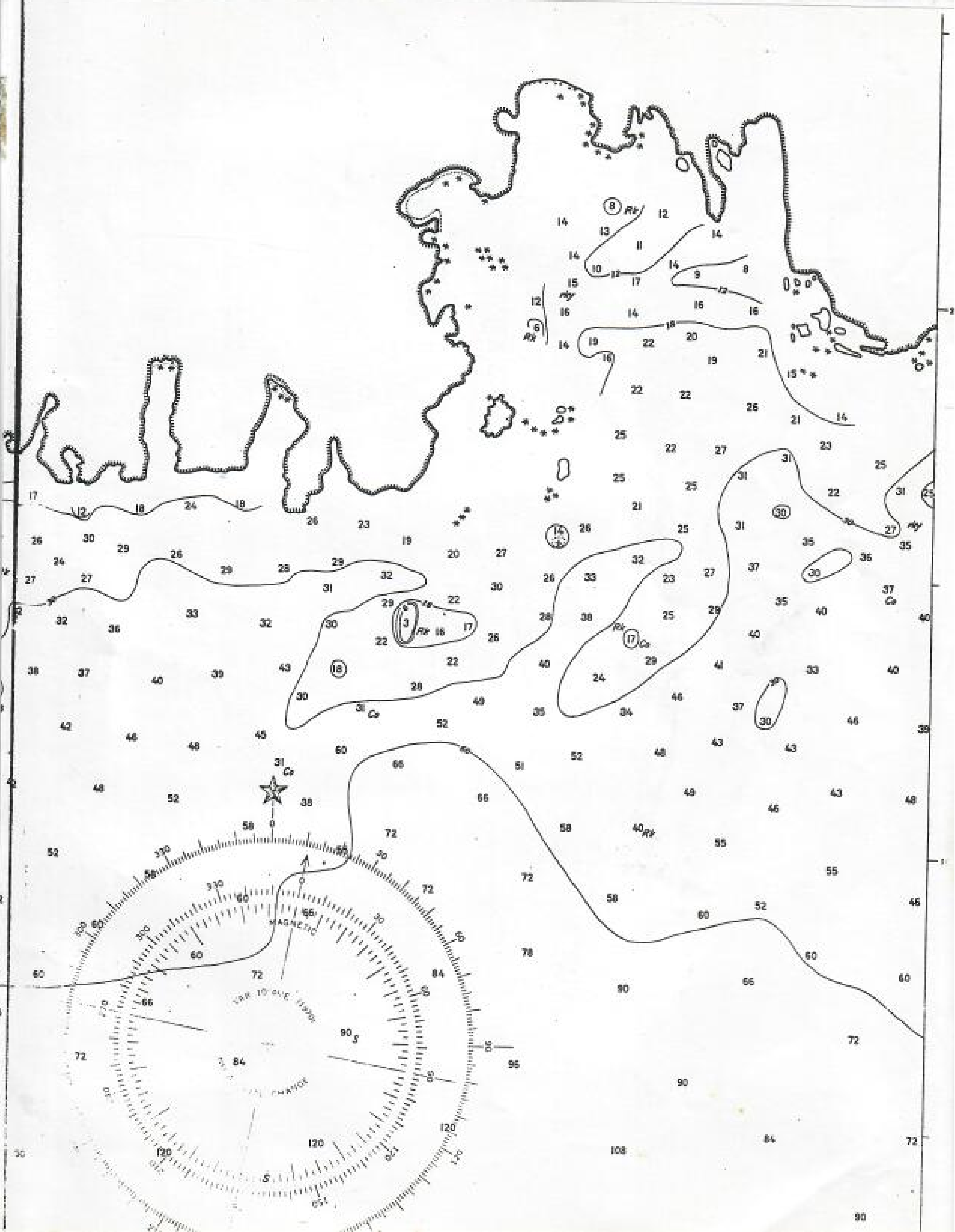
MAGNETIC

Date: Sun, 26 Jan 1997 15:06:18 -1000
From: Kimberly Krusell <krusell@hawaii.edu>
To: "George H. Balazs" <gbalazs@honlab.nmfs.hawaii.edu>
Subject: Re: Aloha, Kimberly

Dear George-
I received your email today. I'll look forward to receiving your map and additional articles. I am still very interested and excited about the project as well. I can begin making my weekly trip to Punaluu starting this week. I've started outlining a proposal already. If you could indicate places on the map where you have caught the turtle in the past, that may prove to be helpful. I was planning to talk to Dr. Hallacher further about this study anyway, so I'm glad you've already involved him. I'm hoping to finish writing the proposal by the end of this week, I'll make sure to forward you a copy upon its completion. I really enjoyed the turtle tagging experience and am very happy I can continue to work with these animals this semester.

Aloha,
Kimberly

On Sat, 25 Jan 1997, George H. Balazs\ wrote:

> Dear Kimberly- Nice to see you at Punaluu. Thanks for all your hard work
> along with the other students. It was a very successful (and pleasant)
> trip for me.
>
> As we discussed, early in the week I'll be mailing you a blowup map of
> Punaluu and an assortment of articles on sea turtles. We (you) need to
> move ahead quite fast to do this project, if you are still interested in
> pursuing. The reason is that the TDR will only record for 60 days (once
> every minutes- by time, depth, temperature, and wet/dry function (out
> basking ashore or in the water). So, your observations at Punaluu to
> verify actual locations, and record other observations relating to
> foraging, will have to be within, and spread out during, those 60 days.
>
> Note that I've copied this message to Dr. Hallacher. After giving more
> thought, I want to absolutely recommend encourage that Dr. Hallacher be
> included as one of your advisors in this project along with Dr. McDermid.
> Leon has excellent knowledge of Punaluu and can provide you with valuable
> guidance. In addition, I'll be traveling much of the time over the next
> five weeks and not readily available to give assistance if important
> questions come up.
>
> Please send me a return message so I'll know you received this one.
> I'm really exciteded about your carrying out the work we discussed.
>
> Best regards, George
>
>

> **********
> * George H. Balazs *
> * National Marine Fisheries Service *
> * Marine Turtle Research Program *
> * Honolulu Laboratory *
> * 2570 Dole Street *
> * Honolulu, HI 96822-2396 *
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Estuarine, Coastal and Shelf Science (1992) **35**, 409–424

Effects of Nutrient Subsidies from Groundwater to Nearshore Marine Ecosystems off the Island of Hawaii

S. J. Dollar and M. J. Atkinson

Hawaii Institute of Marine Biology, University of Hawaii, Honolulu HI 96822, U.S.A.

