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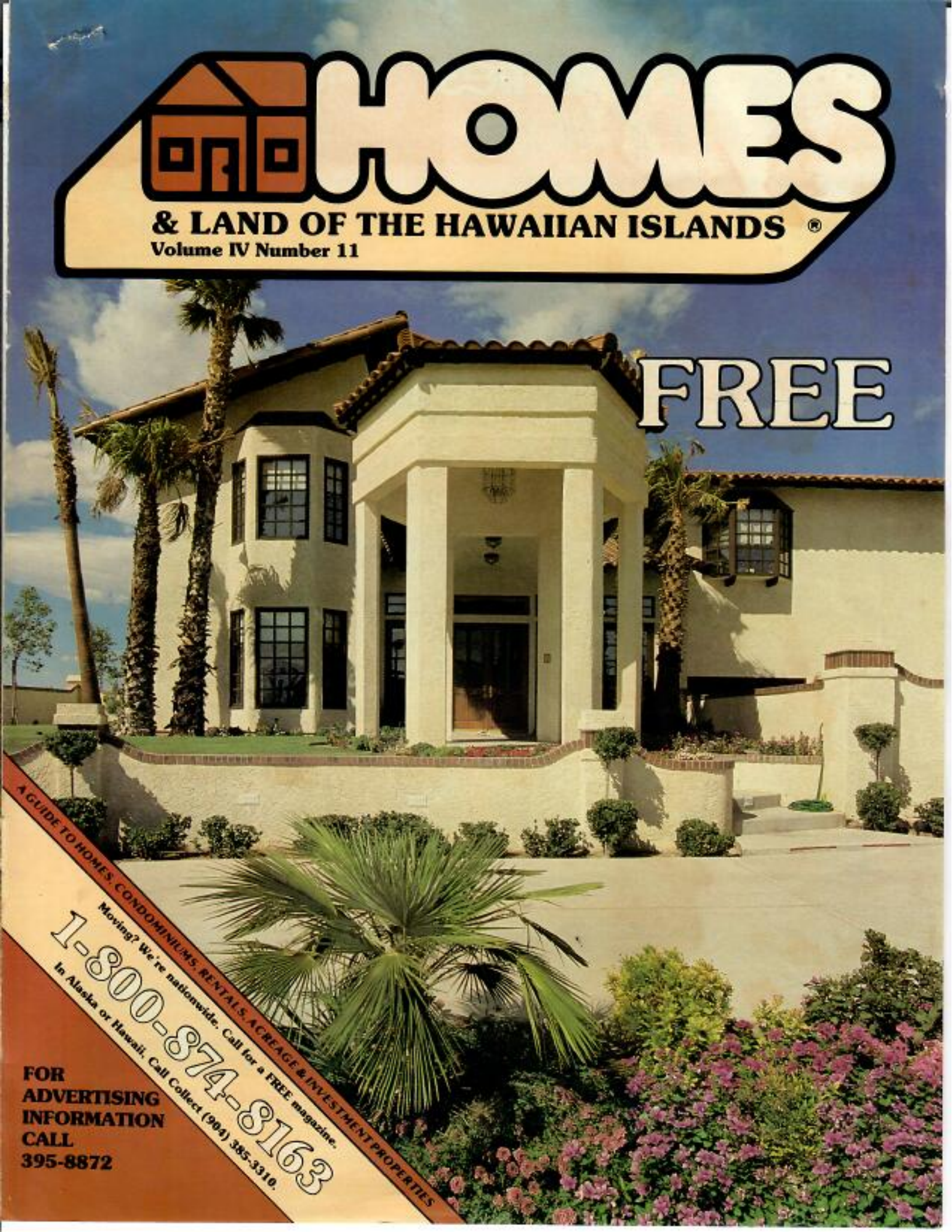

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Aspects of concern over sewage spills are told

A capacity crowd of over 100 people filled the Kokua Hilo Bay meeting last Wednesday night, including representatives of paddling clubs, divers, boaters and shoreline residents.

Steven Holmes, vice - president of the Big Island Ocean Recreation and Tourism Association, told the crowd of the recent discovery by divers of a gaping four foot hole in the sewage out fall pipe only 100 yards from shore in Puhi Bay. The pipe is pouring treated sewage into near shore waters.

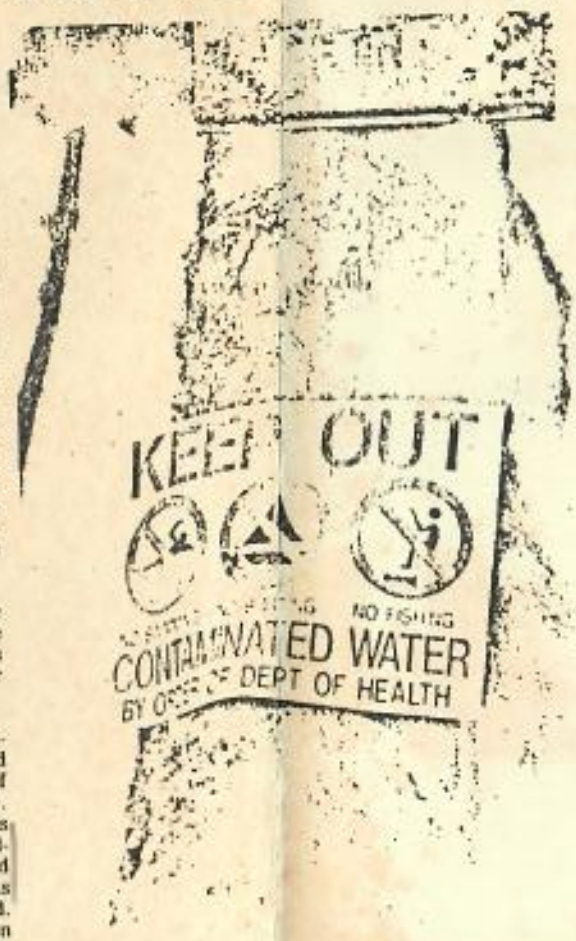
Later, Public Works Deputy Assistant Bruce McClure assured the gathering that the area would be posted with warnings immediately.

Public health concerns about sewage are arising with greater frequency as our population grows, Holmes explained. Cesspools, not hooked into the sewage treatment plant, are leaking into the ground water, and fecal coliform is being measured in our drinking water supplies. Holmes emphasized the need for household hookups to sewage interceptor lines to reduce ground water contamination. He pointed out the Maile Apartments, the Cafe 100, the Hilo Shopping Center and Excelsior Dairy are all on cesspool systems that rapidly infiltrate the Wailoa Pond.

Holmes spoke about the Kokua Hilo Bay Committee's efforts to upgrade the county's sewage treatment facilities that have been in violation of EPA requirements for several years. Holmes noted that the County's challenge has been to secure funding for a new facility, away from the tsunami inundation zone. The Clean Water Act provides supplemental funding for innovative projects, and the committee found engineers who could design a methane fired plant similar to those used successfully in 37 states. The plan proposed by Barrett Harris and Assoc. would move the secondary treatment facility to an area near the present landfill and would utilize sludge in methane digester to run fuel cells. These would produce the electricity required to run the plant, thus saving money and eliminating the need for a sewage outfall into the ocean. The pathogen free, nutrient rich waste water could be used on golf courses and diversified agriculture projects in Panaewa.

Mayor Carpenter and Public Works Director Hugh Ono have endorsed the plan and funding is pending Exxon and Clean Water Act approval.

Dr. Kelvin De Ginder, a primary care physician and wind surfer, described problems of recreational use of Hilo Bay. Nicks, scrapes and other injuries contaminated by strep and coliform bacteria exhibit a rapid spread of infection in his patients if not properly cared for, he said. The organisms causing infection have been cultured in human fecal mater and are frequently resistant to antibiotics. He said cases of swimmer's ear, a complex of infectious organisms, show up in his office in cycles, with as many as eight - ten a week during some months.



BAY CLOSED — Puhi Bay has been closed, following the announcement last week that divers had discovered a gaping four - foot hole in the sewage outfall pipe only 100 yards from shore.

Fish caught in the bay can transmit infectious hepatitis if they have consumed raw sewage during periods of inadvertant dumping. De Ginder explained. He also expressed concern about chemical contamination of the recreational waters by agricultural pesticides and industrial wastes. He called for monitoring by the Department of Health to establish baseline levels of chemical contaminants.

Walt Dudley, UHH oceanographer, described the complex circulation patterns of fresh and salt water within the bay and estuaries. He noted that oxygen rich waters at the surface may overlie oxygen depleted anaerobic water only a foot or two below. Under anerobic conditions, breakdown of organic matter does not take place, and the bottom sediments have a characteristic rotten eggs odor. Sampling by Dudley's undergraduate oceanography students has revealed that the oxygen levels are lowest within the boundaries of the breakwater, near the piers and along the coastline.

He cited as inadequate studies by the Army Corps of Engineers that only sampled a few sites once or twice during the year. He urged improved monitoring of the Bay to better understand the complex circulation patterns. He will be undertaking some monitoring and computer modeling of circulation with his marine options students during the coming year.

Ernie Kha, Professor of Chemistry at UHH-Hilo who has measured high levels of arsenic in the sediments and water of the Wailoa Estuary, said the findings pose no immediate health hazard because humans rarely ingest these waters in quantity. Fish and shellfish caught in the Wailoa pond have been found with high levels in their entrails, but little in the edible flesh.

Arsenic levels may affect biological life in the Bay, he cautioned, as arsenic does not break down with time. He is particularly concerned about disturbance of the sediments, which could cause a release of large quantities of arsenic now trapped 1 2 feet below the surface. He said Hilo Bay is an ideal area for scientific study of the effects of arsenic on organisms, and reiterated the need for increased monitoring and analysis.

Steve Skipper, lifeguard and kayak enthusiast, shared with the audience Kokua Hilo Bay's planned activities during recently completed Coast week.

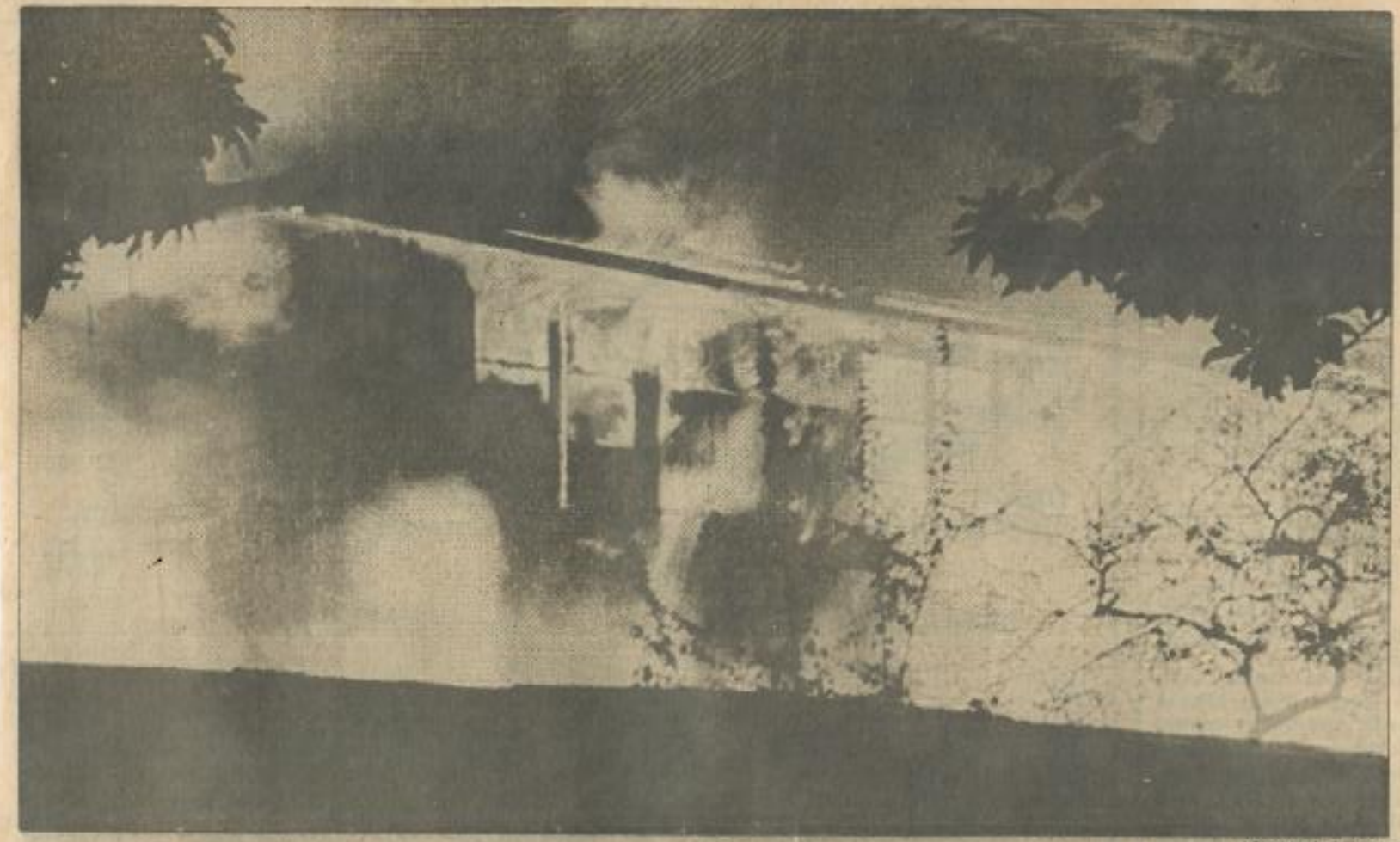
The audience offered many avenues of action to improve conditions of the Bay. These included petitions to the Army Corps of Engineers for studies of breakwater modification, communication with members of the County Council about funding the new sewage treatment facility and interceptor lines, and more workshops to make the public more aware of the Bay's potential for recreation, once clean.

EXHIBIT G

XII-361

Dec. 2, 1986 Honolulu, Hawaii A GANNETT NEWSPAPE

Lava Heads for Queen's Bath



Associated Press

Fire caused by encroaching lava destroys the home of Louis Pau near Kalapana on the Big Island last night. No one was injured.

Flow 75 Yards from Famed Pool

By Tim Ryan
Star-Bulletin Writer

KALAPANA, Hawaii — Lava from the Big Island's Kilauea Volcano was threatening the historic Queen's Bath today after destroying a 10th home that stood in its path to the sea.

A spur of magma moving west from the main flow this morning had crept to within 75 yards of the natural freshwater pool once exclusive to Hawaiian royalty.

Erupting at the rate of 600,000 cubic yards per day, the eight-mile-long flow this morning covered one-half mile of Highway 130 and had created 13 acres of new shoreline here.

Louis Pau
"You can't stop it or hate it"

Today, the hillside above the rural coastal village resembled charred ski slopes where meandering lava flows have burned wide swaths through the forest.

A finger of lava that broke away on Sunday from the east side of the main flow, last night incinerated the home of Louis and Becky Pau on the seaward side of the severed highway.

THE PAUS' two-story home along Highway 130 near the east perimeter of Hawaii Volcanoes National Park began burning about 8:30 p.m. after the lava oozed across the two-lane highway.

A smaller home owned by Kaipo Roberts is east of the Pau property and is in the path of the flow but isn't in imminent danger, officials said today at the Hawaii Volcanoes Observatory.

"It's unbelievable," Louis Pau, 60, said, after his house burned. "I've seen the '46 tidal wave, Kaupo town destroyed, the '60 tidal wave when I got wiped out and I've seen homes destroyed at Royal Gardens by lava.

"Mother Nature takes its course. It's nothing personal. You can't stop it or hate it. The lava gives us more land than she takes."

THE FLOW LAST night put on its most spectacular display since entering the ocean Friday. Gusty winds spread 8- to 10-foot flames into the surrounding brush most of the night.

There have been several sporadic rivers of lava that have broken from the main eight-mile-long flow since yesterday, officials said. But none were as threatening as the eastern branch that broke out

Turn to Page A-6, Col. 3

Volcano Spares Royal Gardens but Tries Patience of Residents

By Tim Ryan
Star-Bulletin Writer

ROYAL GARDENS, Hawaii — Life under the volcano is a matter of compromise.

"You take the good with the bad," said Celia Culp, who has lived in a two-story, 10-foot-by-10-foot house with her 10-year-old twins since 1984. "Now we're experiencing some of the bad."

Lava from Kilauea Volcano damaged several homes in the sprawling, sparsely populated subdivision in 1983-84 and now has closed the highway that was their direct link to the outside world.

The 50 families of Royal Gardens have suffered through hurricanes, droughts, fires and lack of public utilities. And now the main road that they used to get supplies, receive medical treatment, reach a public phone and send their children to school has been destroyed indefinitely.

Kalapana, once 10 minutes away, is now a 160-mile round trip.

SLOWLY, THEY say, Madame Pele is reclaiming her mountain.

"It's inevitable, isn't it?" said Scott Smith, a two-year resident here. "Sooner or later, all our houses will be taken by her."

Residences in many instances are ramshackle and unfinished. Residents are

Turn to Page A-6, Col. 4

12/2/86 HSB

Lava Heading for Queen's Bath

Flow Nears Freshwater Royal Pool

Continued from Page One

Sunday and finally claimed the Paus' 31-year-old home.

Firefighters remained on the scene at the home all day yesterday, preparing to douse any brushfires created by the 2,000-degree lava.

By noon, Pahoa Fire Capt. Harry Onouye said there was little chance the home would escape the molten rock.

Last week, firefighters were able to stop the massive flow from destrpying the house by dousing the advancing lava with more than 30,000 gallons of water.

JACK LOCKWOOD of the U.S. Geological Survey called that incident "a historically important occasion" because it was the first time lava had ever been diverted by such efforts.

Tomas Quihano, 92, father of Becky Pau, built the home in 1955. He also lost his home to the lava last week.

Becky Pau had resigned herself to not returning home, even if it had been saved.

"We were used to people, family and friends around us," she said. "Now most of their homes were taken by the lava. There was no reason to go back."

By Dennis Oda, Star-Bulletin

George and Molly Falkner, who live in Royal Gardens beneath Kilauea Volcano, say they'll stay on unless lava forces them out.

The lava flow this morning had moved closer to Queen's Bath and was about 75 yards away, officials said.

That flow extended into the sea about 400 feet and is also 400 feet wide. A 40-foot black sand beach has been created west of the flow and is growing daily.

THOUSANDS OF people continue to flock to a viewing site of the eruption in Volcanoes National Park.

The flow shows no sign of decreasing and continues to produce about 500,000 cubic yards of lava a day.

As the main flow slows, or its channels clog, new branches break out, scientists said.

Numerous small methane gas explosions occurred throughout yesterday as the new lava finger ignited vegetation and cesspools.

The Paus today remained undecided where they will move. Becky's father, who is staying with his son, has suggested they relocate out of the Kalapana area.

"I don't know if I want to leave Kalapana," she said. "I still love this place."