Received 2 August 1991 and in revised form 31 December 1991

Keywords: nutrients; groundwater; Hawaii; mixing model; anthropogenic

Nonconservative fluxes of dissolved nutrients (Si, N and P) in groundwater and nearshore ocean water off two golf courses (Keauhou and Waikoloa) on the west coast of Hawaii were estimated using a one-dimensional mixing model. Groundwater flowing under the Keauhou course discharges into a semi-enclosed embayment with restricted circulation. Leaching of 10% of the N from golf course fertilizer accounted for an increase in groundwater N flux to the bay of 116%; leaching of 1% of the P from fertilizer accounted for an increase in groundwater P flux of 22%. Uptake of Si, N and P was not measurable within the bay; a buoyant surface layer (1 m thick) did not come into contact with benthic communities, and nutrient uptake by plankton was limited to no greater than 2% of the N and P delivered by groundwater flux.

At Waikoloa, leaching of N and P from golf course fertilizers accounted for an increase in groundwater nutrient flux to brackish ponds near the coastline of 229% and 400%, respectively. Waikoloa is located on an exposed coastline with substantial turbulent mixing throughout the water column. Nutrient subsidies from golf course fertilizers were not distinguishable from natural groundwater input, and uptake of N in the nearshore zone equaled 80% of the groundwater flux at the shoreline.

On a mass delivery basis, natural and anthropogenic nutrient fluxes to the nearshore ocean appear sufficient to cause alteration to community function and structure. Such effects, however, are not solely responses to nutrient loading. Consideration of physical processes, along with use of conservative tracers can provide a practical method for quantifying these effects of man's activities on the ocean.

Introduction

In many coastal areas, groundwater provides a continuous input of biologically and chemically reactive materials to the nearshore ocean. Several studies have investigated the extent and magnitude of high nutrient (Si, N, P) groundwater in nearshore marine environments (Marsh, 1977; Johannes, 1980; D'Elia *et al.*, 1981; Sewell, 1982; Capone & Bautista, 1985; Johannes & Hearn, 1985; Lewis, 1987; Lapointe & O'Connell, 1989; Lapointe *et al.*, 1990; Valiela *et al.*, 1990). These authors demonstrate that anthropogenic

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activities can increase input of nutrients into groundwater, which can subsequently influence biogeochemical cycling and biotic structure of nearshore marine communities. Yet, fates of these compounds are not well described nor modelled, especially for shallow subtropical marine ecosystems.

In the Hawaiian Islands, freshwater flux to the nearshore ocean is substantial in many areas. The west coast of the island of Hawaii is composed of basaltic rock with very little natural soil cover. This leeward region is arid (mean annual rainfall of 25 cm), and streamflow is negligible. Within 10 km of the coastline, however, mean annual rainfall increases to 102 cm. The primary flux of freshwater from the island to the ocean is subterranean groundwater in unconfined aquifers, estimated at 15×10^3 m^3 km^{-1} day^{-1} in the region of the study sites (Kay *et al.*, 1977). Groundwater recharge is mainly from precipitation falling in upland regions of the three mountains (Mauna Loa, Mauna Kea, and Hualalai) that form the central mass of the island. Water budgets predict that the residence time of precipitation within the aquifer is on the order of decades prior to discharge at the coastline (Kay *et al.*, 1977). Dissolved inorganic nutrient concentrations in groundwater are 1–2 orders of magnitude higher than nearshore oceanic water. The large input of groundwater into the coastal ocean creates zones of mixing with strong gradients of nutrients and salinity.

Resorts, golf courses, and other coastal developments are scattered along the coast. Nutrients from fertilizers used to maintain turf and landscaping can leach into groundwater that discharges into the ocean near the shoreline. Because of large fluxes of groundwater and well-defined anthropogenic subsidies, the west coast of Hawaii provides an excellent experimental setting to investigate nutrient subsidies to nearshore marine communities. In this study, we examined two sites with similar coastal land usage, but with different coastal morphology. Our purpose was to employ a mixing model to address three goals: to quantify the fluxes of nutrients in groundwater to the nearshore zone from natural sources; to compare those fluxes with the anthropogenic subsidy; and to assess the relationship between dispersive mixing and biological uptake of nutrients injected into the coastal marine environment.

Sampling sites

Study sites are on the west coast of the island of Hawaii at Keauhou and Waikoloa (Figure 1). Keauhou Bay extends about 500 m inland from the open ocean. The bay is surrounded by a golf course on 372 hectares of sloping lava land. The typical irrigation rate of the golf course is $1{\cdot}5 \times 10^3$ m^3 day^{-1}. One-third of the irrigant is secondary treated sewage effluent from a municipal wastewater treatment plant, while the remainder is brackish groundwater (with salinity of 1–2) from on-site wells. In addition to the sewage effluent, dry fertilizer mixes are used to supply plant nutrients. These practices have been employed at Keauhou for approximately 20 years.

The shoreline of the bay is composed of porous basaltic rock, while the floor is predominantly unconsolidated carbonate sand with scattered patches of solid limestone partially covered with living corals. Because of protection from north and south long-period swells afforded by orientation of the shoreline, the interior of Keauhou Bay is sheltered from all but the most intense wave action.

The Waikoloa site is situated on mostly barren lava land with numerous anchialine (brackish) ponds bordering the shoreline. Two golf courses occupying approximately 700 hectares are situated landward of the ponds. One of the courses has been in operation for