The couple now is staying at a friend's home in Kalapana Gardens. They are relieved that finally the ordeal of waiting for their house to burn is over.

"Now we can go on with our lives and try to have peace of mind," she said. "It always seemed we were caught between the highway and the eruption. But Kalapana is where my heart is. It will always be my home no matter where I am."

Continued from Page One

loners, living here because they can afford to own their own land — even if it is a lava flow area.

Many ocean-view lots sell for as little as $3,500.

Royal Gardens residents and their children must travel about 160 miles round trip — a long trek on winding mountain roads — for supplies and mail, or to school in Pahoa.

"It's like my kids are working an 11-hour day," said Culp, 39, who is unemployed. "I wouldn't work that long, would you?"

She wants school officials to allow the Royal Gardens children to study at home while the road is closed.

THE FIRST long bus ride was yesterday. Only four Royal Gardens children out of a dozen students made the trip. Most parents have moved to homes of relatives or friends closer to the school.

Culp's twins, Monique and Angelique, called their first trip "pretty boring."

"I watched the trees most of the way," Angelique said.

"I fell asleep," Monique added. The bus leaves Royal Gardens at 6 a.m. and returns about 5 p.m.

George and Molly Falkner, both 61, had to borrow a car yesterday to make the 160-mile round trip to Kalapana to pick up mail. The couple also complained about the constant stream of smoke from the lava flow into their home since July.

Both already suffer from lung problems.

"But the view and weather can't be beat," he said. "Where else could a disabled vet on a fixed income afford an ocean-view home?"

LIKE OTHER Royal Gardens residents, the Falkners have experienced their share of natural disasters. In 1982,

Volcano Spares Royal Gardens but Tries Patience of Residents

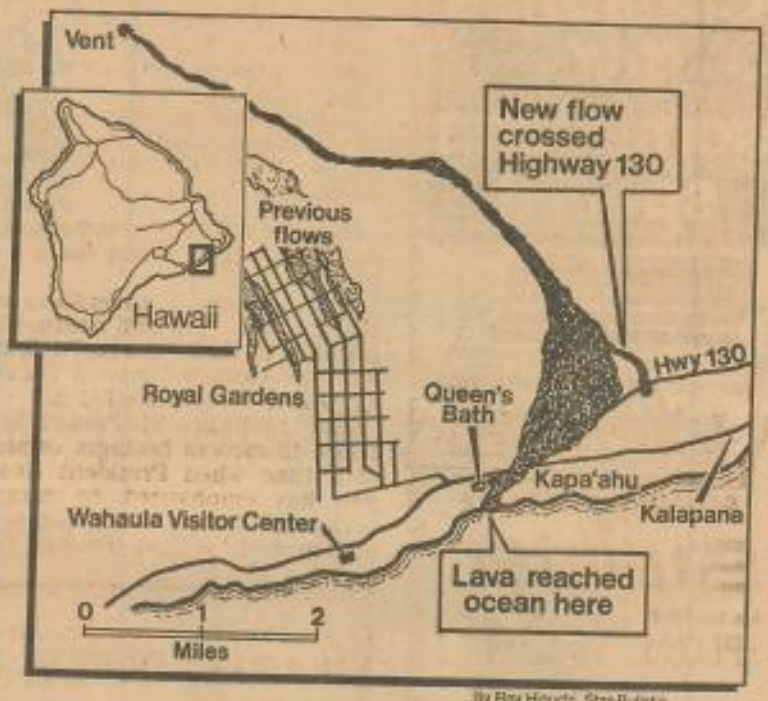
Hurricane Iwa struck two days after they arrived at their new home.

"We'll stay here until Pele knocks at our door," he said.

Carpenter John Weston, 31, has lived in Royal Gardens for six years. "The beaches at Kalapana are beautiful and I have all the privacy in the world I want up here."

The road has cut him off from the surf at Kalapana but, fortunately, at this time of the year he surfs the waves on the other side of the Island at Kona.

"There are a lot of compromises living here," he said. "The volcano is a constant reminder how transient life at Royal Gardens is."



By Ray Higuchi, Star-Bulletin

Red Cross Seeks Lava Victims' Aid

The Hawaii State Chapter of the American Red Cross is appealing to Hawaii residents for donations to help the victims of the lave flows on the Big Island.

Families from 14 homes destroyed or surrounded by lava are being housed with friends or in hotels at Red Cross expense. Red Cross spokeswoman Nancy Spivey said the cost of caring for the Kilauea Volcano victims will be high because of the flow's continuing nature.

Checks should be marked "Lava Flow Disaster" and sent to the Hilo office of the American Red Cross at P.O. Box 945, Hilo, Hawaii, 96816. Call 935-8395 in Hilo or 734-2101 in Honolulu for more information.

The Red Cross also is looking for volunteers on the Big Island to help serve coffee and refreshments to victims and helpers. To volunteer, call the Hilo office.

12/3/86 HSB

56 New Acres Created by Volcano

A CLOSE LOOK—A boat carrying divers armed with underwater cameras lies at anchor within a few yards of the lava flow at Kalapana yesterday.

By Dennis Oda, Star-Bulletin

Lava Flowing into Ocean, Homes Not Threatened

By Tim Ryan
Star-Bulletin Writer

Most of Kilauea Volcano's lava is flowing into the ocean, leaving previously threatened Queen's Bath and eight Kalapana area homes out of danger for now, scientists said today.

The volcano's lava output has increased to about 780,000 cubic yards a day, about 80 percent of which steadily is dripping into the sea eight miles away. Just two days ago the volcano was producing about 500,000 cubic yards of molten rock a day, scientists said.

If the lava stops flowing into the ocean, it may pool and spread laterally along the shoreline, again endangering the homes and the historic freshwater pool called Queen's Bath, scientists said.

A SURVEY by geologists yesterday showed that about 56 acres of shoreline had been created where the molten rock enters the ocean, said Carl Johnson, seismologist at the Hawaiian Volcano Observatory.

The new coast — consisting of up to 10 feet of new rock — this morning was about 2,300 feet wide and extends about 900 feet into the ocean, said Dan Johnson, scientist at the Observatory. A 40-foot wide, black-sand beach created last weekend by the flow yesterday was covered by lava, officials said.

The black sand is created when the molten rocks explode after entering the ocean, said Jon Erickson, a supervisor of park rangers at Hawaii Volcanoes National Park.

"DON'T WORRY," he said, "this flow will make another one (black sand beach)."

Massive clouds of steam rise above the new piece of coastline and molten rocks remain glowing underwater as they cool.

Most of the lava movement is oozing out from tubes under the flow making it difficult for scientists to predict where the fiery fingers will head next.

"This is a major eruption that will do what it darn well pleases," Erickson said.

The lava is more than 2,000 degrees where it reaches the surface at Kilauea's east vent and is nearly that hot when it reaches the ocean because so much of the melted rock is insulated by lava tubes it's traveling through, Johnson said.

Aerial views of the flow where it meets the sea show red-hot lava emerging from the underwater tubes.

Underwater photographers within 20-feet of the flow are taking still and video footage of the oozing lava. The temperature of the water remains unchanged because the ocean has such a tremendous cooling affect, scientists said.

The crater formed by the oozing lava measures about 600 feet by 900 feet, scientists said today. The red-hot is "at least" 35 feet deep, Dan Johnson said.

In the past week the meandering flow — up to a half-mile wide in several places — has destroyed 10 homes and two other structures.

THE MOST ACTIVE part of the lava flow this morning slowly was moving west on both the mauka and makai sides of Highway 130 which has been covered since last week for more than a half-mile by the molten rock.

The historic Queen's Bath, a natural freshwater pool, appears safe for the time being as a finger of lava less than 100 feet from the site has stagnated, hardened, Carl Johnson said.

However, he quickly warned, new fingers can begin at any time without notice.

Several scientists believe Queen's Bath eventually will be destroyed by the flow.

Scientists cannot predict when the flow will end and have said it could happen "in a day or a year."

Once the flow has stopped it probably will be several weeks before the lava will cool, Dan Johnson said.

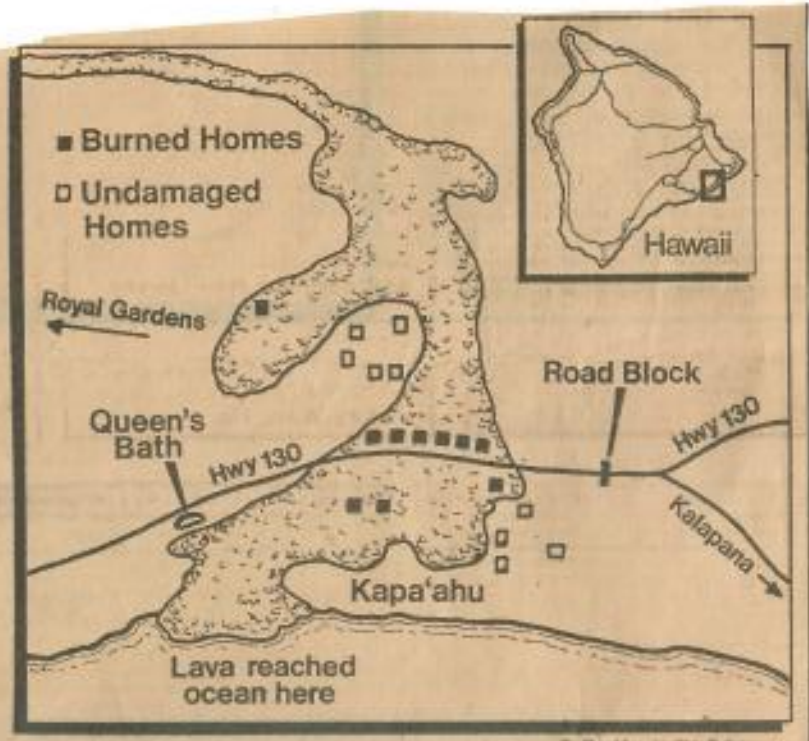
Kaipo and Maizie Roberts yesterday watched the 8-mile-long flow approach their home of 42 years.

THE LAVA LAST night filled a gully near their house, destroying much of the orchids, bananas and papayas they grow in their back yard.

"I think that I have really loved the land and tried to bring up my children to know that this is their home, so I feel very close to it," said Mrs. Roberts, as she watched the molten mass approach her two-story home.

"I'm only glad my mother-in-law — she's 89 — cannot see this," Mrs. Roberts said. "She would not be able to understand why Pele would do this to the family."

In Hawaiian lore, Pele is the mercurial volcano goddess.



By Ray Higuchi, Star-Bulletin

Harry Kim, Hawaii County's civil defense administrator, yesterday said the lava also threatened two other homes in the area makai of Highway 130. Officials continue to carefully watch a smaller flow mauka of the highway that could head toward Kalapana town, a small residential area of about 30 homes.

About 60 families — most of Hawaiian descent — have been evacuated from the area. The American Red Cross is caring for 12 families who have been sheltered at two Hilo hotels.

Nov. 28, 1986 Honolulu, Hawaii A GANNETT NEWSPAPER

Big Island Lava Flow Reaches Sea

By Dennis Oda, Star-Bulletin

Steam rises from the sea near Kalapana on the Big Island today as a seven-mile flow of lava from Kilauea Volcano reaches the coast after destroying nine homes.

Pele Puts on a Show at King's Beach

By Tim Ryan
Star-Bulletin Writer

KAPAAHU, Hawaii — Molten rock on the edge of a seven-mile-long lava flow oozed into the ocean here this morning causing gray-white steam to shoot hundreds of feet into the air.

Crowds gathered near the water's edge to watch the spectacular display, the first time lava has reached the ocean in 12 years.

The 2,000-degree flow has crept across ancient Hawaiian sites with names like King's Beach and Queen's Bath.

The air was filled with smoke and steam and the there were occasional explosions as plants were covered with lava, turned to methane gas and ignited.

Ocean waves crashed upon the front of the lava flow, exploding into steam.

THE LAVA reached the water at King's Beach at 7 a.m., the result of the lava's relentless march to the ocean since Kilauea began its current eruptive phase July 18.

In its wake, the lava has left nine homes destroyed and several others threatened. By noon, the popular Queen's Bath area nearby still had not been damaged by the flow which officials estimated was moving at about 10 feet per hour.

The lava has three distinct branches but the center flow is the widest and the one that struck the ocean.

Officials said the lava where it has hit the ocean should have no effect on marine life.

How Much Lava Has Flowed from Kilauea? A-3

About 500,000 cubic yards of lava is flowing out of the vent, which is located at the 2,100-foot level of Kilauea.

THE PARK service is allowing sightseers to view the spectacular event at a spot a few hundred yards from ocean's edge. It has erected a sign at the highway that says, "This way to eruption."

It is a half-mile walk from the road to the observation point.

Pavel Srnensky and his wife Lenka and their three children, from Czechoslovakia, made a one-day trip to the Big Island from Waikiki to see the fiery display.

"You sure can tell there is something cooking over there," said Lenka Srnensky.

A thick layer of smoke hung over the meandering lava route this morning. However, officials said that there were fewer fires than in previous days because the lava has completely incinerated everything in its path.

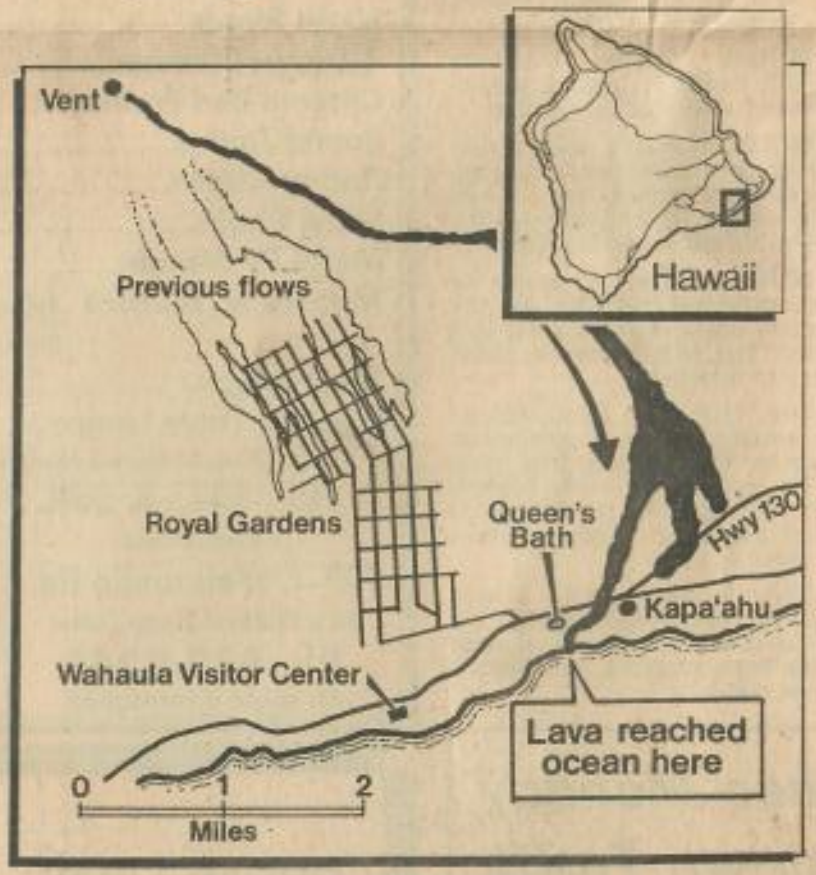
Several helicopters transporting news media and scientists circled the flow where it entered the ocean.

GORDON BEATTIE and his wife, Elise, of Volcano, recently moved to the Big Island from Kauai and were watching the eruption.

"It's spectacular to have this kind of thing in your backyard. It's nature at its wildest," he said.

James Jackson, of Waikaloa,

Turn to Page A-6, Col. 5



A Kapaahu Resident Mourns Her Home

By Peter Young
Special to the Star-Bulletin

KAPAAHU, Hawaii — Kuulea Pavao is glad it was only her home she lost to the lava rolling from Kilauea Volcano through this coastal village to the sea.

"There was nothing we could do. It was an act of God," she said yesterday at an emergency shelter set up by the county.

"Everyone was there to help us. The county, the police department. I want to thank them," said Pavao, whose residence was destroyed Wednesday.

For the family of Emma Kauhi, the fiery rock incinerated a house standing on the spot where five generations have lived.

Gilbert Kauhi, best known as the character "Zulu" from the Hawaii 5-0 television series, said his mother learned of the destruction from a television report at the hospital where she is being treated for a back problem.

"How do you tell a 70-year-old woman she has to start all over? Older people don't know. They need familiar surroundings," he said.

KAUHI SAID his feelings of loss involve more than the personal belongings and memorabilia he lost to the lava.

"It's a real hopeless kind of feeling. Every day you spend there you did something dif-

Turn to Page A-6, Col. 5

Kuulea Pavao
"It was an act of God"

Battle Won, Resident Is Ready to Go Home

Special to the Star-Bulletin

KAPAAHU, Hawaii — After fighting Madame Pele to a standoff, Louis Pau is ready to go home.

County firefighters armed with fire hoses succeeded in stopping a lava flow from destroying Pau's house before water pressure was cut off.

Today, the lava surrounded his two-story, wooden home on three sides, as near as five feet away. Still hot enough to melt the soles of tennis shoes, the molten rock was expected to take two weeks to cool off.

Firefighters on Tuesday held back the flow that was threatening Pau's two-story home by dousing several thousand gallons of water on the advancing lava to harden it.

A RETIRED park service worker, Pau visited his home several times yesterday and today to check things out.

Pau's grandfather, Tomas Quihano, 92, wasn't as fortunate. His home burned Wednesday morning.

Photo on Page A-3

Louis Pau, 63, has become accustomed to natural catastrophes and surviving them. In the 1960s his four sons had to drag him from his home to avoid destruction by a tidal wave. The house survived.

Today, he was looking forward to returning home again.

"With God's help, I hope to return.

Big Island Lava Reaches the Sea at King's Beach

Continued from Page One

agreed.

He and his wife slept in their car next to the flow sight so they could see the flow enter the ocean this morning.

"The steam explosions have been fantastic," he said. "And tonight with the orange glow, its going to be even better."

By noon, about 100 people were watching the display.

No houses were destroyed overnight. The only injury so far has been to the hand of a firefighter.

YESTERDAY the lava destroyed its ninth house in the Paradise Park subdivision, 200 yards from the ocean.

Homeless families and other evacuees are staying with friends or relatives.

There are about five more homes in the subdivision but they are not in danger, officials said.

The thick, mud-like lava has spread across more than 1,300 feet of Kalapana Highway, beginning about a half-mile from the park's eastern perimeter. It is not within the park boundaries.

Last night the lava on the two-lane highway had "stagnated" and crusted over and appeared to have completely stopped, said Volcano National Park spokesman Bobby Camara. Large sections of the asphalt highway burned from the intense heat, estimated by officials to be more than 2,000 degrees Fahrenheit.

The lava flow has provided some spectacular natural sights.

The lava's orange glow last night reflected off of low clouds and the eerie phenomenon could be seen for miles.

THE RIVER of fire meandered through miles of brush land as it headed to the sea. Strangely, many large trees surrounded by the molten rock did not burn for hours until the heat had made them tinder-dry and they suddenly exploded.

In the past, state and park officials have been more lenient in allowing people to get close to the lava flows.

But this type of crusty lava is deceptive, because it is not as solid in some places as it appears. It also can cause explosions, when heated plant material turns into methane gas, Camara said.

Wednesday night, methane gas from a cesspool near a house that was destroyed blew up, startling several nearby observers, Camara said.

The National Park Service and state and county Civil Defense have established a command center at the Wahaula Visitor Center, about a half-mile from the eastern perimeter.

HOMEOWNERS with fire insurance should be covered for their losses, Camara said, as long as the house caught fire before the lava hit. If the house is destroyed by the lava itself, the destruction is considered an "act of god" and may not be covered, he said.

The state may have to wait a month after the lava stops flowing before it can rebuild the highway because of the intense heat retained in the rock. That's how long it took the lava from a September 1982 eruption to cool where it covered the road.

The fire crews on Wednesday dug a 12-foot-wide, 3,700-foot-long firebreak from the highway upslope to prevent additional brush fires from overtaking sections of Royal Gardens subdivision and the national park. Royal Gardens has been struck by lava several times in the past 10 years but is not threatened by the current eruption.

'Nothing We Could Do,' Says a Kapaahu Resident

Continued from Page One

ferent. It's hard.

"It's like they say, before you die your life flashes before you. For the young guys, it's OK. For the old folks, it's hard," he said.

But Kauhi was philosophical about the family's loss.

"Hawaiians look at the volcano differently. They're not threatened by it. They look at the land and it's not a threatening thing. It's mother earth. It gives birth. You see, the land is like a baby," he said.

Kauhi said, "A long time ago a guy had 30 acres. He was very upset when the lava came. He just went completely out of it.

"Then he found out he had 300 acres. He went to the county and filed for the new land. Good came out of it."

KOHALA DIVERS LTD.

Kawaihae Shopping Center
P.O. Box 4935
Kawaihae, Hawaii 96743
Phone: (808) 882-7774

Dear George, 10/21/86

Today we released turtle with tags # 4970; 4971
The shell length was C- 17 3/8". Turtle appeared to be in good health - no distinguishing marks or scars except for the 2 tags. It was very happy to get back in the ocean. Alan Brown (engineering) and Danny Akaka jr. are great to have then - it looks like at best for now MLBH will be glad to support any turtle support effort.

Aloha,
Pete Hendricks

P.S. Daryl Zgliczynski was showed or called after we left messages at his phone #. Got some great release pictures however.

Professional Full-Service
Diving Center

PADI

year = 1985

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
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FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
[redacted]

DIVISION OF AQUATIC RESOURCES
P.O. Box 936
Hilo, Hawaii 96721-0936

Mr. George Balaz
Southwest Fisheries Center
Honolulu Laboratory
National Marine Fisheries Service
P.O. Box 3830
Honolulu, Hawaii 91812

Dear Mr. Balaz;

At the request of your office I assisted Mr. James Weller, Hilo DOCARE Enforcement officer, in retreiving and releasing a green sea turtle from the Liliuokalani Park (County of Hawaii) pond on November 15. The turtle had numerous tumor-like growths around the head and mouth regions. There was a growth originating from the left orbit covering the eyeball. A similar growth around the periphery of the right orbit partially covered the eye but the eyeball looked intact.

The turtle seemed lethargic when captured but actively swam offshore when we released it in Hilo Bay, in the vicinity of Coconut Island. The turtle was 19 " carapace length (following the curvature of the shell) and was tagged on both front flippers, # 8695 and 8696.

The Park caretaker informed us that there are 3 similar-sized turtles in the pond. They disposed a dead one last week that had numerous growths around the head, the one we released, and a third, seemingly healthy (no growths and very active) specimen. We could not locate the third animal.

A photograph of the turtle we released is on file, attached to Mr. Weller's report to the Hilo DOCARE office.

Sincerely,

ROBERT T. NISHIMOTO
Aquatic Biologist

cc: DAR-Honolulu
DOCARE-Hilo

Year =

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
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WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
~~DIVISION OF FISH AND GAME~~

DIVISION OF AQUATIC RESOURCES
P.O. Box 936
Hilo, Hawaii 96721-0936

Mr. George Balaz
Southwest Fisheries Center
Honolulu Laboratory
National Marine Fisheries Center
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Mr. Balaz;

On November 27, I received an anonymous telephone call about a dead sea turtle on the beach in the vicinity of the Wailuku River and the old lighthouse. The left eyeball was missing and the right eye was protruding from the socket and the cornea was translucent. Except for the missing and injured eyes, there was no external injuries on the turtle. The plastron was distended and the turtle smell -ed putrid. I discarded it at the local sanitary dump.

The green turtle had a carapace length of 18" (measured along the curvature of the shell). See attached photograph.

Sincerely,

ROBERT T. NISHIMOTO
Aquatic Biologist

cc: DAR-Honolulu
DOCARE-Hilo

Green sea turtle on beach fronting Waianuenue Avenue. An 18" long ruler is above the shell.

April 10, 1987 F/SWC2

Mr. Robert L. Hind. Jr.
P. O. Box 1149
Kailua-Kona, HI 96745-1149

Dear Bobby,

Many thanks for your recent note describing the property advertisement I came across. I was relieved to hear that the land is outside the inner bay.

The sea turtles of Kiholo Bay have simply not received the amount of research and monitoring attention that they warrant by our agency. Money and personnel are at the root of this problem. At a minimum, we ought to be visiting Kiholo once a year to live-capture, tag, and census the turtles. Twice a year would offer a more reasonable assessment baseline. Recently, I was able to meet with an instructor at Hawaii Preparatory Academy (HPA) whom I formerly knew as a student at UH-Manoa. Interestingly enough, he is eager to develop an ongoing field project, working with an established scientist, for some of his brighter students at the junior and senior levels. He was aware of my previous work at Punaluu in Kau with students from UH-Hilo. We discussed the possibility of a similar project at a location closer to HPA. I didn't specifically mention Kiholo, but it is foremost in my mind as an ideal site. Would you be receptive to having a group of 10-15 well-supervised HPA students help me tag turtles at Kiholo once or twice a year? Each visit would be 3-4 days (2-3 nights) in duration. The times could be quite flexible, I'm sure. If this sounds like something you might be able to approve, and would like to explore it further, please let me know and I'll talk more with the HPA staff.

The enclosed report covers some of the work we have done at other turtle "hot-spots." On page 3 I mention the importance of Kiholo and the need for more research there.

Best regards and Aloha.

Sincerely,

George H. Balazs
Zoologist

Enclosure

GHB:ey
cc: Balazs
HL

ROBERT L. HIND, JR.

MAR. 20, 87

DEAR GEORGE

THANK YOU FOR THE KAHOLO ACT. I AM AWARE OF WHAT IS GOING ON. THIS PIECE IS NOT IN THE INNER BAY AND A BIT SOUTH OF IT. BERNHARDT (SP?) HEITMANN (SP?) HAS IT FOR SALE - WE HAVE NO CONTROL THERE HAVE BEEN MANY SIGHTED TURTLES IN THE INNER BAY AND WE ARE AS PROTECTIVE AS POSSIBLE HOW COME NO FINS ON THE TURTLE I SAW ON TV LAST NITE - SHARKS?

ALOHA - BOBBY

PH. - 329-8981

96745-1149

POST OFFICE BOX 1149 • KAILUA KONA, HAWAII ~~96740~~

FOOD FAIR

HAWAII TRIBUNE HERALD

March 17(?), 1986

(LIMITED SUPPLY)

CHILLED LOUISIANA
ALLIGATOR MEAT
LB.

6.95

FRIED ALLIGATOR

1 POUND ALLIGATOR MEAT
1 CUP SHERRY
1 T. LEMON PEPPER
1 TSP. SEASON-ALL
1/4 CUP LEMON JUICE
1/4 CUP ITALIAN SALAD DRESSING
FLOUR TO DREDGE
COOKING OIL FOR FRYING

MARINATE ALLIGATOR MEAT IN THE FIRST FIVE INGREDIENTS FOR 2 HOURS. DRAIN AND DREDGE WITH FLOUR. FRY PIECES FOR ABOUT 15 MINUTES TURNING OFTEN UNTIL BROWN. DRAIN AND SERVE HOT.

FROZEN
STEAMER CLAMS
LB.

89¢

WEATHER PERMITTING

FRESH
OYSTER W/SHELL 6/2.79
FRESH PACIFIC RED
SNAPPER FILLET ... LB. 3.29

(LIMITED SUPPLY)

FRESH LOUISIANA
CHANNEL CATFISH
1 1/2-2# SIZES
(LIMITED SUPPLY)

2.99

BAYOU CATFISH

2 T. LEMON JUICE
2 T. CHOPPED PARSLEY
2 TSP. SALT
1/4 TSP. CRUSHED BAY LEAF
1/4 TSP PEPPER
1/4 TSP. DRIED THYME
6 PAN DRESSED SKINNED CATFISH
1 CUP DRY WHITE WINE
1/2 C. MELTED FAT OR OIL
1/2 C. CHOPPED FRESH MUSHROOMS
1/4 C. CHOPPED G/ONIONS

CUT 6 SQUARES OF HEAVY ALUM FOIL 16" EACH. GREASE LIGHTLY. PLACE A FISH ON HALF OF EACH FOIL SQUARE. COMBINE REMAINING INGREDIENTS. POUR SAUCE OVER FISH USING APPROX. 1/3 CUP SAUCE FOR EACH FISH. FOLD OTHER HALF OF FOIL OVER FISH AND SEAL EDGES BY MAKING DOUBLE FOLDS IN THE FOIL. PLACE PKGS. OF FISH ON A BARBECUE GRILL ABOUT 6" FROM MODERATELY HOT COALS. COOK FOR 20 TO 25 MINUTES, OR UNTIL A BIG CRISSCROSS IN THE TOP OF EACH PACKAGE AND FOLD THE FOIL BACK. MAKES 6 SERVINGS

(LIMITED SUPPLY)
CHILLED LOUISIANA
TURTLE MEAT
LB.

7.95

WEATHER PERMITTING

FRESH
PERCH FILLET ... LB. 3.29
FRESH FILLET
BUTTERFISH ... LB. 2.99

Office of Environmental Services
U. S. Fish and Wildlife Service

George:

It's nice to see some reaction from the county on this. Let's hope they follow through on their good intentions

Thanks for letting me know about the problem.

William

A.PH
E. ES
cc: B Rod

DEPARTMENT OF PARKS & RECREATION — Herbert Matayoshi, Mayor

COUNTY OF HAWAII — Milton Hakoda, Director

May 14, 1984

Mr. Allan Marmelstein
Pacific Islands Administrator
Fish and Wildlife Service
U. S. Department of Interior
300 Ala Moana Blvd.
Honolulu, HI 96850

Dear Mr. Marmelstein:

Your letter of May 3, 1984, regarding vehicular intrusion on Harry K. Brown beach is acknowledged.

We share your concern that the endangered hawksbill sea turtles' nesting area is being adversely affected by dune buggies.

We have discussed the problem with the Chief of the State Division of Conservation and Resource Enforcement, the Chief of Police, and our maintenance personnel.

The Conservation Enforcement officers and police will include that area in their patrol. We will post signs prohibiting unauthorized vehicles and our park caretaker assigned to Harry K. Brown Park will check the area regularly.

We hope these three measures will resolve the problem.

Sincerely,

Milton Hakoda

Milton T. Hakoda
Director

cc: Chief of Police
Branch Chief, Conservation and Resource Enforcement
Maintenance Superintendent

• 25 AUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE 961-8311

5-11

Bill- FYI and return. I originally sent the newspaper "letter-to-the-editor" to Kramer after spotting it in the Hilo Tribune Herald. I pointed out to him that hawks occassionally nested there, so that was an FWS matter for protection. I'm delighted (and very suprised!) to see that he did anything. By the way, did you know that he now calls himself William instead of Lucian? GB

Thanks
Bill

U.S. FISH & WILDLIFE SERVICE
Office of Environmental Services
300 Ala Moana Blvd., Rm. 6307
P. O. Box 50167
Honolulu, Hawaii 96850

ES 6307

MAY 3 1984

Mr. Milton Hakoda
Director, Department of Parks and Recreation
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Hakoda:

The April 15, 1984 Hawaii Tribune-Herald published a letter to the editor (copy enclosed) expressing concern about disturbances caused by dirt-bikes and dune buggies at the Harry K. Brown Beach. The author asked for help in protecting this area for sun bathers and swimmers.

That park also provides one of the very few beaches in the State where hawksbill sea turtles still nest. They are currently listed as endangered species by both the Federal and State governments. A major reason for their population decline has been the disturbance of nests or nesting beaches, and the use of vehicles such as those described in the newspaper could cause the direct breaking of turtle eggs, compaction of sand over nests which would impede newly-hatched turtles from digging their way to the surface, and activities and noise which might frighten away adult female turtles before they can lay and cover their eggs.

Both the State and our Service are charged by the Endangered Species Act to assist in the recovery of species such as the hawksbill. Any action which you could take to protect the Harry K. Brown Beach from activities such as those described in the Tribune-Herald letter would help us reach that goal. If we can be of any service to you in this regard, please let us know.

Sincerely yours,

Original signed by

Allen Marmelstein
Pacific Islands Administrator

Enclosure

cc: Regional Director, FWS, Portland, OR (AFA-SE) w/Enclosure

bcc: George Balazs

WRKramer:wrk:5/1/84

HAWAII TRIBUNE-HERALD 4-15-84

Protest dune bikes

Dear editor,

A few Sundays ago I did my usual Black Sand Beach sun-fun trip. Normally there are a few Jeeps driving over the beach but nothing that really troubles me.

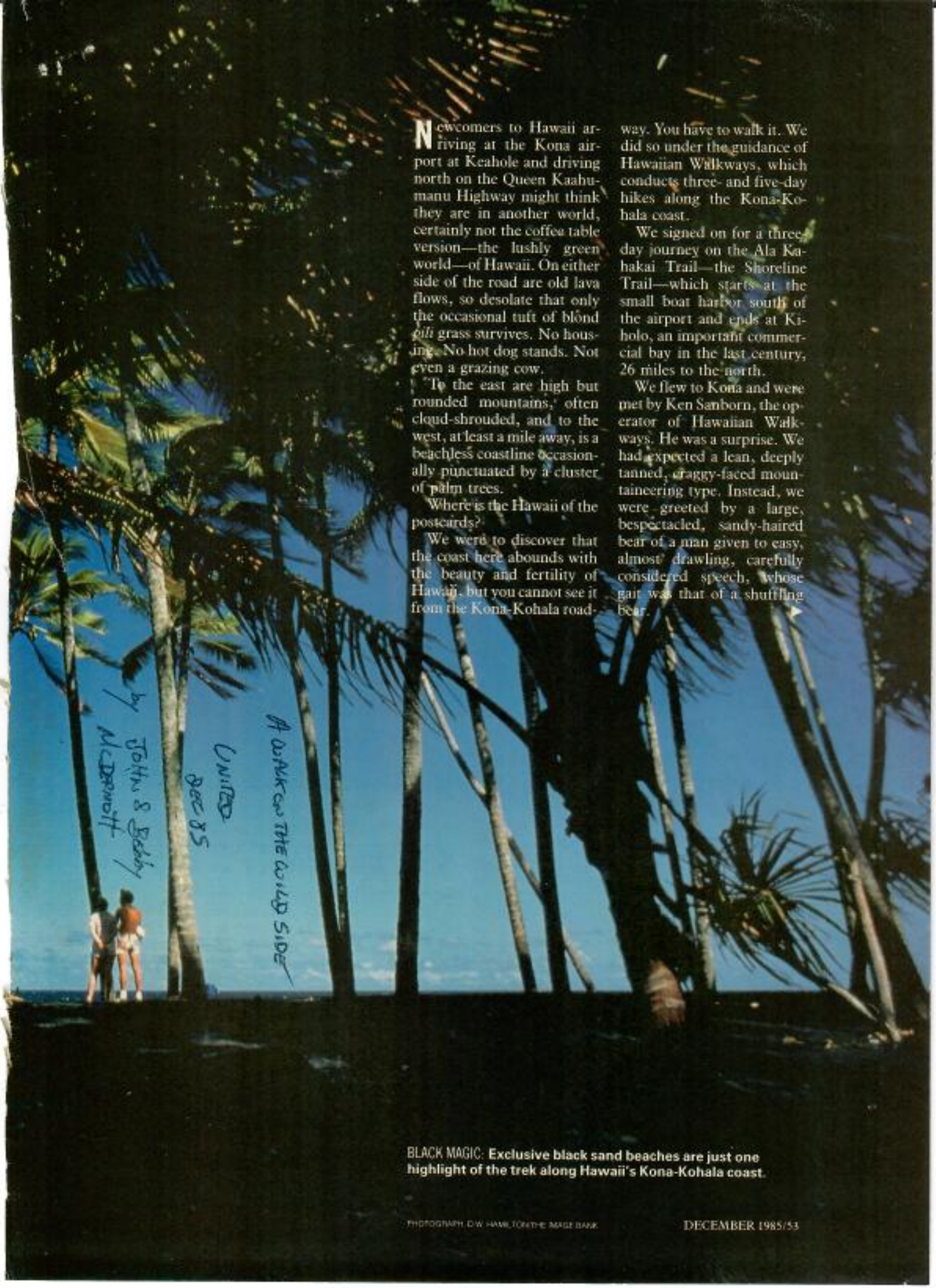
But this time the beach was invaded by four riding-lawnmower-looking dune buggies, and they were having a ball.

It wasn't like the normal lazy Sunday at Harry K. Brown. It was like Sunday at a dirt-bike rally.

It's time to do something to protect this small strip of sand for sun bathers and children swimming. I really don't expect any legislation to come soon. Perhaps if a few others out there get sand kicked in their faces enough, maybe some one will protest also.

Charlie of Kalapana

ENCLOSURE



Newcomers to Hawaii arriving at the Kona airport at Keahole and driving north on the Queen Kaahumanu Highway might think they are in another world, certainly not the coffee table version—the lushly green world—of Hawaii. On either side of the road are old lava flows, so desolate that only the occasional tuft of blond *pili* grass survives. No housing. No hot dog stands. Not even a grazing cow.

To the east are high but rounded mountains, often cloud-shrouded, and to the west, at least a mile away, is a beachless coastline occasionally punctuated by a cluster of palm trees.

Where is the Hawaii of the postcards?

We were to discover that the coast here abounds with the beauty and fertility of Hawaii, but you cannot see it from the Kona-Kohala roadway. You have to walk it. We did so under the guidance of Hawaiian Walkways, which conducts three- and five-day hikes along the Kona-Kohala coast.