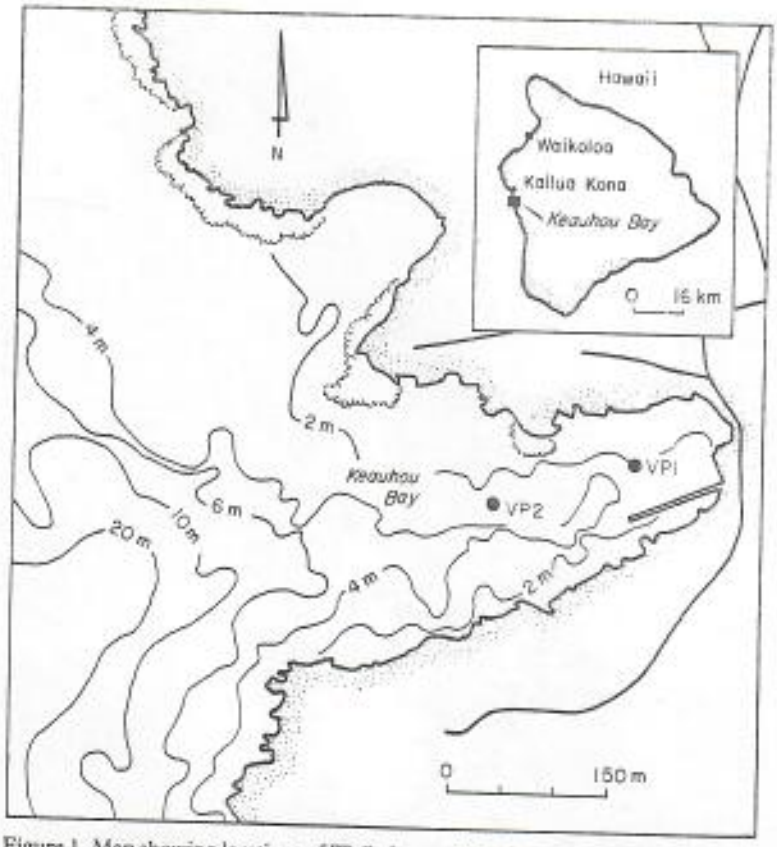

Figure 1. Map showing locations of Waikoloa and Keauhou study sites on west coast of island of Hawaii (inset). Map of Keauhou Bay shows locations of vertical profile sampling (VP).

about 20 years, whereas the second course was completed during this study. The irrigation rate is $1{\cdot}2 \times 10^4$ m^3 day^{-1} of which about 90% is brackish groundwater, and 10% is treated sewage effluent. The older Waikoloa course was constructed with a thin (15 cm) layer of soil composed largely of sand and cinder. As a result, rates of irrigation at Waikoloa are approximately four times higher per unit area than at Keauhou.

The nearshore marine environment consists of an unprotected open coastline. The intertidal and subtidal regions are composed of a flat basaltic bench that is exposed to substantial energy from breaking waves and surge. Benthos primarily comprises scattered hermatypic corals and encrusting coralline algae.

Materials and methods

Sampling methods

Water samples were collected at each site over a 25-month period during February 1988, October 1989, March 1990, and July 1990. The investigative strategy was to sample within the widest possible salinity range between groundwater and coastal oceanic water.

At Keauhou, water samples were collected from the shoreline around the perimeter of the inner bay to approximately 75 m offshore. Sampling was most intensive within about

10 m from the shoreline and near groundwater seeps. At each sampling location water samples were collected in the upper 25 cm of the water column and within 1 m of the seafloor. In addition, two sets of vertical profiles were sampled through the water column in the centre of the bay (see Figure 1).

At Waikoloa, samples were collected in a transect roughly perpendicular to the shoreline through a series of anchialine ponds and the nearshore ocean. The most landward pond was approximately 500 m inland from the coastline, while the most seaward pond was less than 10 m from the open ocean. Surface and deep marine samples were collected from the upper wash of waves to a distance of approximately 50 m offshore.

At both sites water samples were collected approximately 500 m from shore at depths of about 10 m. These samples were deemed to be beyond the influence of groundwater input, and are defined as 'oceanic endmembers'. Samples representing 'groundwater endmembers' were collected from potable wells located at elevations above the golf courses. In total, 129 ocean samples were collected at Keauhou, and 120 samples were collected at Waikoloa.

Water was collected in 1-litre polyethylene containers; subsamples for dissolved nutrient analyses were immediately filtered through glass-fibre filters into triple-rinsed, acid-cleaned, 125-millilitre polyethylene bottles. Subsamples for dissolved N and P were immediately frozen on dry ice, while subsamples for dissolved Si were chilled, but not frozen. Salinity of each sample was determined in the field using a hand-held refractometer with readability of 0·5. In the laboratory, salinity was determined to 0·0001 using an AGE Model 2100 Minisal salinometer. Analyses for Si, dissolved inorganic N ($NO_3^- + NO_2^-, NH_4^+$), and dissolved inorganic P (PO_4^{3-}) were performed using a Technicon AAII system, with standard procedures modified for high-precision analyses (Technicon Industrial Systems; Industrial methods for water, seawater, and wastewater analysis). Total N and P were determined using the same methods following UV digestion. Dissolved organic N (DON) and dissolved organic P (DOP) were calculated as the difference between total N and dissolved inorganic N, and total P and dissolved inorganic P, respectively.

Data analysis

As stated earlier, mixing groundwater with seawater creates gradients of nutrients and salinity. If salinity is considered as a conservative tracer of mixing, then it is possible to quantify the uptake and release of biologically or chemically reactive compounds within the mixing zone. These rates of uptake and release of reactive compounds are termed nonconservative fluxes.

A simple, one dimensional mixing model (Officer, 1979) was used to calculate nonconservative fluxes of nutrients. This approach assumes that the dominant mixing of two distinct types of water is by turbulence; mixing by molecular diffusion is not significant.

We calculate three nonconservative fluxes for nutrient compounds: (1) F_t = total nonconservative flux between the groundwater and the ocean endmembers; (2) F_l = nonconservative flux on land between the groundwater endmembers and the shoreline, and; (3) F_m = marine nonconservative flux between the shoreline and the ocean endmember (see Figure 2).

The equations for these nonconservative fluxes are derived as follows. Conservation of mass through any arbitrary cross-sectional area (A) defines flux (F) as:

$$F = QC - K_x A(dC/dx) \quad (1)$$

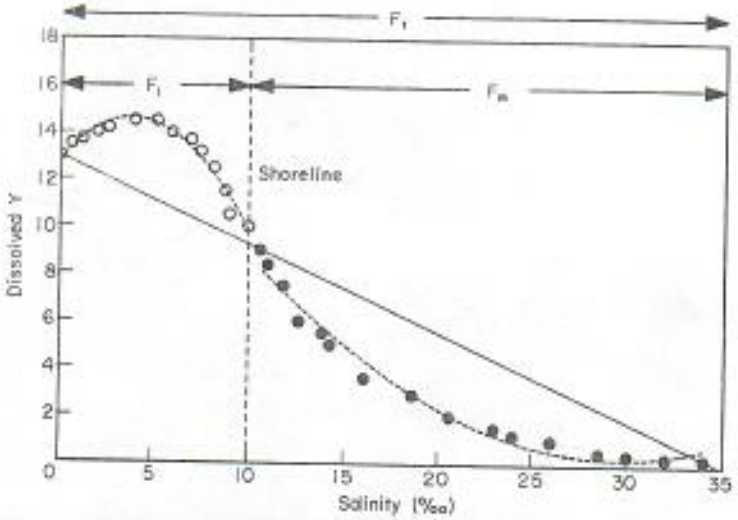

Figure 2. Idealized diagram representing mixing model of biologically reactive nutrient Y. The total flux of the system (F_t) from endmember salinities in well water (0) to open coastal waters (35) is divided at the shoreline into land fluxes (F_l) and marine fluxes (F_m). Solid diagonal line represents conservative mixing line constructed by connecting endmember concentrations. Curved dashed lines are regressions of second order polynomials fitted through data points from pond samples (open circles) and ocean samples (solid circles).

where Q is net volume transport of water through A; C is concentration of the reactive material; and K_x is a mixing coefficient at x.