We signed on for a three-day journey on the Ala Kahakai Trail—the Shoreline Trail—which starts at the small boat harbor south of the airport and ends at Kiholo, an important commercial bay in the last century, 26 miles to the north.

We flew to Kona and were met by Ken Sanborn, the operator of Hawaiian Walkways. He was a surprise. We had expected a lean, deeply tanned, craggy-faced mountaineering type. Instead, we were greeted by a large, bespectacled, sandy-haired bear of a man given to easy, almost drawling, carefully considered speech, whose gait was that of a shuffling bear.

BLACK MAGIC: **Exclusive black sand beaches are just one highlight of the trek along Hawaii's Kona-Kohala coast.**

PHOTOGRAPH: D.W. HAMILTON/THE IMAGE BANK

At the airport we joined our fellow hikers, a pleasant thirtyish engineer from South Africa, now residing in London, and the wife of a prominent Honolulu businessman. We all piled into a battered van and went immediately to the small boat harbor at Honokohau, eight miles south of the airport. There we met Ester, Ken's wife, who would meet us every afternoon at an already set up camp, and Guy Jackson, the driver of a truck that looked ready for the junk heap but reliably carried all camp equipment and our extra luggage.

We were issued plastic canteens of water and lightweight backpacks to carry our swim togs, towels, and whatever extras we wanted on the trail. We immediately commenced the first leg of the journey, a 15-minute hike to Honokohau Beach and the Amakapa Pond, where we stopped for a sandwich and apple lunch. The pond is one of several along the coast protected as sanctuaries for more than 200 kinds of birds such as ducks, coots, and stilts.

After lunch, we started on the coastline trail, one of several historic trails that connected ancient seaside communities and intersected trails leading to upland settlements, the trading routes for exchanging fish and salt for taro and adzes. The blue waters on Honokohau Bay were almost motionless. The sun-filled day under skies without clouds was comfortable for strolling.

At the end of the bay, Ken led us inland over somewhat smoothed lava paths marked by mounds of small lava stones, which the Hawaiians use as landmarks. At the end of the path was a pool of fresh water in a lava basin about 15 feet around and about shoulder deep.

"This is known as the Queen's Bath," Ken explained. "It is said that Queen Kaahumanu would come from Kailua-Kona by canoe and be carried here to the clear fresh waters for her private bath."

"Can we swim?"

"That's why you're here," said Ken.

Each of us found a convenient lava outcropping to duck behind to change into our swimsuits. The water was cool, freshly fed from underground springs. What an incongruous lark . . . swimming in the middle of a lava field.

After toweling off, we changed and dawdled back to the coastline path, now marked by football-sized chunks of white coral, and continued north over lava fields and on sandy beaches, sometimes following jeep tracks, stopping at a fisherman's camp on the beach, or stumbling onto an isolated but occupied shack (one had a television aerial and a rude No Trespassing sign). We walked by other ponds reserved for the birds but filled with fish.

Along a lava cliff bordering the ocean and about 20 feet above it, we peered down into a wide hole; the sea would fill it with swirling white foam through an

underground tunnel, and then the hole would empty with a loud sucking noise as the waves receded. The hole had no name; having just swum in the Queen's Bath, we called it the King's Toilet.

Our first day's easy stroll ended at a campsite on the beach where two-person tents with plastic floors and padded sleeping mats were in place. We were issued sleeping bags, sheets, and pillows. Cooking and serving tables had been set up and a large mat was spread on the sand for communal lounging and dining. Sand chairs were neatly arranged around the mat's perimeter.

The smell of potatoes roasting over coals rose from the campfire. A jug of red wine was uncorked, beer and soft drinks were offered, and a tray of raw vegetables with a creamy dip were placed in the middle of the community mat. This was followed by dinner, which consisted of barbecued steak, coleslaw, and potatoes.

As the stars came out, we had an offshore sight of the SS *Constitution*, heading for Maui following an afternoon in Kailua-Kona. We had the feeling that we were looking at another world. To hikers huddled around a beach campfire, the huge ship ablaze with festive lights might have come from another planet.

The next morning, after juice, fresh papaya and banana bread, and coffee, we were on the trail before eight. Ester and Guy stayed behind to break camp. The sky to the north was darkly ominous and the clouds were heading in our direction, and soon we were in a light rain. It was refreshing, one of the rare rains in Kona. An hour later, the patter of drops stopped and the sky gradually cleared into another fully sunny day.

"Tomorrow," Ken had said at dinner the previous night, "we will experience three kinds of lava: *aa*, *pahoehoe*, and too much."

We walked miles across lava of every description and color. *Aa* (ah-ah) is a clinker type of lava resulting when a wall of slowly moving lava crushes itself into fine bits under the pressure of its own weight. *Pahoehoe* (pah-hoy-hoy) is a shiny black, swirled and coiled pavement of lava that once was a river of hot molten lava, frozen in place as it cooled. From an overhead airplane it looks like the end of the earth, but seen on foot the *pahoehoe* is a fascinating blend of patterns, natural sculpture, and tones of black. Walking through it provided an endless change of scenery.

This was the lava flow of 1801 that was stopped finally, according to legend, by Kamehameha the Great. Taken by canoe to the spot where the lava had entered the sea, he cut off a portion of his hair and threw it into the ocean to appease the fire goddess, Pele. How could she refuse? The lava flow halted immediately.

The lava came from the mountain of Hualalai, which has not erupted since that time. It had been declared inactive, but recently volcanologists detected

trembling in the mountain. Hualalai has been reclassified as dormant.

At one rest stop on a plateau of lava above the ocean, we detected agitation upon the water and then we were treated to a passing marine show put on by a school of twirling dolphins who leaped, spun on their tails, and frolicked just offshore.

After hiking through three miles of lava, we returned to the white sand beach and, traversing a point of land, came to a cove and Magoon's Beach, shaded by palm trees, where we ate lunch, swam, napped, and swam again before pushing on. After another small stretch of lava we came to the pristine white, lonely beach of Makalawena Bay in back of which is a freshwater pond, perhaps only 15 feet long. These perfect little beaches, hidden from view of the highway just a mile away, were ours alone. We encountered not another human being.

Circling the bay, whose beachfront lands are owned by the Bishop Estate and kept for Hawaiian civic groups—Boy Scouts and the like—we found our camp set up on the far side. We settled down to relax, snack, and enjoy the scenery.

At sunset we all stood like children peering into a candy store window, all in a row, watching the sun being swallowed by the ocean, waiting until the last tip of gold disappeared, hoping to see the green flash. No green flash.

The next day we did nine miles in eight hours. We'd walk and swim, walk and swim. Every swimming spot seemed to be better than the last one, but Kua Bay, completely isolated, with silken white sand, turquoise-green water, and an easy roller-coaster surf, is unmatched. It was hard to leave.

Our luncheon stop was at the empty picnic grounds for the cowboys of Huehue Ranch, where there were clean outhouses with toilet paper, fresh water, benches and tables, and a natural saltwater swimming pool protected by a large outcropping of rock at the entrance to the sea, around which reef fish played.

Two miles' hike farther on, we arrived at Kona Village Resort. It was a little bit like Robinson Crusoe walking into New York City. Kona Village is a resort of a hundred or so "native" huts—in truth, very modern individual houses patterned after the housing of nine different Pacific island nations. There are no telephones, radios, or television sets. The accent is on peace and isolation. Breakfast, lunch, and dinner are provided because it is not expected that the guests will choose to leave the property. They will sun, swim, snorkel, sail a boat, eat, and drink—and pay from $100 to $300 a day for this Polynesian peace and tranquility.

We went to the Shipwreck Bar, actually the hull of a boat put on a reef by the original builder, Johnno Johnson. Having a drink out of a tall glass with tinkling ice in it was a welcome break.▶

After the constrasting touch of resort living, we strapped our knapsacks on again and picked our way carefully across the crumbling coastline, now a series of giant jagged lava pinnacles and valleys besieged by a constant and angry surf which had reduced portions of the lava to black sand beaches. We reached an ancient track whose stepping stones had been placed by hand hundreds of years before.

The thrill of the dramatic coastline waned as the black ground seemed to stretch endlessly around Mahewalu Point. Finally, the vegetation of Mano Point, our last campsite, appeared. The flat beachless plateau, about 12 feet above the sea, was well known to the ancients for its tidal pools and salt pans.

Dinner that night was Hawaiian: lau-lau, a butterfish and pork combination cooked with the tops of taro leaves inside a sack of ti leaves; poi, a paste of the taro root and water; lomilomi, bits of salmon mixed with onion and tomato; and coal-roasted yams.

That night there was a half moon and a blanket of touch-me stars. The lights of Waikoloa and Waimea could just be discerned in the distance. We were halfway between heaven and civilization with the soft sound of waves sweeping over rocks and swirling into foaming waters in the tidal pools.

The entire camp was asleep by nine and not a body stirred until six the next morning when the distant mountains of Kohala, Mauna Kea, and Hualalai were framed in black against the new gold of the morning sky.

After a breakfast of Portuguese sausage, French-toasted sweet bread, slices of papaya, and strong black cof-

Getting There

United Airlines operates the mainland's only daily nonstop service to the Big Island. United flies nonstop to Kona from San Francisco and Los Angeles, with nonstop and one-stop return flights. Hilo is served with one-stop round-trip flights from Los Angeles.

On January 6, 1986, United will increase its service to 20 daily round-trips between the Hawaiian islands and five gateway cities on the mainland: Chicago, Denver, Los Angeles, San Francisco, and Seattle. In fact, United is the airline with the most in Hawaii—the most nonstop flights and the most wide-body airplanes to the most Hawaii destinations from the most mainland cities. All flights are timed for convenient connections to almost every city United serves.

From the mainland, United is the only carrier with direct service to all four major Hawaiian islands: Honolulu on the island of Oahu, Lihue on Kauai, Kahului on Maui, and Hilo and Kona on the Big Island. For further information and reservations, call United or your travel agent.

fee, we were on the last trail. Not more than a mile later, we had our first swim at Luahinewai, a black sand beach, behind which is the prettiest freshwater pool we had seen. Encircled by high cliff walls tufted with greenery and topped by coconut palms that filtered the sunlight, it was at least 40 feet long with a shallow black sandy bottom which deepened to about 20 feet at one end. The water was cool and clear. With the aid of snorkeling masks, the sight of underwater green plants gave us the sense of swimming in an aquarium garden. It was a charming spot.

After the swim, we went on to the edge of Kiholo Bay, past a house site being prepared for Loretta Lynn, to another freshwater pond, only this one was inside a lava tube and we had to go down a short ladder to the water. Some of us swam from one opening through the lava tube to a second opening and explored the depths of a cave at the far end.

On Kiholo Bay there were a few scattered houses facing the black sand beach, groves of neatly kept coconut trees, and a proliferation of Keep Out signs. We heard the barking of a dog for the first time in three days and the cackling sound of chickens.

Ken said the bay was formerly a terminus for cattle driven over the King's Trail by *paniolos*, or cowboys. The cattle were herded into the sea to swim to an offshore freighter, then hoisted by slings onto the ship on their way to market in Honolulu.

We pushed through scrub at the north end of Kiholo Bay to find the King's Trail. A half mile farther, at the 26-mile highway marker, Ken shaded his eyes against the noon sun, spotted the van waiting on the highway, and led us over a field of twisted, tortured lava the last two miles to the highway.

As we drove to the airport, it was a time of rediscovery. "Oh, there's where we camped the second night. There's where we had lunch. There's Makalawena Bay where the tidal pool was freezing cold."

We chuckled over the incongruity of imagining ourselves so far removed from the real world when, in reality, we had always been within sight or sound of civilization. We could see the automobiles on Queen Kaahumanu highway most of the time, but they, like the fishing boats, the luxury liner, and the sightseeing helicopters, appeared as mirages, momentary and fleeting reminders of a familiar world easily shucked for the world we were discovering.

Our only regret was that the exercise wasn't longer, continuing north up the historic Kohala coast.

SIGHTING INFORMATION: (TURTLE) AND SEAL

Animal sighted (circle): TURTLE SEAL

Number of animals: 3 Type, if known: Green

Date: 7-7-85 Observer: W. DeRooy

Time: 10:30 AM Address & phone (optional) 382 Kamaoe Hilo 935-6938 96720

Location: K Leleiwi

Observed from(circle): shore; boat(name: _____);

while skin or (SCUBA) diving(on surface or at 30 feet deep).

Estimated size(length): 2-4'

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

Leo FYI the whole document will be in RSS's office - if you want to see it - give him a turtle + see what happens... wks.

Reply requested w/ in 30 days of receipt

BELT, COLLINS & ASSOCIATES
Engineering • Planning
Landscape Architecture

December 18, 1984
84-1940

Turtles mentioned in document?

Mr. Richard S. Shomura, Director
National Marine Fisheries Service - Honolulu
U.S. Department of Commerce
2570 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Shomura:

Environmental Impact Statement Preparation Notice
Mauna Lani Resort Expansion, South Kohala, Hawai'i

Mauna Lani Resort, Inc. is proposing several changes to the existing Mauna Lani Resort in South Kohala, Hawai'i. These changes include the construction of a second 18-hole golf course and a public beach park, a reduction in the density of residential development by spreading the units over a larger area, and the relocation of an existing hotel site. In addition, it is seeking to eliminate the need for Special Use Permits for existing and proposed support facilities. In order to implement these proposed changes, the petitioner has asked that the Urban District containing the resort be increased by approximately 654 acres. In addition, it is seeking a new lease and Conservation District Use Permit allowing about 40 acres of land north of Pauoa Bay leased from the State to be used for two golf holes and a public beach park.

An Environmental Impact Statement Preparation Notice (EISPN) announcing the intention to prepare an EIS in accordance with Chapter 343, Hawai'i Revised Statutes, was published in the December 8, 1984 issue of the Office of Environmental Quality Control Bulletin. Copies of the EISPN and the environmental assessment (EA) on which it was based are attached to this letter for your use. The EA provides a description of the proposed development, the changes in Land Use District boundaries that are being sought, and the existing environment which would be affected. It also summarizes the kinds of impacts that may result and indicates the kinds of additional analyses that are being conducted for the EIS.

We request that you/your organization assist us in preparing the EIS by providing comments on the proposed project as it relates to your jurisdiction and responsibility, special knowledge, or interest. It is our intention that the EIS will explore all aspects of the project's probable impacts, but we hope to devote the bulk of our effort to those issues which are of greatest concern. You could help us accomplish this by indicating in writing the specific questions, issues, and topics you believe should be addressed, the reasons why you believe the requested data and/or analyses are important, and, if applicable, the ways the information we supply will be used in the decision-making process. The more specific you can be, the greater the likelihood that we will be able to respond with satisfaction.

Honolulu: 606 Coral Street, Honolulu, Hawaii 96813, Telephone (808) 521-5361, Telex: BELTH 7430474
Singapore: 360 Orchard Road, #12-06, International Building, Singapore 0923. Telephone 235-6870, Telex RS 50464 BCISIN

As you probably know, the Environmental Impact Statement Regulations stipulate that a written response to requests for comments be made within 30 days of their receipt. It is our hope that you will make every effort to respond within this time period so that no issues are given short shrift simply because they are raised belatedly.

If all goes as planned, it is expected that the EIS will be available in May 1985. At that time the document will be circulated for public review and comment.

If you have any questions regarding the project or the kinds of input which would be most helpful to us in preparing the EIS, please call me at 521-5361. I will be happy to provide any additional information and guidance I can.

Sincerely,

Anne L. Mapes

Anne L. Mapes

ALM:lf

Attachment

SUMMARY

Mauna Lani Resort is a major resort development on 3,200 acres of land in the Kohala Coast Resort Region. Plans for the resort already approved by the County would permit the development of 3,000 hotel rooms and 3,182 residential units as well as related amenities and facilities on 778.5 acres of Urban District lands. Completed to date are the 351-room luxury-class Mauna Lani Bay Hotel, the 80-unit Mauna Lani Terrace condominiums and the 18-hole championship Francis H. I'i Brown Golf Course.

Mauna Lani Resort, Inc. is currently requesting the State Land Use Commission to amend the State Land Use District Boundaries, by putting 486 acres now in the Agricultural district into the Urban district and 168 acres in Conservation into Urban. A Conservation District Use Application is being submitted separately to the State Board of Land and Natural Resources to allow development of a public beach park and two holes of golf on State leased land in the Conservation District.

The above changes would not increase the overall magnitude of development, which would continue to be within the 3,000-hotel-room and 3,182-residential-unit County limit. On the contrary, most likely fewer units will be developed overall, with a range of 1,350 to 3,000 hotel rooms and 1,100 to 3,182 residential units (numbers include existing units). The lower end of the range reflects the ten-year demand projected in a preliminary market study performed by Ming Chew Associates.

In seeking the above boundary changes and use permit, Mauna Lani Resort, Inc. has four primary objectives. They are to:

(1) provide additional open space and recreational areas, including a park and golf course (the preliminary market study bears out the need for additional holes of golf, based on increasing demand);

(2) accommodate support facilities (within the Urban district) that have been constructed within the Agricultural district under the Special Permit process;

(3) allow for relocation of an existing hotel site on Honokaope Bay to a more desirable location on the bay; and

(4) allow for a decrease in density within the resort's hotel and residential areas, thereby promoting the achievement of established luxury resort goals and standards.

Implementation of the proposed action would involve substantial grading, vegetation removal, new construction and other changes to the existing environment on several hundred acres of land. Thus, the potential exists for significant impacts, including effects on the physical environment and socio-economic effects.

15 Hina Street
Hilo, Hawai'i 96720
December 16, 1984

George Balazs
National Marine Fisheries Service
P.O. Box 3830
Honolulu, Hawai'i 96812

Dear George,

This letter is in response to the letter I recieved from you on December 15, 1984 regarding the turtle caught at the breakwater in Hilo. Here is the additional information you requested.

1.) The turtle was intentionally caught by three fishermen who spotted it from land and I suppose swam out to it. They caught it with two throw nets.
2.) No, I did not see them do this, but I did see the turtle about a half hour after they brought it to shore.
3.) The turtle did not wash ashore. It is possible that it was very weakened by its sick tumorous condition and that's why it was caught so easily. I did ask a few questions of the people standing around who could have seen this happen, and one old man said they caught it real easy, just swam out and netted it.
4.) Yes, they butchered the turtle and took everything, I mean everything.