Equation 1 for a conservative tracer, in this case salinity (S), with F = 0 yields:

$$0 = QS - K_xA(dS/dx) \tag{2}$$

Solving Equations 1 and 2 for K_xA results in an equation for F in terms of C and S at any given x (Officer, 1979):

$$F = Q(C - S(dC/dS)) \tag{3}$$

The nonconservative flux between two fixed points is the difference between the flux out of a component of the system and the flux into the system. The marine flux (F_m) equals flux at the ocean endmember (subscript o) minus flux near the shoreline endmember (subscript s):

$$F_m = Q(C - S(dC/dS))_o - Q(C - S(dC/dS))_s \tag{4}$$

In order to solve for F_m, the first derivatives dC/dS of the regression curves were evaluated at the shoreline salinity and oceanic salinity. Volume transport of groundwater (Q) for the study areas was taken from Kay *et al.* (1977).

Total nonconservative flux (F_t) between the groundwater endmember (subscript g) and the ocean endmember is derived similarly:

$$F_t = Q(C - S(dC/dS))_o - Q(C - S(dC/dS))_g \tag{5}$$

However, dC/dS within the aquifer is difficult to determine with only several wells to sample. In addition, the salinity of groundwater (S_g) is very low, and it cannot be

ascertained that the measured salinity represents marine salt. We are interested primarily in the input of freshwater at the land-ocean interface. Thus, with S_z equal to zero, the flux from horizontal diffusion in the aquifer (S_z dC/dS) is considered zero in equation 5. The total nonconservative flux (F_t) between the groundwater endmember and the ocean endmember is then:

$$F_t = Q(C - S(dC/dS))_o - Q(C)_g \quad (6)$$

To solve for F_t, C_g equals the mean nutrient concentration of well water. For areas with no facilities (wells or ponds) to sample groundwater in the aquifer, F_l is calculated as F_t minus F_m. For sites where water from the aquifer could be sampled, the land flux (denoted as F_l') was calculated using the mixing model similarly to F_t:

$$F_l' = Q(C - S(dC/dS))_s - Q(C)_g \quad (7)$$

Positive values of F_t, F_m and F_l indicate that the system is a source of the reactive compounds, and negative values indicate the system is a sink.

To apply the model, nutrient concentrations were plotted *vs.* salinity, and a second order polynomial was fitted to the data from the shoreline to the ocean. A second order polynomial was used because it gives the best overall average curvature for each sector. If the coefficient of the second-order term was not significantly different from zero, the curve was considered a straight line, indicating that there was no apparent nonconservative flux in the nearshore marine environment.

The horizontal flow of groundwater in the vicinity of the study sites has been estimated at about 2 m day^{-1} (Kay *et al.*, 1977). The distance from the shoreline to the landward borders of the golf courses is about 2 km. Thus, the transit time of groundwater under the golf courses is between 2·5 to 3 years. For our analyses, all data collected over 2 years were combined into a single set because the transit interval is long compared to the interval between sample collections.

Results

Groundwater fluxes

Mean salinity of the water from the wells is about 0·2 at Keauhou, and 0·5 at Waikoloa (Table 1), confirming that groundwater in the area has a very low salt content compared with ocean water. Mean concentrations of dissolved Si, PO_4^{3-}, and NO_3^- are fairly constant within each sampling location but differ between locations. For the Keauhou well, mean Si, PO_4^{3-}, and NO_3^- are approximately 780, 4, and 75 μM, respectively. The standard error for these nutrients is less than 3% of the mean value (Table 1). At Waikoloa, mean values of Si, PO_4^{3-}, and NO_3^- are 906, 1·6, and 83 μM, respectively, with standard errors less than 16% of the means. Mean Si at Waikoloa is higher than at Keauhou by approximately 15%, while mean PO_4^{3-} is about 40% lower. The dominant form of N in groundwater is NO_3^-; NH_4^+ and DON are present in extremely low concentrations, less than 0·2 μM. Likewise, P exists almost exclusively as PO_4^{3-}, rather than as DOP (Table 1).

Fluxes of Si, N, and P per metre of shoreline per day via groundwater flow (GW in Table 2), are calculated as the product of mean concentrations (Table 1) and volume water flux. Volume flux at Keauhou and Waikoloa is estimated at 22·5 and 12·5 $m^3\ m^{-1}\ day^{-1}$, respectively (Kay *et al.*, 1977). Even the most recent hydrologic models, such as Aquifem (Townley, 1987), can only estimate volume transport of groundwater from aquifers such as at Waikoloa and Keauhou to the coastal zone with a certainty of a factor of 2.

TABLE 1. Nutrient concentrations and salinity in groundwater collected from wells upslope from the study areas