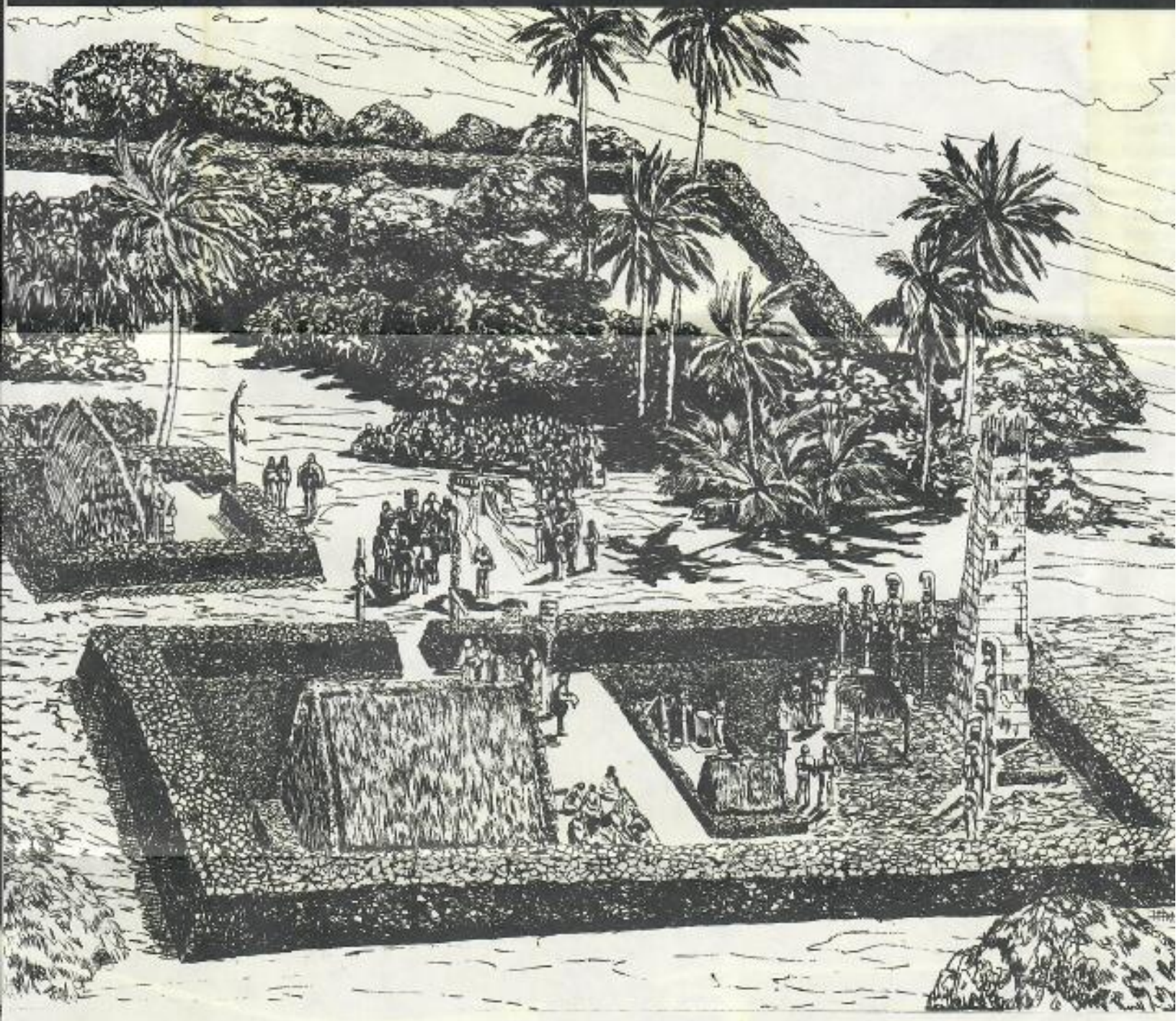
In addition to this, I happened to see one of the guys last week. He said the meat was very good and no one got sick.

Thank you for the material enclosed with your letter I really appreciate it, especially the one about the turtle lady from South Padre Island, very touching. I wish you and your family a very Merry Christmas and Joyous New Year.

Aloha
Lisa Hall
Lisa

Waha'ula Heiau

Ter
Re



THE WAHA'ULA HEIAU

Only 150 feet along the path from the Waha'ula Visitor Center, is the Waha'ula Heiau (Temple of the Red Mouth). Constructed during the 13th century by a foreigner from Kahiki (southern lands), Waha'ula changed the worshipping rituals of Hawai'i's people.

Before the time of Waha'ula, customs and rituals of the temples were less stringent. There was a basic understanding that every aspect of nature was the embodiment of some deity, and that the respect of nature in

WAHA'ULA VISITOR CENTER INFORMATION AND ACTIVITIES

The Congressional Act of June 20, 1938 officially added the Kalapana Extension Lands to Hawai'i National Park, now Hawai'i Volcanoes National Park. In doing so, one of the most traditionally significant sites of Hawai'i was added to an already geologically unique area, making the national park a showplace which intertwines traditions and sciences.

Other than the physical remains of Waha'ula, there is little left as a reminder of the events that occurred here. Fragmented chants and stories are all that remain of once rich oral histories that kept

le of the Mouth

Hawaii Volcanoes National Park
U.S. Department of the Interior
National Park Service

tional Park
e Interior

The ancient Hawaiians believed that the islands and all forms of nature were the embodiments of creative forces of nature and spirit beings. The first people that came to these islands from Kahiki (southern lands) brought with them their own rituals which they intertwined with what they encountered here.

Throughout the following generations, historic legends recorded the migrations between Hawai'i and Kahiki. People on double-hulled canoes crossed the vast expanse of the Pacific Ocean, bringing with them valued plants, new customs and rituals. These events led up to the 13th century, when during a period of migrations a man of great spiritual power known as Pā'ao came to Hawai'i. Pā'ao was received as a chief by the people of Hawai'i. After some time here, Pā'ao told the chiefs that they had weakened and degraded their bloodlines by mingling with the commoners, thus setting aside their divine right to rule.

Pā'ao returned to Kahiki seeking a chief who would strengthen the Hawaiian chiefs' blood and ties with the gods. The chief Pili returned to Hawai'i with Pā'ao. They landed on the coast of Puna. Pili became established as the new chief and Pā'ao became his high priest. The two founded a dynasty which ruled Hawai'i through the time of their descendents, Kamehameha I and Hewahewa his high priest, rulers of the early 19th century.

It was shortly after Pā'ao's return to Hawai'i that he determined that Pūlama would be the site of a new heiau (temple). Women were not allowed to assist with the construction of the heiau, nor were they permitted within its consecrated walls. After the heiau was completed and dedicated, it became known as "Waha-'ula-Red Mouth," because its new rituals required human sacrifices at times. The sacrifices were made to give strength to prayers or pay the penalty for breaking the gods, or temple's restrictions. They might also be offered when a chief was asking for divine guidance or preparing for battle, or when natural phenomena, famine or pestilence occurred. Waha'ula was the site of state worship for the supreme chief. The mana (spiritual power) of Waha'ula lasted for five hundred years, while many other luakini type temples rose and fell into disuse because their mana had failed.

By the time of Kamehameha I, only Waha'ula and five other luakini temples remained in use on the island of Hawai'i. They had survived new rulers and reconstructions because their mana had prevailed. The time of Kamehameha I saw great and tragic changes in Hawai'i. The arrival of foreign ships brought new gos and ways of living; customs and beliefs quickly changed. Kamehameha I attempted to blend the beliefs and knowledge of his ancestors with knowledge of the foreigners, trying to take the best of both. Upon the death of Kamehameha I in May of 1819, his son and heir Liholiho was persuaded to set aside the religious rituals of his ancestors and people.

Liholiho was the last of Hawai'i's ruling family to use any of the state heiau. Interestingly enough, Waha'ula, the first of the luakini temples, was also the last one to be used by Liholiho, who was himself a descendent of the first chief to use the temple.

In 1819 there was an unsuccessful rebellion in an attempt to save the old order and rituals, but by the end of 1819, temple rituals ceased, and the heiau were abandoned. In 1824 a royal decree was issued which ordered the destruction of all objects associated with the heiau that had not already disappeared or been destroyed. The events of 1819 through 1824 guaranteed the wiping out of any clear traditional understanding of Hawai'i's religious past.

FOR MORE READING

JOHN PAPA I'I **FRAGMENTS OF HAWAIIAN HISTORY**
DAVID MALO **HAWAIIAN ANTIQUITIES**
SAMUEL KAMAKAU **KA PO'E KAHIKO**
FORNANDER **COLLECTION OF HAWAIIAN ANTIQUITIES**
THRUM'S **HAWAIIAN ANNUAL**
MARY PUKU'I **POLYNESIAN FAMILY SYSTEM IN KA'Ū HAWAI'I**

Waha'ula as it is today

not always enough
the principal sacrifi
the gods on import
From here in the d
luakini (human sac
Hawai'i. The luakini
century, after whic
change in customs

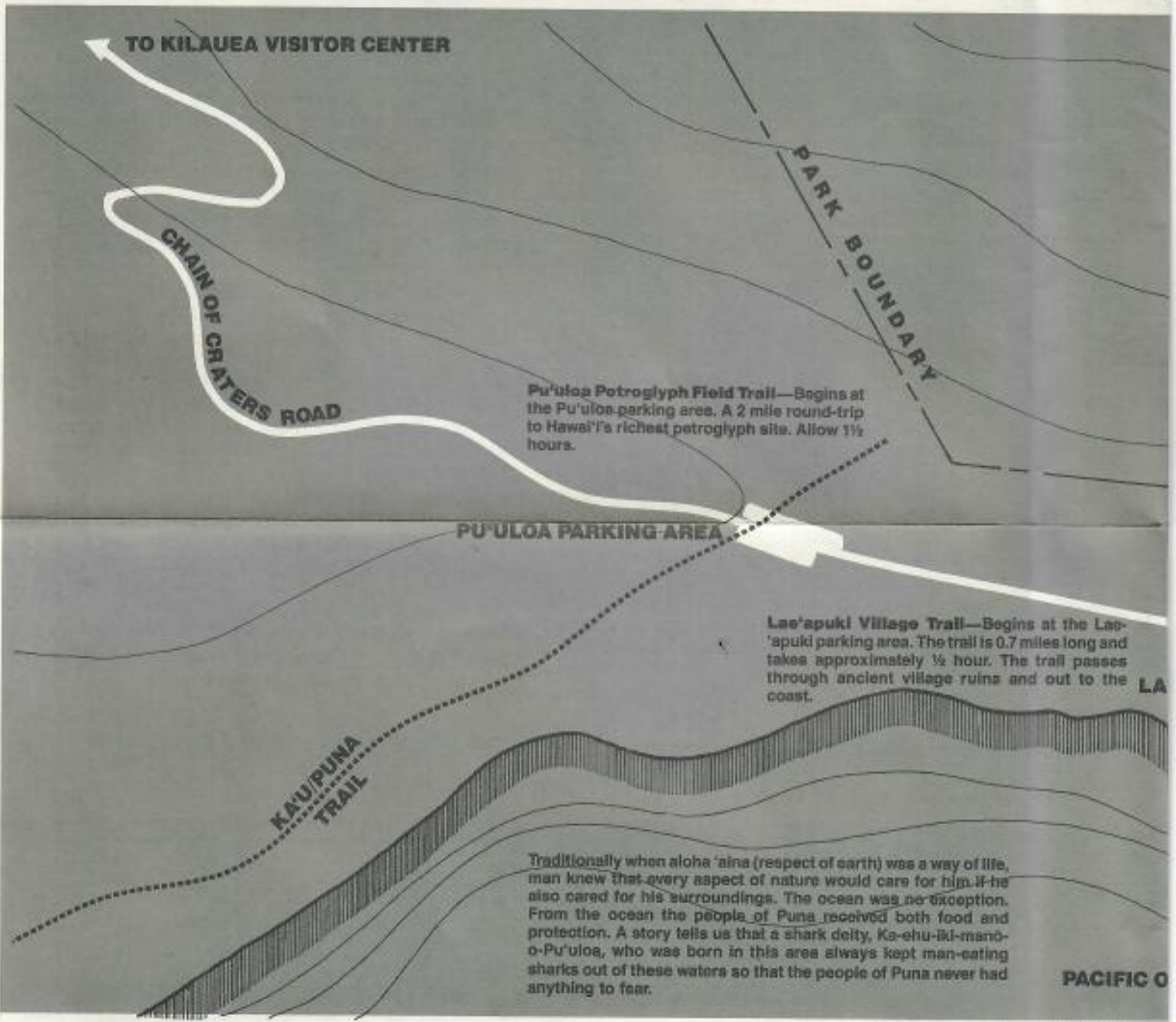
Waha'ula Heiau

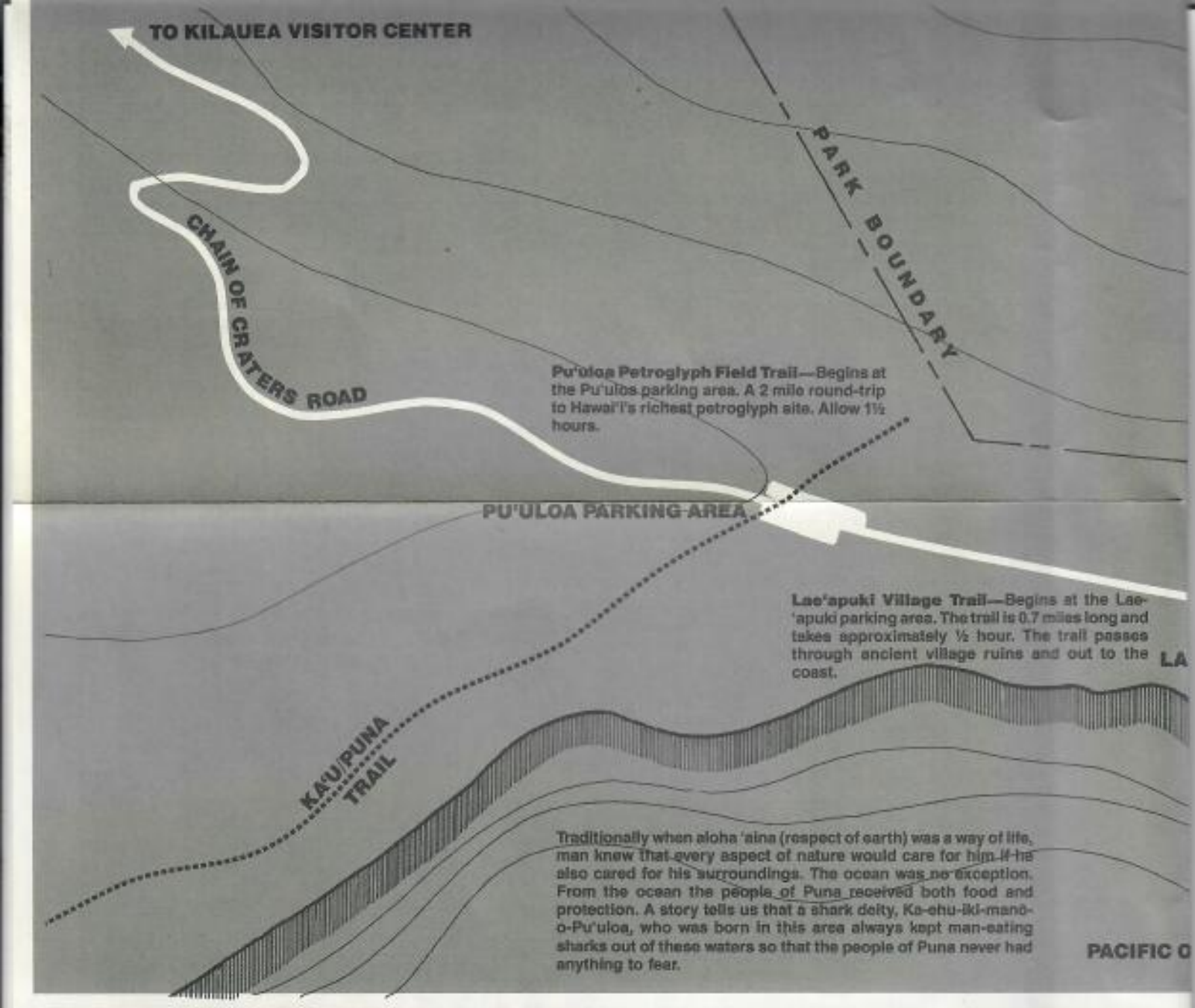
KE ALA KAHIKO/THE ANCIENT PATH

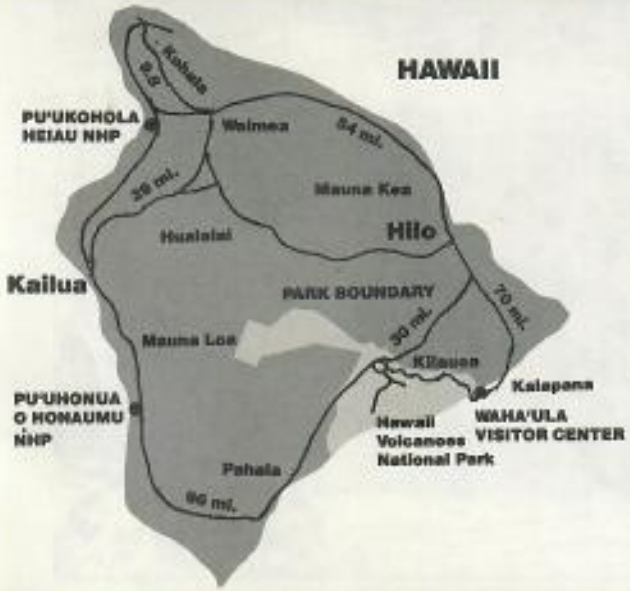
Trail Information

Start the trail at the Waha'ula Visitor Center and continue past the heiau ruins. Numerous plants are marked along the trail, many are unique to Hawai'i. Just past the heiau, the trail turns towards the coast, watch out for the waves that sometimes rise above the cliffs. The ocean was an abundant source of food for the ancient Hawaiian people. Today as you look at the cliff and in the water you can see the limpets, fish, seaweeds and turtles that were important food items traditionally. Before the trail turns from the ocean, just across from the blowhole is a paena wa'a (canoe landing site). It is a good example of how man worked with his surroundings.