Sampling date	Salinity (‰)	Si (μM)	PO_4 (μM)	NO_3 (μM)	NH_4 (μM)	DOP (μM)	DON (μM)
			Keauhou				
February 1988	0·18	734·8	4·28	74·14	0·14	no data	no data
July 1989	0·20	748·7	4·17	79·38	0·04	no data	no data
October 1989	0·02	811·0	3·88	74·43	0·01	b.d.l.	b.d.l.
March 1990	0·27	770·3	4·14	73·68	0·13	b.d.l.	b.d.l.
October 1990	0·29	780·9	3·66	75·27	0·04	b.d.l.	1·82
Mean	0·19	769·14	4·03	75·38	0·07	—	—
SD	0·11	29·53	0·25	2·31	0·06	—	—
n	5	5	5	5	5	5	5
SE	0·05	13·21	0·11	1·03	0·03	—	—
95% Upper limit	0·32	805·80	4·34	78·25	0·15		
95% Lower limit	0·06	732·48	3·71	72·51	−0·00		
			Waikoloa				
February 1988	0·20	880·8	2·16	87·94	0·21	no data	no data
October 1989	0·19	974·2	2·20	94·47	0·01	no data	no data
March 1990	0·19	866·4	1·41	85·27	b.d.l.	b.d.l.	b.d.l.
October 1990	0·89	893·9	0·99	60·09	0·02	0·11	7·43
October 1990	0·86	919·6	1·16	86·02	0·07	0·12	2·60
Mean	0·47	906·98	1·58	82·76	0·06	—	—
SD	0·37	42·37	0·56	13·18	0·09	—	—
n	5	5	5	5	5	4	4
SE	0·17	18·95	0·25	5·89	0·04	—	—
95% Upper limit	0·93	959·58	2·28	99·12	0·17		
95% Lower limit	0·00	854·38	0·88	66·40	0·00		

Si:N ratios of GW are within 10% at the two sites (10·2 at Keauhou, 11 at Waikoloa), while N:P and Si:P ratios vary by factors of 2·7 and 2·9, respectively.

Nonconservative fluxes on land

Nonconservative fluxes from land (F_l), the marine environment (F_m), and the total system (F_t) are summarized in Table 2. Coefficients of second order polynomials fitted through the data are shown in Table 3. At Keauhou, F_l is positive for fluxes of Si, N and P, indicating that there are source (subsidy) terms in each of the components. These subsidies are depicted by data points falling above the conservative mixing line (Figure 3). At Keauhou, the subsidy from land (F_l) of Si as a percentage increase in groundwater flux (GW) is small (2%) compared to N (116%) and P (22%).

At Waikoloa, the anchialine ponds provide sampling points where the Ghyben-Herzberg lens is exposed to the atmosphere between the area of nutrient application and the ocean. These ponds also appear to be the sites of complex biotic interactions as revealed by plots of nutrient concentrations *vs.* salinity (Figure 4). Plots of N and P *vs.* salinity in the ponds display a scatter of data above and below the conservative mixing line. Solving F_l' using curvilinear regression lines fitted to pond data demonstrates upward concave curvature (i.e. uptake) for Si, and downward concave curvature (i.e. input) for N and P (Figure 4). Uptake of Si is equivalent to about 8% of the groundwater flux. N and P

TABLE 2. Mass transport of nutrients from groundwater (GW) and nonconservative fluxes from the land (F_l) and marine (F_m) components of the total system (F_t) between groundwater wells and the open coastal ocean. F_t is calculated as the F_l minus F_m; F_l' is calculated according to equation 7 in text. * Indicates curvature of regression line significantly different than zero ($P<0.05$). Also shown are ratios of nutrient fluxes. All fluxes are mol m^{-2} day^{-1}

Flux	GW	Keauhou F_l	F_m	F_t
Si	17·30	0·44	4·04*	4·48*
N	1·69	1·96	0·29*	2·25*
P	0·09	0·02	0·02*	0·04*
Si:N	10	0·2	14	2
Si:P	190	23	184	109
N:P	19	103	13	55

Flux	GW	Waikoloa F_l	F_l'	F_m	F_t
Si	11·34	−0·97	−4·03*	2·23	1·26
N	1·04	0·24	2·27*	−0·84*	−0·59*
P	0·02	0·01	0·08*	0·003	0·01
Si:N	11	−4	−2	−3	−2
Si:P	567	−114	−50	665	106
N:P	52	29	28	−279	−50

TABLE 3. Regression statistics for the term B(2) in the second order polynomial equation, $Y = B(0) + B(1)X + B(2)X^2$, fitted through the nutrient vs. salinity data at each sampling site. * Indicates curvilinearity significantly different than a straight line ($P<0.05$)

	Regression coefficient	SE	Confidence limits	
			Lower	Upper
Keauhou				
Si	−0·155*	0·024	−0·204	−0·107
N	−0·011*	0·005	−0·022	−0·0002
P	−0·0009*	0·0003	−0·001	−0·0002
Waikoloa Ocean				
Si	−0·172	0·116	−0·405	0·061
N	0·065*	0·015	0·035	0·094
P	−0·0003	0·0007	−0·002	0·001
Waikoloa Land				
Si	2·035*	0·474	1·086	2·983
N	−1·149*	0·341	−1·829	−0·468
P	−0·040*	0·015	−0·069	−0·011

fluxes from land augment groundwater by 229% and 400%, respectively. Estimating F_l by the difference between F_t and F_m (Table 2) indicates that F_l and F_l' are similar in sign (i.e. consistent input or uptake) but differ in value by an order of magnitude.

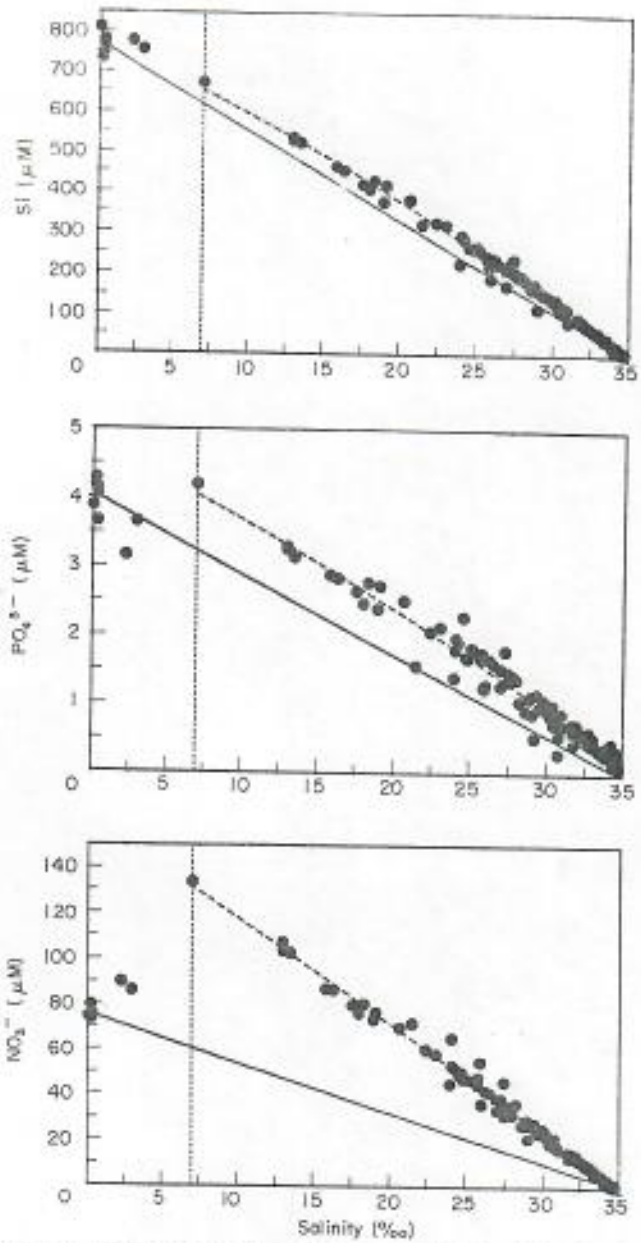

Figure 3. Plots of dissolved nutrients versus salinity at Keauhou. For explanation of plots, see Figure 2.

Nonconservative fluxes in the ocean

Nonconservative marine fluxes (F_m) of Si, N and P within Keauhou Bay are all sources of nutrients to the environment, as reflected in the downward concave curvature of the regression lines in Figure 3. Such inputs indicate no significant net biotic uptake of nutrients in Keauhou Bay. The subsidy of Si in the bay is about 23% of the groundwater flux (GW), and is about nine-fold larger than the flux from land (F_l). While the flux from

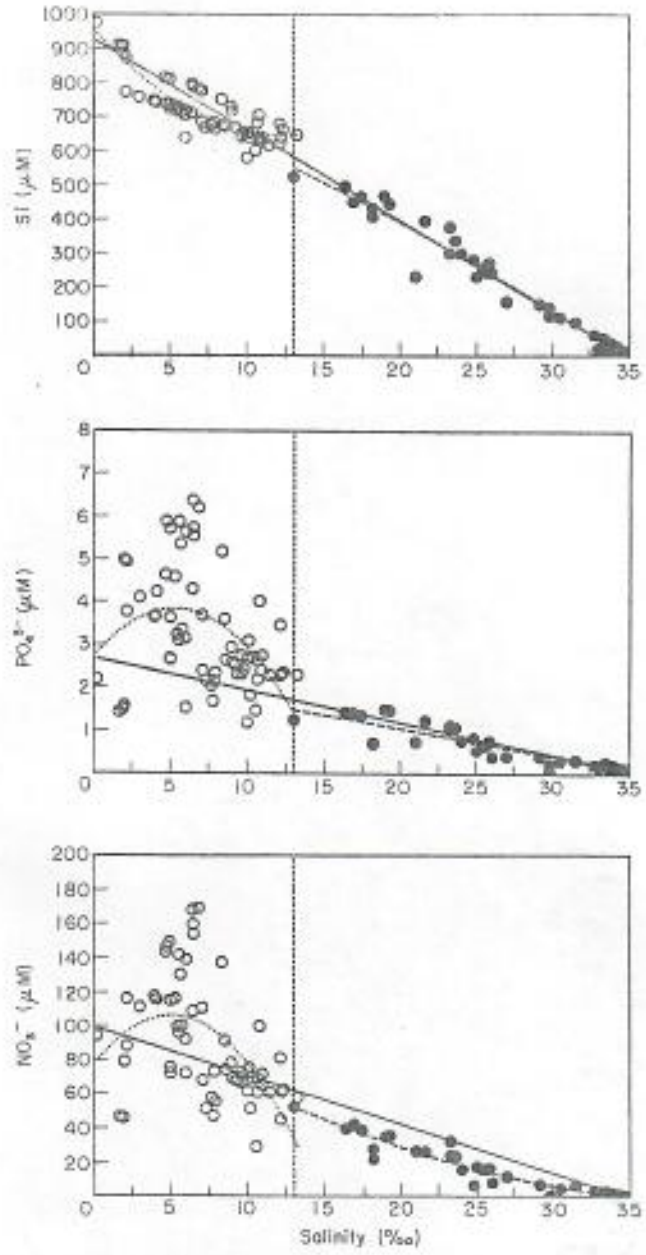

Figure 4. Plots of dissolved nutrients versus salinity at Waikoloa. For explanation of plots, see Figure 2. ●, ocean; ○, ponds.

land doubled the N concentration in groundwater, the marine flux subsidizes GW by about 17%. The marine flux (F_m) of P is nearly equal to F_t, representing an enrichment of GW of 20%. The N:P ratio of F_m (13) is substantially lower than the N:P ratio of F_t (103) suggesting that the land and marine fluxes are from different sources or have been subjected to different pathways of biogeochemical cycling.

N fluxes in the marine environment off Waikoloa indicate biotic uptake equivalent to 81% of groundwater flux (GW) and 65% of the combined flux from GW and the land flux (F_l). The regression line of NO_3^- *vs.* salinity below the conservative mixing line reveals that the N removed from the water column is delivered via groundwater flux and is not from nonconservative subsidies on land (Figure 4). The marine flux (F_m) for Si and P was not significantly different than zero (Table 3).

Discussion

Land fluxes

N and P are added to groundwater prior to discharge into the coastal ocean. Assuming leaching of nutrients from the golf courses is the sole source of the subsidies to groundwater, it is possible to calculate the percentage of fertilizer nutrients that reach the ocean. The application rate of inorganic fertilizers on the 370 hectare Keauhou golf course is $14{\cdot}6 \times 10^3$ moles N day^{-1}, and $2{\cdot}2 \times 10^3$ moles P day^{-1}. In addition, irrigation of the grassed area utilizes about $0{\cdot}25 \times 10^3$ moles N day^{-1} and $0{\cdot}050 \times 10^3$ moles P day^{-1} of treated sewage effluent. Sewage effluent contributes about 2% of the N and P in fertilizer applications.

The nonconservative flux of N from land to the ocean at Keauhou is approximately $1{\cdot}57 \times 10^3$ moles N day^{-1} (800 m of shoreline $\times$ 1·96 mol m^{-1} day^{-1}, Table 2), representing 10% of the golf course loading. The nonconservative flux of P from land to the ocean is 16 moles P day^{-1} (800 m $\times$ 0·02 mol m^{-1} day^{-1}, Table 2), equal to 1% of golf course application. The 116% increase in groundwater N entering the ocean (Table 2) appears to be caused by leaching of only 10% of the applied fertilizer. Likewise, a 22% increase in groundwater P appears to be a result of leaching of 1% of applied fertilizer.