By lashing logs to holes in the rock, men were able to launch and land their canoes as they went about their daily fishing and traveling. From there the trail turns into the forest. There are cracks in areas here that are holding places for brackish water. These areas made life along a dry coastline much easier. The last section of trail is notably different from the rest. It has been paved with water worn boulders. Placed here hundreds of years ago, this path is a remnant of a series of paths that joined one village to another. The trail ends back at the Waha'ula parking area. If you have any questions, please talk to the visitor center staff. ALOHA





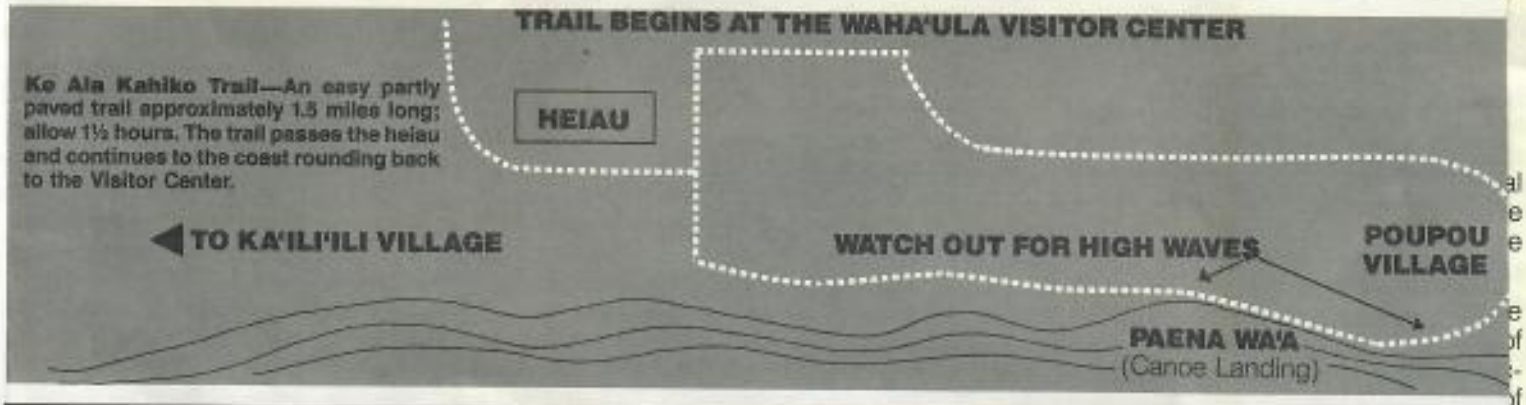


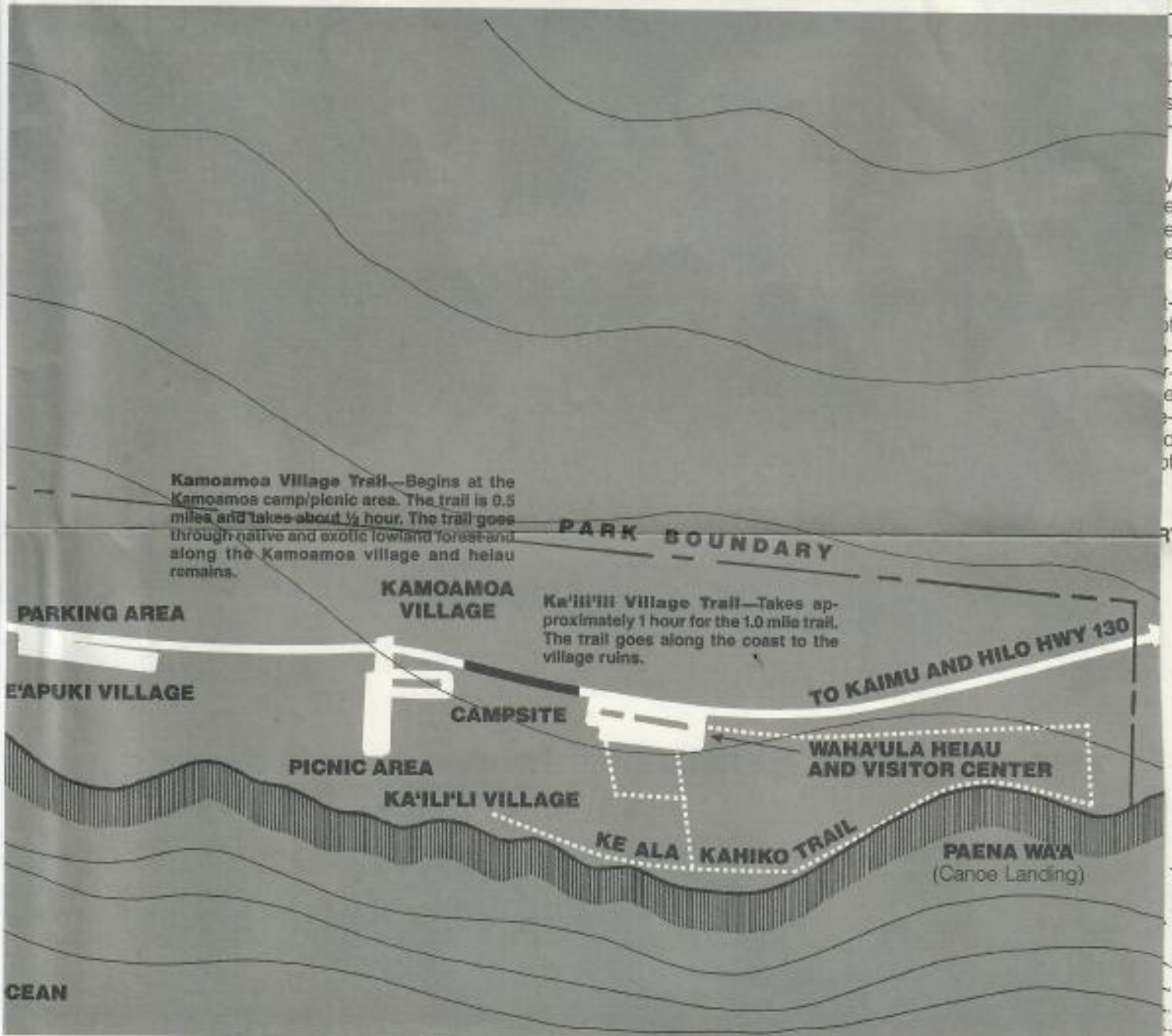
GLOSSARY OF HAWAIIAN WORDS USED IN TEXT

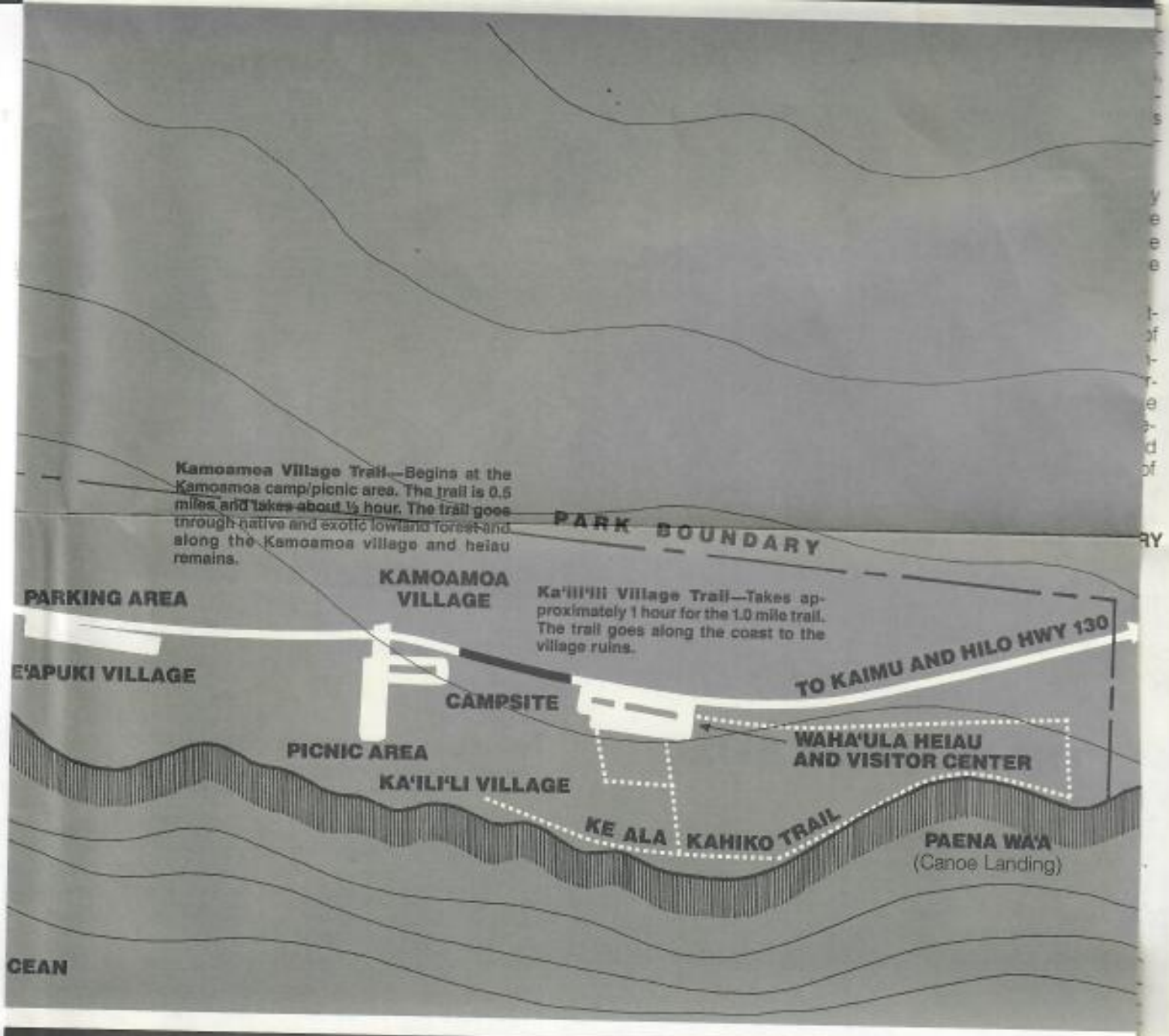
HEIAU	Ancient Hawaiian temple
HEWAHEWA	High priest to Kamehameha, descendent to Pā'ao
KAHIKI	Southern/Distant lands
KAMEHAMEHA	Chief who united the Hawaiian Islands/ Descended from Pili
LIHOLIHO	Son and heir of Kamehameha
LUAKINI	Human sacrificial temple
MANA	Spiritual power
PĀ'AO	Priest who came from Kahiki and founded Waha'ula
PILI	Chief who came to Hawai'i with Pā'ao
PŪLAMA	Land section, District of Puna
PUNA	Land district, Island of Hawai'i
WAHA'ULA	"Red Mouth," First temple of its kind built in Hawai'i

Temple of the Red Mouth

Hawaii Volcanoes National Park
U.S. Department of the Interior
National Park Service







HELP PROTECT YOUR PARK

To protect yourself and the natural beauty of the park, please pay special attention to these regulations. They are enforced by park rangers. Registration at Waha'ula Visitor Center is required for back-country camping and overnight hikes.

Fires are permitted only in designated camp and picnic sites. DO NOT leave your fires unattended.

Collecting rocks or artifacts and the picking of plants is prohibited.

Hunting is prohibited except by Citizen Hunters assisting in goat and pig management programs. Firearms are otherwise not to be carried or displayed unless broken down or in a case.

Pursuant to the Act of June 20, 1938 (52 Stat. 781; 16 U.S.C. 30lb and 396a) Native Hawaiian residents of the villages adjacent to the Kalapana Extension Lands added to the park by the above act and visitors under their guidance are granted exclusive privileges of fishing or gathering of seafood from park lands (above the high water line).

Vehicles of all kinds are restricted to designated roadways.

Pets are to be under physical control at all times. No pets are allowed in the back-country.

Park roads are for leisurely driving only. Speed limits are posted.

Douglas L. Blake
PO Box 307
Kailua-Kona
HI 96740

September 11,1983

Mr. George H. Balazs
National Marine Fisheries Service
Honolulu Laboratory
PO Box 3830
Honolulu,
HI 96812

Dear Mr. Balazs

Thank you for your letter of inquiry requesting local information about likely areas around the Big Island for the study of green sea turtles.

My own experiences with green sea turtles have come from my years spent in nearshore waters-mostly on the Kona side-in fishing and surfing activities.

In answer to your questions;

1. From my own experience,it seems turtle populations here tend to be more concentrated in areas with more than average offshore reefs;I believe that one of the best areas for studies in Kona might be the north portion of the reef areas located at Honokohau,just north of Kailua.Another area that I believe would be good for study purposes is the Kiholo Bay area in North Kona.

2. I am unaware of any specific areas that offer greater chances of catching turtles of larger size than average.

3. The safest methods of capture,tagging,and release,I believe, would involve techniques using SCUBA equipment to approach turtles at rest under ledges in the reefs by means of hand-capture or broad-netting.

4. I have heard in years past that green turtles nested occasionally on small beaches south of Hookena Beach in South Kona.Also on small beaches and sandy areas around brackish ponds between Kiholo Bay and Anaehoomalu Bay in North Kona.

Thank you for the opportunity to provide in-put on the proposed study.If I can be of any assistance in the future please contact me.Incidentally,I have been meaning to write and thank you for the material you sent me in regards to the assistance that some fishermen are giving the green turtle preservation program throughout the Islands;It is real good to see an increasing awareness on the subject.

Aloha George

Sincerely,

Douglas L. Blake

Douglas L. Blake
PO Box 307
Kailua-Kona
HI 96740
325 9950


BLONDE REEF
HILO BREAKWATER
Puhi Bay
Keokea Pt
BAY
Kuhio Bay
Kaulainaiwi Island
Cocoanut Island
Liliuokalani Gardens
Waiakea Pond
Golf Course
Reeds Bay
Naval Reserve Electronics Facility
Light
KALANIANAOLE AVE
KESHA
DAMERA AVE
20 TODD AVE
KING
Bayfront Beach Park
KAMEHAMEHA AVE
STATE PARK
Wailoa
Waiakea Pond
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HUALANI ST
KEKUANAOA ST
Shopping Center
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EAST LANIKULA ST
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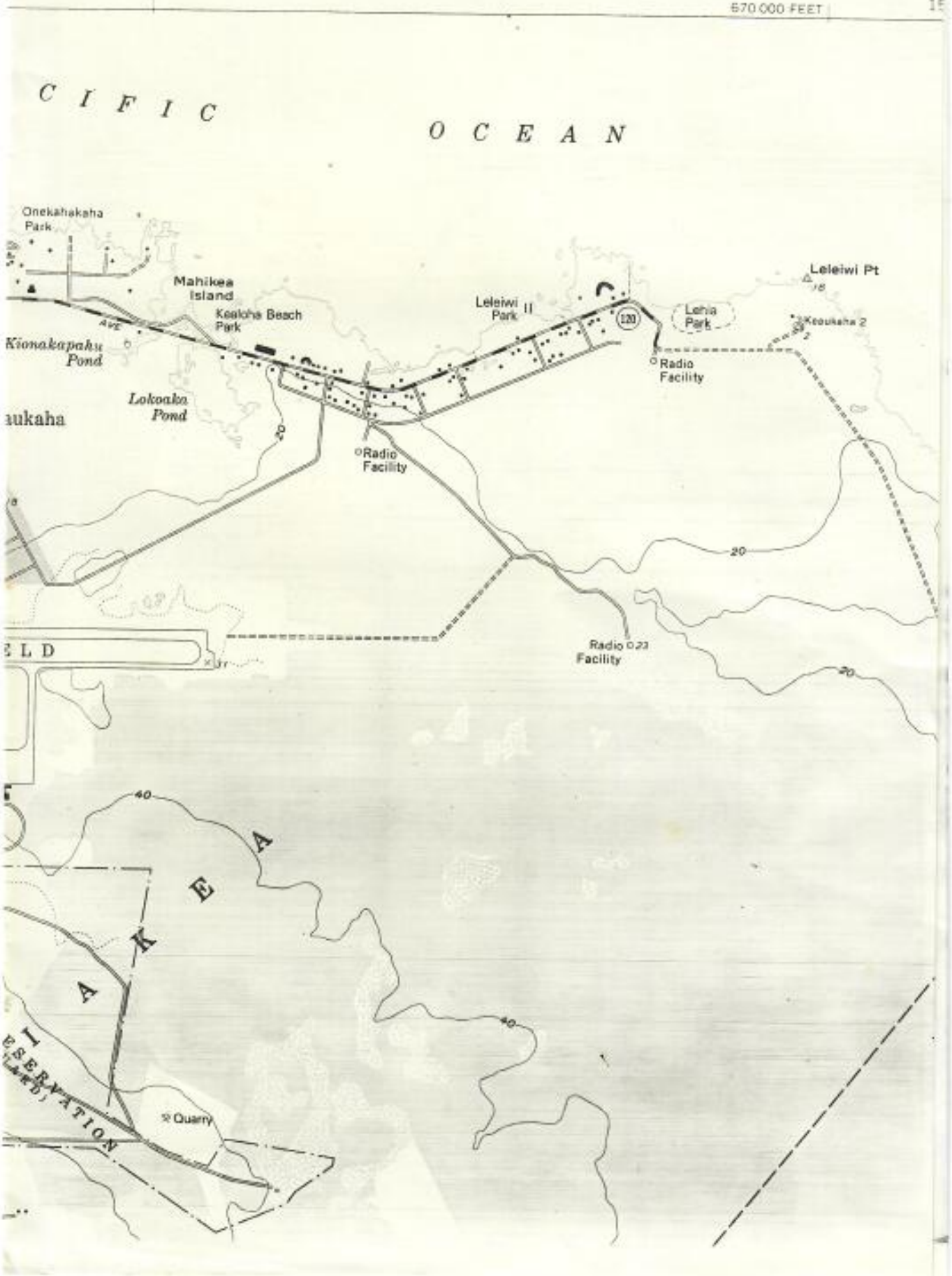
C I F I C
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Mahikea Island
Keaiha Beach Park
Leleiwi Park II
Leleiwi Pt
Lehia Park
Keoukaha 2
Kionakapaku Pond
Lokoaka Pond
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Radio Facility
Radio Facility
Radio Facility
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I ESERVATION
Quarry
20
40