Similar calculations for Waikoloa using fluxes from land calculated as the difference between total and marine fluxes (F_l, Table 2) indicate that about 1% N and 0·1% P applied as fertilizers reach the ocean. If the land flux is calculated using F_l' (Table 2), the percentages of applied fertilizer N and P that reach the ocean are 10% and 1%, respectively, identical to the values as Keauhou.

Differential leaching of N and P through golf course soils is probably caused by different retention characteristics of these elements in soils. Hawaiian soils have higher uptake and sorption capacities for P than N (Goudy 1931; Butler *et al.*, 1954, Fox 1972, Chang & Young, 1977). At Keauhou, the N:P ratio of land flux (103, Table 2) is about 34 times greater than the N:P of the applied fertilizers (3), indicating that soils are preferentially retaining P.

In contrast, the N:P ratio of the land flux at Waikoloa is 28 (F_l, Table 2) indicating that soils retain less P relative to N compared to Keauhou. Apparently the thin layer of sandy soil at Waikoloa does not adsorb P as efficiently as the soil at Keauhou.

Chang and Young (1977) measured total N and P in water from test wells on a golf course on Oahu, Hawaii, following fertilizer application. Nutrient leaching ranged from 2% to 14% of the applied total N, and from 0% to 1·6% for total P. Petrovic (1990) reports that in 67 studies the range of N losses through the turfgrasses was 0–84% of application rates, with a mean loss of 10·5% (SE = 2·02). The values of nutrient leaching at Keauhou and Waikoloa (10%) are similar to the mean from Petrovic's compilation. Thus, it appears reasonable to assume that the dominant subsidy of nutrients to groundwater is from golf courses.

Marine fluxes

At Keauhou, the nearshore marine environment is a source, rather than a sink of Si, N and P (Tables 2 and 3). The Si:N and the Si:P ratios for the marine fluxes are 14 and 184 respectively, while groundwater flux ratios of Si:N and Si:P are 10 and 190 (Table 2). Because these ratios are similar and Si behaves essentially conservatively, it is suggested that the Si subsidy is from input of groundwaters with slightly different compositions. Si concentrations in groundwater vary in relation to the age of groundwater (Visher & Mink, 1964). The positive F_m represents about a 23% increase relative to the well water endmember concentration. By comparison, the mean Si concentration from the Waikoloa well water endmember is about 15% greater than the well water endmember at Keauhou. The source of N in the ocean (F_m in Table 2) is only 15% of the land flux and 17% of groundwater flux (Table 2). D'Elia *et al.* (1981) also report curved mixing plots of NO_3^- as a function of salinity in Discovery Bay, Jamaica. The bends in their fitted curves did not consistently fall above or below the linear conservative mixing line, suggesting that curvature was a result of multiple inputs rather than benthic sinks.

Lapointe and O'Connell (1989) found that N and P enrichment of groundwater in Harrington Sound, Bermuda, resulted in enhanced photosynthetic capacity, decreased doubling time, and decreased C:N, C:P, and N:P ratios of blooms of a benthic alga (*Cladophora prolifera*). The subsidies of N and P into Keauhou Bay appear to be sufficient to cause similar stimulation of biological processes of the coastal benthic and planktonic communities. The following calculation is made to estimate the benthic uptake of N and P. Gross productivity of the reef communities is approximately 500 mmol C m^{-2} day^{-1} (Kinsey, 1985). Assuming that most of the organic material that is produced has a C:N:P ratio of 500:30:1 (Atkinson & Smith, 1983), the amount of N and P turned over through the community is about 30 mmol N m^{-2} day^{-1}, and 1 mmol P m^{-2} day^{-1}. Each meter of coastline bounds about 75 m^2 of benthic area; N and P exchange are therefore 2·3 and 0·07 moles m^{-1} day^{-1} of shoreline, respectively. Groundwater fluxes of N (1·7 m^{-1} day^{-1}) and P (0·09 mol m^{-1} day^{-1}) deliver 74% and 129% of the uptake potential of the benthic community. With a 116% increase in N input and a 22% increase in P input from golf course input, the potential clearly exists for nutrient uptake by the benthos. Figure 5 shows the hypothetical uptake curves for N and P using the above calculation. The lack of such curvature in the data, however, indicates that benthic and water column communities in Keauhou Bay are not taking up the nutrient delivered by groundwater. In addition, inspection of the bay revealed no indications of anomalous benthic algal growth.

The lack of nutrient uptake or abundant benthic algal growth appears anomalous. Vertical profiles of nutrients and salinity taken at two locations in Keauhou Bay (Figure 1) reveal, however, strong stratification in the upper 1 m of the water column (Figure 6). Below the surface layer, nutrient concentrations decrease to typical coastal ocean values. Therefore, nutrient subsidies from groundwater and anthropogenic inputs do not normally come into contact with the bottom of the bay.

Johannes and Hearn (1985) estimate that in terms of N, the macrophyte production in a coastal lagoon off Perth, Western Australia, is approximately equal to NO_3^- delivery by groundwater discharge. Similar to the west Hawaii sites, the potential exists for alteration from nutrient subsidy, but in both locales it appears that rapid mixing of buoyant plumes limits exposure of benthic plant communities to nutrient subsidies.

We also consider the potential magnitude of planktonic uptake of nutrients during the time groundwater is mixing from the bay into the ocean. Chl *a* measured in Keauhou Bay in March of 1990 had a mean value of 0·24 mg m^{-3} ($n = 8$, SD = 0·16). Using an average