HILO HOTEL

142 KINOOLE STREET
HILO, HAWAII

In downtown Hilo
1 block to banks and post-office

A Detached Palace
In Hawaii

HILO HOTEL

142 KINOOLE STREET
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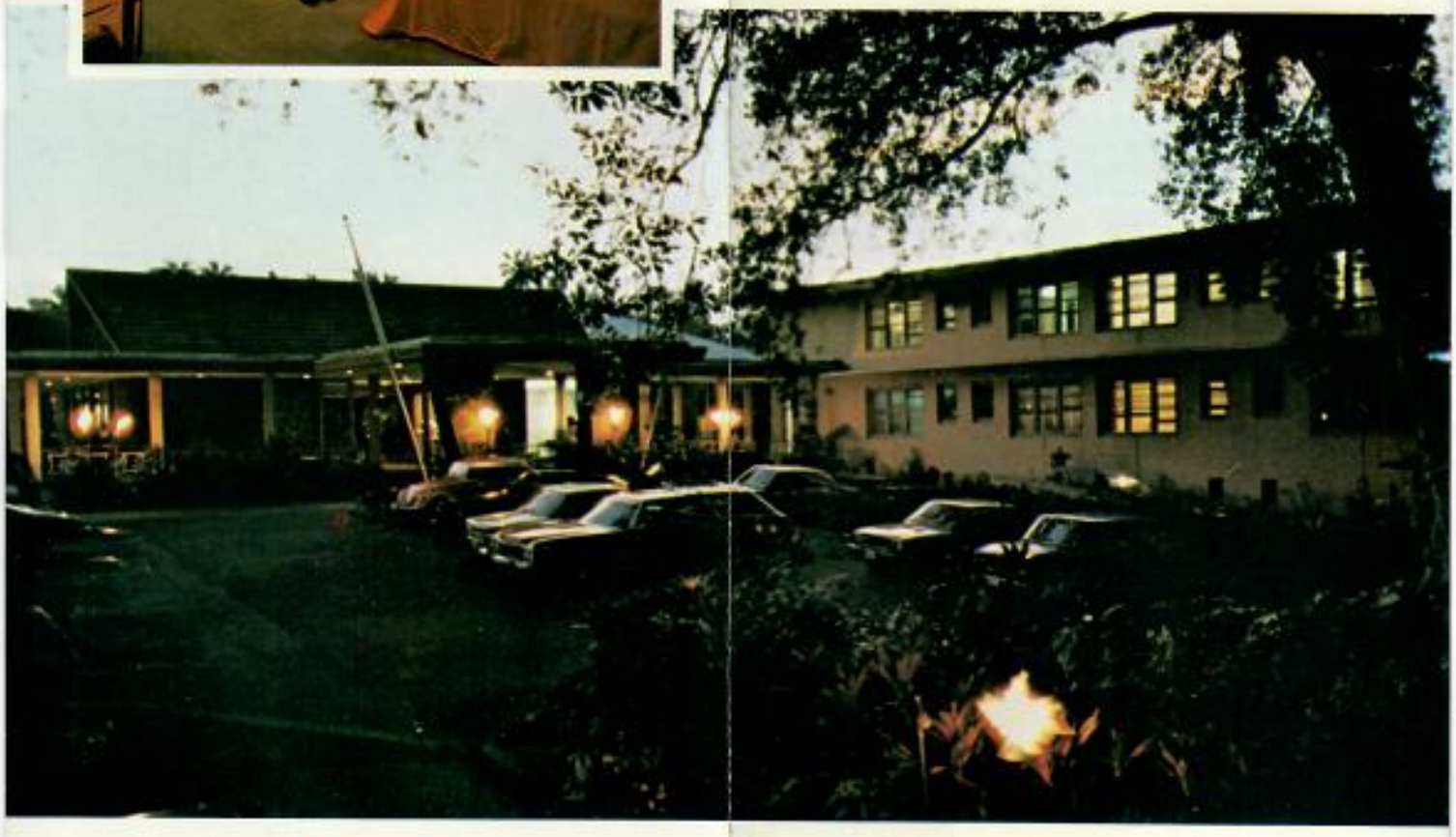
1 block to banks and post-office



Hilo Hotel
P. O. Box 726
142 Kinoole St., Hilo, Hawaii 96720
Phone (808) 961-3733

A Detached Palace
In Hawaii

Hilo Hotel

was acquired by George Lycurgus from his old friends, Spreckels family in 1908. The Spreckels interest had built the main hotel structure in 1888, a hostelry consisting of ten rooms with two baths.

A small cottage in the rear, built some time in the 60's, had served as King Kalakaua's "Summer Palace", a hideout used by the monarch for poker and relaxation when they wanted to escape from the pressure of court life and politics in Honolulu.

Kalakaua's cottage remained in existence until 1955, when it was torn down to make way for a new hotel, but a rubber tree reputed to have been planted by Princess Ruth in 1873 and now a giant over a hundred feet tall with a girth of thirty feet still shades the grounds of the present hotel.

Comfort & Luxury — exciting holidays await you

Restaurant Fuji

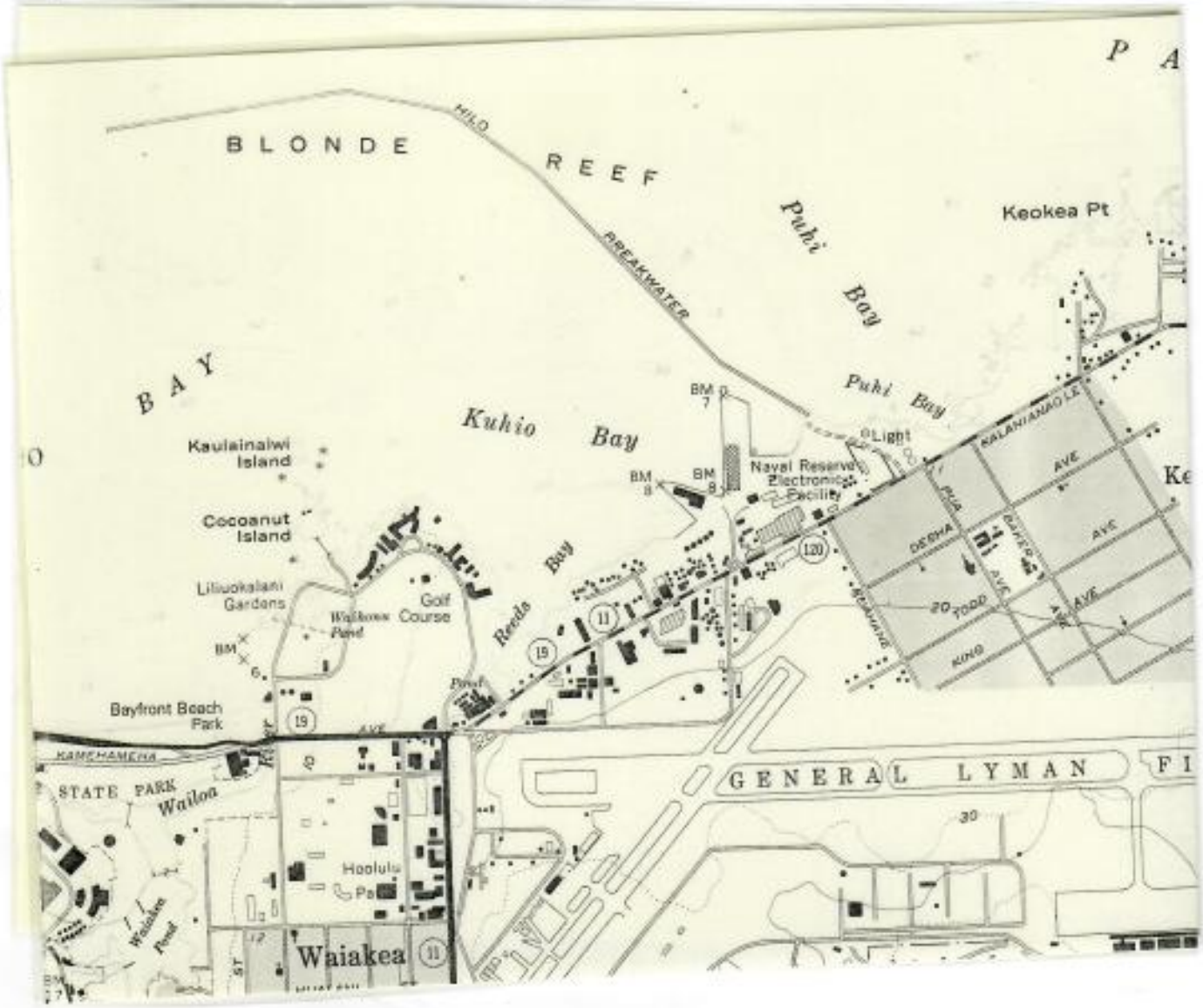
The relaxing atmosphere, combined with the oriental touch of Restaurant Fuji will give you a meal to remember.

Restaurant Fuji features a great number of unusual and delectable dishes prepared by chefs from Japan.

The lunch menu offers 8 complete "teishoku" lunches plus 4 "don" dishes and 5 noodle dishes.

The dinner menu consists of 15 different selections. For example, the Teppanyaki is a selection of beef and vegetables cooked before your eyes on a buttered grill. Also the Uminoko is prepared with various kinds of seafood, shrimp, crab, salmon, oyster and scallop.

Try something new and exciting at Restaurant Fuji.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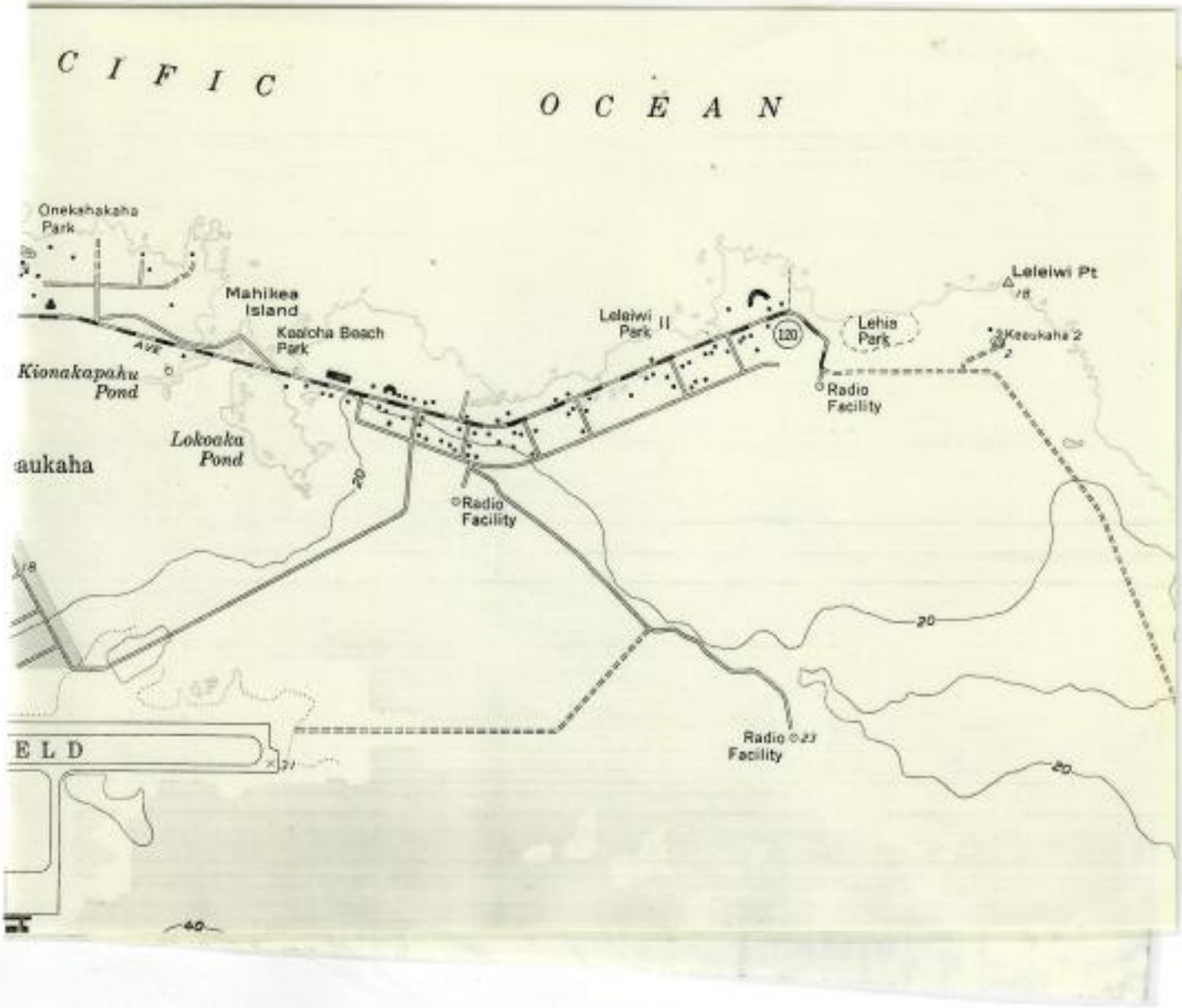
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Lehia Park
Leleiwi Pt
Keoukaha 2
Kionakapaku Pond
Lokoaka Pond
aukaha
Radio Facility
Radio Facility
Radio Facility
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Listen carefully and you will hear...

Seawords

News of the Marine Option Program — University of Hawaii

SEAWORDS SEPTEMBER 10, 1984 ISSUE 13

MOPER MEETING

On August 31 and September 1, the Marine Option Program held it's annual Coordinator's Meeting in the Marine Science Building at the University of Hawaii, Manoa. I was present at the first half of that meeting, and I'll try to present some of the more important points in this article, as what transpired is of interest to MOPers throughout the state.

John Craven opened the meeting with an inspirational speech recounting the history of marine science at the University of Hawaii, it's present status, and his hopes for the future. The program began 18 years ago when it was decided that there was to be a national commitment to marine science. Governor Burns instituted "Hawaii and the Sea", which resulted in recommendations, legislation and finally a coordinated program at UHM, including Sea Grant, MOP, and a state Marine Affairs Coordinator, which evolved into the Ocean Resource Office. During the Nixon era, this initial period of prosperity and rapid growth was all but stiffled. Haldeman said outright that the oceans are not important to America, and since then, although the program has gotten verbal support, the budget squeeze has been on.

As a result, all of these initial seeds have had to sprout and grow in a highly competitive environment. There seems to be little perception, at the top, of the total marine environment, and yet the programs have consistantly gotten grass-roots support.

Craven is presently reviewing Hawaii's progress in Marine Technology. Foremost is the Keahole Point Natural Energy Lab, where work is being done on applying ocean thermal energy to everything from abalone farms to OTEC. Hawaii, at present, is the world leader in ocean thermal energy research; primarily because everybody else has dropped out of the field. In addition, the Pacific Center for High Tech Research is doing work with the SeaMARC II sonar system, Deep Rover, and the whole HURL submersible and sub launch program. DUMAND-- a plan to use the ocean itself to detect high energy particles by Cerenkov radiation-- is still alive and well.

Although there are problems, mostly with the budget and legislature, MOP's program of ocean education is taking hold and growing. The program is exponentiating every ten or fifteen years.

Next on the line up was the campus reports, starting with Manoa. Activities have included classes on limu, coral and fish identification, the Maui Transecting Workshop, MOP-ins with special speakers, trips by MOPers to the Northwest Hawaiian Islands and scuba classes. There's been talk of tie-ins, with possible internships, with the College of Business Administration and the School of Engineering. Now, the 7th Annual Fishing Derby is coming up, as are various appearances at vocational and science fairs and radio spots, various field trips, an aquaculture tour, night snorkeling expeditions and a wide range of recreational and social events.

Fund raising plans which worked in the previous year, and will likely be repeated, include the big sea food plate lunch sale. Notable upcoming projects are the state fish selection and the possibility of computerizing the skill project lists.

At the Windward Community College, seven MOPers were graduated and nine skill projects were completed . A ceramic mural was constructed by two Windward MOP artists, and the program included a variety of tours, lectures, films and displays. The whole MOP program at Windward has expanded this year due to increased support from the WCC administration. The Hawaiian Backyard Aquaculture Project has still been the focus for activities at Windward, and most skill projects have revolved around

Continued page 3

RESEARCH AT U.H.

JEANETTE YEN

On a recent cruise of the R/V KILO, several days were devoted to the unique research of one woman: Dr. Jeanette Yen, who's been doing comprehensive studies of a specific type of plankton at three different latitudes. These research cruises are studying the copepod Euchaeta near Norway, Seattle, and Hawaii, looking for similarities and differences brought about by adaptations to three different environments.

Euchaeta, a minute, free-swimming crustacean is itself somewhat unusual in that it's a carniverous species of copepod, preying on other zooplankton, such as other copepods and, at certain times of the year, fish larvae. Most copepods are herbiverous, but at the next tropic level, Euchaeta is the most prevalent of the carniverous zooplankton of it's type.

The main subjects of these investigations are the copepods diet and verticle distribution in the ocean. The research on this particular cruise involved a series of plankton catching tows, both with open nets and with 'bongo' nets which can retrieve a sample from a specific depth range. These samples were taken throughout the day and night, at a wide range of depths, to correlate feeding habits with time of day, light levels and the like, as well as to gain an over all view of how Euchaeta population and behavior relate to location, food type, presence of predators and many other factors.

The results have been interesting. There is little difference between the subarctic and temperate zone Euchaeta, but the tropical, Hawaiian version is another story entirely. It's smaller and contains less lipids, but the reason for the differences is not quite clear-- the higher temperature and lack of a seasonal cycle may have resulted in different Euchaeta feeding habits, but all the results aren't in yet. In addition, it seems that the relationship between predator and prey size is not always rigidly fixed, but changes with climate and food availability.

This research is unusual in several ways. First, most copepod research has centered on the herbiverous species, a larger source of food for fish. But the importance of Euchaeta shouldn't be underestimated. One study showed that, in a particular bay, they can consume a large percentage of fish larvae. Also, the temperate and subarctic varieties contain large amounts of lipids, or fats; an excellent source of energy.

In addition, these studies are trying to measure feeding rates before the copepods are caught, by measuring fecal pellet production in isolation.

Studies in all three areas used the same basic laboratory techniques, including tests to determine the copepods favorite prey. Sampling techniques, however, were somewhat different; the plankton concentration is somewhat lower around Hawaii, and instead of vertical tows (which bring less water through the net), oblique tows are being used.

While at the University of Washington, Dr. Yen did her thesis on the feeding habits of one particular strain of copepod. Some five years ago, while on vacation, she met Jed Hirota, who told her about his work and suggested that she run the comparison studies. At present she is on a two-year NSF grant as a post-doctoral fellow.

These Euchaeta experiments are only one example of a research program at UH where graduate students (here Bob Harman and Jim Finn) work with scientists from around the world on projects with globe-spanning scope.

OF INTEREST

The big news around the MOP office all concerns the upcoming election. Of course, the whole state-- the whole nation-- is abuzz, as "Decision '84" (as some are calling it) will be a turning point in history. More than that, it's the first truely dramatic election we've had in many years: a clear choice guaranteed to polarize the voting public. But it'll be a close race from starting gun to finish line-- nobody's placing any bets this early on, despite what the polls say. But whether the winner is candidate manini or kala or humuhumu-nukunuku-- what's that? You thought I was talking about the presidential election? Cut me some slack, man-- it's the race to decide the state fish that you should be following.

The Marine Option Program and the Waikiki Aquarium have been chosen by the '84 legislature to assist in the selection of a state fish for Hawaii. It must be indigenous, culturally significant and readily visable, and nominations are being accepted from everybody-- both residents and visitors are being actively encouraged by Ka I'A Hawai'i, the organization formed to handle this bedlam. The legislature will make the final selection.

At present, the front runners are: hinalea lau-wili, the saddle back wrasse; kala, the bluespine unicorn fish; kumu, the whitesaddle goatfish; lau- wiliwili-nukunuku- 'oi'oi, the longnose butterfly fish; uhu-uliuli, the 'peckled' parrotfish; manini, the convict tang; humuhumu- nukunuku- a- pua'a, the reef triggerfish; and awaowao, the glass eye. Write in candidates are also encouraged.

MOP Director Sherwood Maynard will be on a mainland trip from September 1 through September 18. He'll visit the National Science Foundation and the National Museum of Natural History, meet with Senator Spark Matsunaga and talk about MOP at the Ocean '84 Conference in Washington DC. This is the first time that MOP, a unique program, has been discussed at a national level.