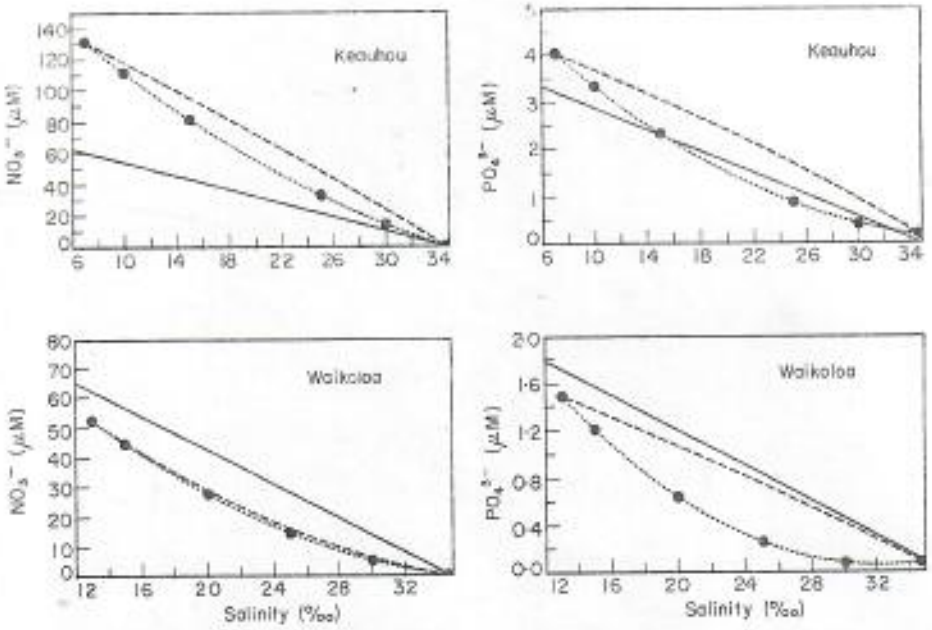

Figure 5. Plots showing second order polynomials (dotted lines) fitted through hypothetical uptake of NO_3^- and PO_4^{3-} at various salinities (based on rates from Kinsey 1985). Dashed curves are regression lines from actual data taken from Figures 3 and 4. Solid lines are conservative mixing lines.

scaling of 50 for estimating total plant carbon from Chl *a* (Strickland & Parsons, 1972), there is about 1 mmole planktonic C m^{-3} in the surface layer of Keauhou Bay. Assuming a Redfield C:N:P ratio of 106:16:1, and a specific growth rate of 2 day^{-1} (Goldman & Carpenter, 1974), a maximum of about 22 mmoles N, and 1·5 mmoles P can be taken up by plankton during a residence period of 12 h. Thus, the maximum uptake by plankton is about 2% of the N and P delivered by groundwater (Table 2). The observed doubling of N flux owing to anthropogenic subsidy on land would result in planktonic uptake of N equivalent to about 1% of input. Changes of 1–2% are within the error of sampling and would not be detectable.

There have been anecdotal reports by local residents of increased turbidity in Keauhou Bay during late summer. As this is the season of lowest rainfall, it is not likely that the turbidity is a result of storm runoff. If the changes in turbidity are a result of increases in plankton biomass, it is clear that the events are not specifically a function of nutrient subsidies from the golf course; natural groundwater contains more than sufficient N and P to result in formidable plankton blooms, given longer residence time of the water. It is likely that any changes in the planktonic community are a result of increased daylight, warmer water temperatures, and longer residence times rather than nutrient subsidies.

The results at Waikoloa are very different from Keauhou. The apparent N and P subsidy of 200–400% to groundwater flux from golf course fertilization does not result in conspicuous subsidies to the nearshore zone. Mixing processes in the open coastal environment appear to be sufficient to dilute the substantial anthropogenic input apparent in the anchialine ponds. Without vertical stratification, nearshore reef benthos are exposed to nutrient subsidies from groundwater efflux. Within the nearshore zone there

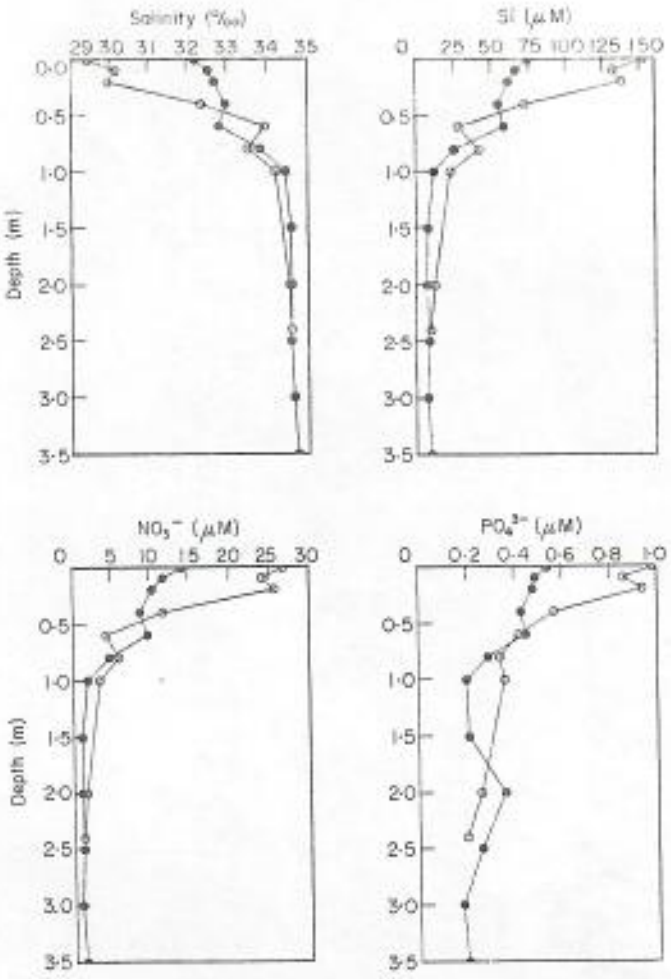

Figure 6. Vertical profiles of salinity and dissolved nutrients in Keauhou Bay. For sampling locations, see Figure 1. Open circles (○) are from site VP1; closed circles (●) are from site VP2.

was an uptake of N equivalent to about 80% of the groundwater flux, but no apparent uptake of P. Measured N uptake almost exactly matches predicted N uptake (Figure 5).

These results show that natural and anthropogenic nutrient fluxes to the marine environment can certainly be differentiated. While it has been documented that anthropogenic nutrient subsidies in groundwater can result in eutrophic conditions in nearshore waters (e.g. Marsh, 1977; Sewell, 1982; Lapointe & O'Connell, 1989), it is evident that impacts to marine communities are not solely responses to nutrient loading. Rather, ecosystem responses to nutrients are dependent on a combination of physical and biological factors. For example, even with the doubling of nitrogen input to the confined body of water at Keauhou Bay, there are no apparent negative consequences to date. Incremental increases in nutrient subsidies in the future may not alter this scenario as long as the nutrient-enriched surface layer mixes out of the system with limited contact with the benthos. On the other hand, if changes in physical mixing processes occur which break

down the vertical stratification or increase residence time, alteration of community structure and function may ensue. To accurately understand the effects of man's activities on land to the coastal ocean, it is vital to continue to quantify the effects of these interacting physical and biological processes in the nearshore environment.

Acknowledgements

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