MOPer LETTER:
Diane Mazarakis, Hilo MOP

The UHH MOP Coordinator, Dr. Walter Dudley, was in France this past summer partaking in two research cruises that will study the water, atmosphere, and ocean floor along the east Asian continental margin. The first cruise, August 31 to September 24, will sail from Nagasaki to Yokohama through the Sea of Japan. The second expedition will depart Manila in the Philippines and dock at Djakarta, Indonesia.
Diane Mazarakis, the UHH MOP student coordinator, keeps him updated.

.....July 3, 1984

Dear Walt,

Hope you are well and enjoying all your free time. Hilo is quiet, MOP is busy.

Ten of us just returned from one of George Balazs Green Sea Turtle tagging expeditions at Punaluu, June 26, 27, and 28. Everything went well. We caught a few large adults and also the smallest turtle yet, 35.2cm., thirteen all together. We caught a long term recovery that George had tagged nesting at French Frigate Shoals in June, 1982. It's a great recovery. We will make one more trip during July, it'll probably be our last one. We dissected a turtle today, before George had to leave. It was interesting but I don't think I want to ever do it again. And soon, we'll be having a net mending party. The nets are in shreds, auuggggghhhh.

The Richardson's Aquaculture Ponds Project is taking off. A terrific community effort by Hoa'aloha O Waiuli, the community group being organized there, has helped us tremendously with the pond clean-up. The County Park and Recreation Department have been real helpful too with equipment loans and debris pick-up. We'll be ready to begin making the makaha next week and within the next month we'll be stocking.

The bathymetric model of Richardson's Bay is complete but we've decided to supplement it with another map.

We've begun some work at Shipman's estate with Dr. Fast's floating pen culture of trout. He expects to be in full swing during the middle of July. It's already the 4th, holy mackeral.

The gutters are up and the boat shed is dry. The Patti-Jo is sanded and ready for painting. The trailer got it's first coat last week. I'll get back to you on what color we paint the boat. We've got a can of yellow and a can of red. That ought to mix into a mean flourescence, we've been thinking of stripes.

Can't wait to hear from you,

..... Diane

Continued from page 1

its water quality, economic and chemical analysis, recycling and so on. One problem has been that the MOPers seem to be less close knit there than at Manoa. No active recruiting has begun yet.

Hilo MOP presented a beautiful slide show of their facilities and activities. For the latest on MOP Hilo, I'll refer you to Diane Mazarakis' letter, elsewhere in this issue.

At Maui MOP, the biggest problem is money. The students, for example, have difficulty affording diver certification, and they are relying heavily on the run run which, last year, raised $600. Fortunately, a great deal of equipment has been donated, and many field trips, including night and tidal pool dives, are planned. Again, a major goal is to make MOP more visible. A co-sponsored lecture series is planned with Sea Grant and the Sierra Club, with the hope of involving the community. Titles include 'Aquaculture', 'Coral Reef Ecology', and 'Whale Research in Maui'. The Maui Transecting Workshop is always a major concern, as is the underwater trail project. A 'Shark Social', designed to get people together to talk about and eat sharks is planned, as are numerous field trips.

Sherwood Maynard gave a 'system level' report on MOP activities. There are 455 MOPers, some 185 of whom are new.

57 of those completed skill projects, and 35 certificates were given-- all about the same as last year. There were four active campuses, Manoa, Windward, Maui and Hilo, with the possibility of starting up one at Kapiolani. There were some 527 activities statewide, with 15,000 people reached. The Maui Transecting Workshop involved 40 people and 6 campuses, with follow up trips to Samoa, the Diamond Head Kapuku Survey Area and the Northwest Hawaiian Islands.

There was a special report on the Maui Transecting Workshop, or MTW. In this program, 40 MOPers were taken to Maui to polish safe diving techniques and learn about transecting and coral reef biology in the field. Another slide show was presented, highlighting the time the students spent together and the techniques they learned. These included transecting with a photo quadrat, a camera and frame designed to take pictures of the substrate, with the general idea being the creation of a permanant record of sea life and substrate.

There will be some changes in the next MTW in '85, including moving it back to after finals and lengthening it to 10 days to provide a more relaxed atmosphere.

The MOP degree was the final major concern presented on Friday. MOP is closer than ever to getting the recognition and support that will move it from being a certificate organization to a degree program. This would both take the pressure off Sea Grant and provide for the needs of students who've been asking for marine degree.

The first trial balloon would set up a 'pre-oceanography' degree under the Liberal Studies Program with the possibility of upper division electives. It's still under consideration... but the signs and portents look good.

Next issue: a report on comrade Maynard's Five Year Plan for MOP.

The Calendar

SEPTEMBER

5 DUE Classes start
5 MOP sponsored NAUI scuba classes start at UHM. Call 948-8433 for details
6 Number one in the Water Resources Research Center's Seminar Program: Dr. George Richardson speaks on "Determination of National Marine Pollution Research and Monitoring Issues Utilizing a Decision Analysis with Paired Comparisons (DAPC) Computer Program". Watanabe 420, 1500 hours.
7 Last day at UHM for late registration.
7- Oct. 19 Fall Docent Training & Instructional Workshop at Sea Life Park. Call 259-7933.
8 MOP Fishing Rally
9 BML Graduation-- Waikiki Aquarium, 0700 hours
13 Water Resources Research Center seminar: Mr. Zhiyuan Fan on "Water Balance and Water Utilization in North China Plain"
13 Deadline to register for Oct 13 GRE.
14 Last day at UHM for dropping classes.
15 BML-UI Workshop
20 Water Resources Research Center seminar: Dr. Roger Fujioka on "EPA's Proposed New Criteria for Recreational Water Quality".
23 MOP Towing excursion from Snug. See Annie, Sherwood or Scott.
24 BML Cruise Series One starts from Snug Harbor.
26 MOP Advisory Council, MSB 204/205, 1630 hours, everyone invited
29 State Fish Candidates march in Aloha Day Parade.
30 MTS Annual Picnic and Milk Carton Race.
30 MOP Welcome Back Party, Pauley Estate beach house, Coconut island, 2-6 pm. See Scott or Annie.

OCTOBER

4 Water Resources Research Center seminar: Dr. Philip Loh on "Uses of Marine Molluscs as Sentinel Animals to Assess Ocean Waters for Sewage-borne Human Enteroviruses.
9 Holiday-- Discoverers Day
18 Water Resources Research Center seminar: Mr. Donald McDonald on "Hydraulic Study of Drip Irrigation Emitters and System Design for Wastewater Reuse"
14 MOP towing excursion.
19 State Fish Nomination Convention and Rally, Waikiki Aquarium, 1600 hours.
28 MOP Towing Excursion.1 Water Resources Research Center seminar: Dr. Richard Ward on ...."Environmental Spread of Viral Diseases".

NOVEMBER

4 MOP towing excursion.
6 The General Election.
15 Water Resources Research Center seminar: Dr. Paul Ekern on "Acid Rain in Hawaii".
18 MOP Towing Excursion.
30 Last day to vote for State Fish-- 5:00pm deadline.

SEAWORDS
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Sherwood Hayward — Director — 948-8433
David Stroup — Editor — 262-6485

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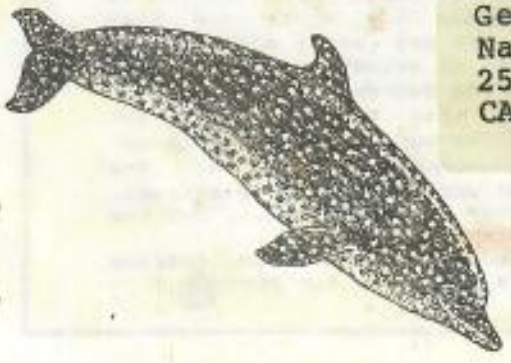
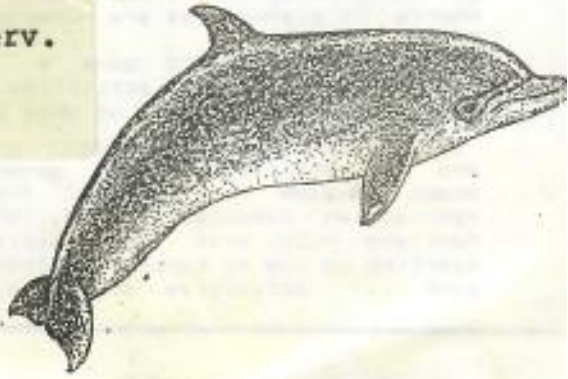




Hawaii Report
Column
don Chapman

The Honolulu Advertiser
Thurs. Sept. 13, 1984

Yes, it did, Eileen said, offering verification — or bearification, if you prefer . . . Mid Pacific Air ferried yet another green sea turtle to the Big Island for release into the wilds of the Ka'u Coast by the UH Marine Options Program □ □ □

What's this
OLD NEWS?

LISA
15 HINA ST.
HILO 96720

CISA HALE
MARINE OPTION PROGRAM
UNIV. HAWAII - HILO

NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

FROM
GEORGE H. BALAZS
HAWAI'I INSTITUTE OF MARINE BIOLOGY
P.O.BOX 1346
KANEOHE, HAWAII 96744

BIOLOGY AND CONSERVATION OF SEA TURTLES

LOCATION: X_1 KEAUKAHA (KING'S LANDING)

AUG FROM SHORE
SEPT BY LOCAL FISHERMAN

SURFACE
NO THGS
X_2 - HONOLI'I
OFF THE POINT
BY LOCAL SURFERS
PRETTY BIG, DARK GREEN,

2 TURTLES IN PONDS
KEHUKAHA
YELLOW HOUSE ACROSS ONE SMALL BRACKISH WATER PONDS

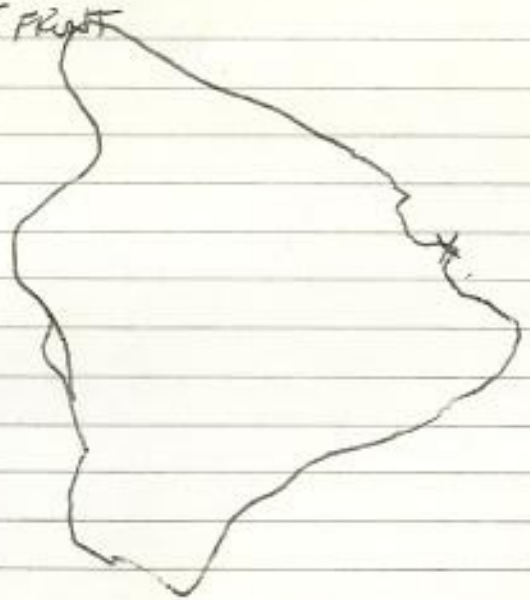
LOCATION: PUHI BAY
ROAD BEFORE SEWER PLANT
AT BEGINNING OF BREAKWATER AREA
2 LARGE (1 BIGGER THAN OTHER)
1 TAG (ORANGE COLOR)

OCT
1 DEAD COCONUT ISLAND

DEC
DEAD
70 lbs +
BUTCHERED
BEHIND AUILI STORE, KEAUKAHA

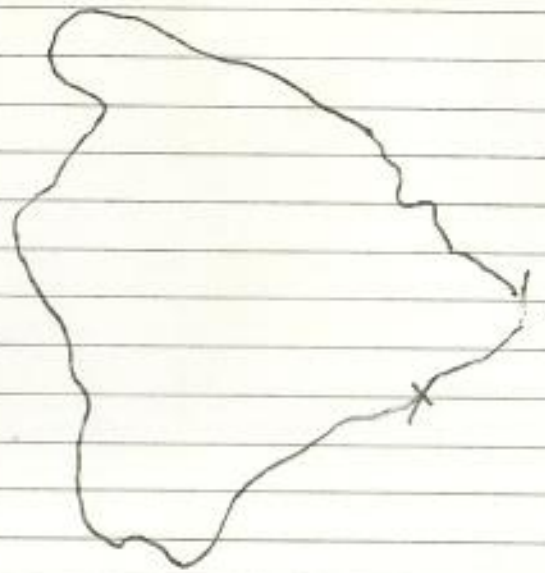
DOWN DIRT ROAD
AT END
BRCH OFF TO LEFT
OCT 22
2 TURTLES
FROM SHORE
50 - 60 YDS.
SURFACE

LBA HALL
NOV 2 9:00 AM
BOAT
SURFACE
TURNERS LEFT FRONT
PUHI BAY



NOV, 1984
3 TURTLES, SMALL (ALL)
SURFACE
1 SLASHED SHELL (1 & KNIFE SCARS)
DOVE WHEN APPROACHED

BEHIND AWILI STORE
DEAD TURTLE
SHELL GONE ; SOME MEET
BY SAND
CALLED AUTHORITY



KAPOLEI, LAST ROAD, BY BEACH
6 TURTLES
OLDEST ONE HAD FOR 8 YEARS
LIVING IN FISH POND
ALL SEEMED HEALTHY

BEFORE RONALD'S
TONI GURRO.
FISHES FOR TURTLE
PLENTI (12) 15-20 CAN SEE
ISOLATED PLACES, HIGH CLIFF
HOOK UP

LOCAL FISHERMAN
CAUGHT MAR 12, 1984
100 + lbs
STILL ALIVE WHEN OBSERVED
BIG UGLY TUMORS BACK R + L
NO TAGS OR MARKS

LOCAL FISHERMAN
CAUGHT LATE MAR
HILO BAY
HAS TAGS
JUST BROUGHT MEAT
SAYS OVER 170 lbs
USED ALL PARTS
MEAT TASTED TENDER HE SAY

BUTCHERED TURTLE
KING'S LANDING INSIDE ON ROCKS
NOT OBSERVED MYSELF
SHELL STILL REMAINED
NO MEAT, ROTTEN ARREADY
BEEN THERE A WHILE

HILO BAY

SMALL < 60 LBS
DEAD
KILLED BY FISHERMAN
WHO SHOWED IT TO ME
CLEAN SHELL

KIE'AUKAHA
CAUGHT IN NET
NEVER SAW, JUST MEAT
LATE MARCH
SAID HAS BIG WHITE STUFF
GROWING ON FLIPPERS, BACK
OF SHELL

BUTCHERED, COCONUT ISLAND
FOUND MAY
DECAYED ALREADY

Aug 27, 84

Aloha George,

Well, first day of school, all is well, Josh & Diane here, say hi. Here's the long over due book I've been spacing out returning for so long. I know it isn't what you expected. I still talk to people all the time and will try and remember to write down any thing important. Next time you are here maybe could arrange to go to Kapoho to see the turtles in the ponds. Write then take care.

Lisa

Hall

August 15, 1984

George;
the painted turtle site is one of my fishing grounds. Give me a phone call on prior to your Big Island trip & I'll show you the area. Its not a difficult trail. We can go to the site together. If the Sea is not too rough we may be able to get in the water

Bob
961-7501
961-7291 (Enforcement)

DAR
P.O. Box 936
Hilo 96720

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

MEMORANDUM

TO George

FROM BL

DATE 30 July 84

SUBJECT Turtle sighting

And attached a description of the "hunked" turtle we observed.

?

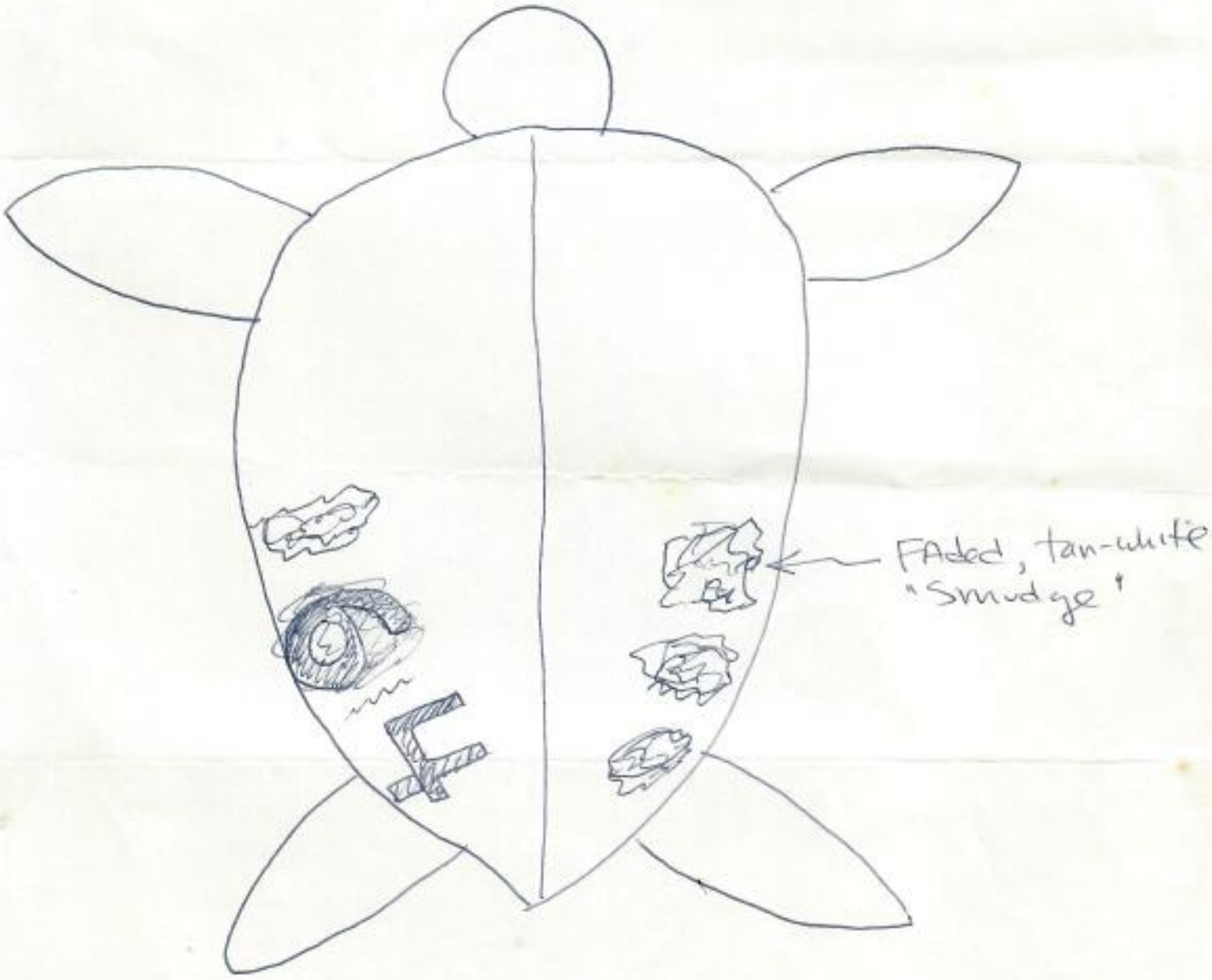
B

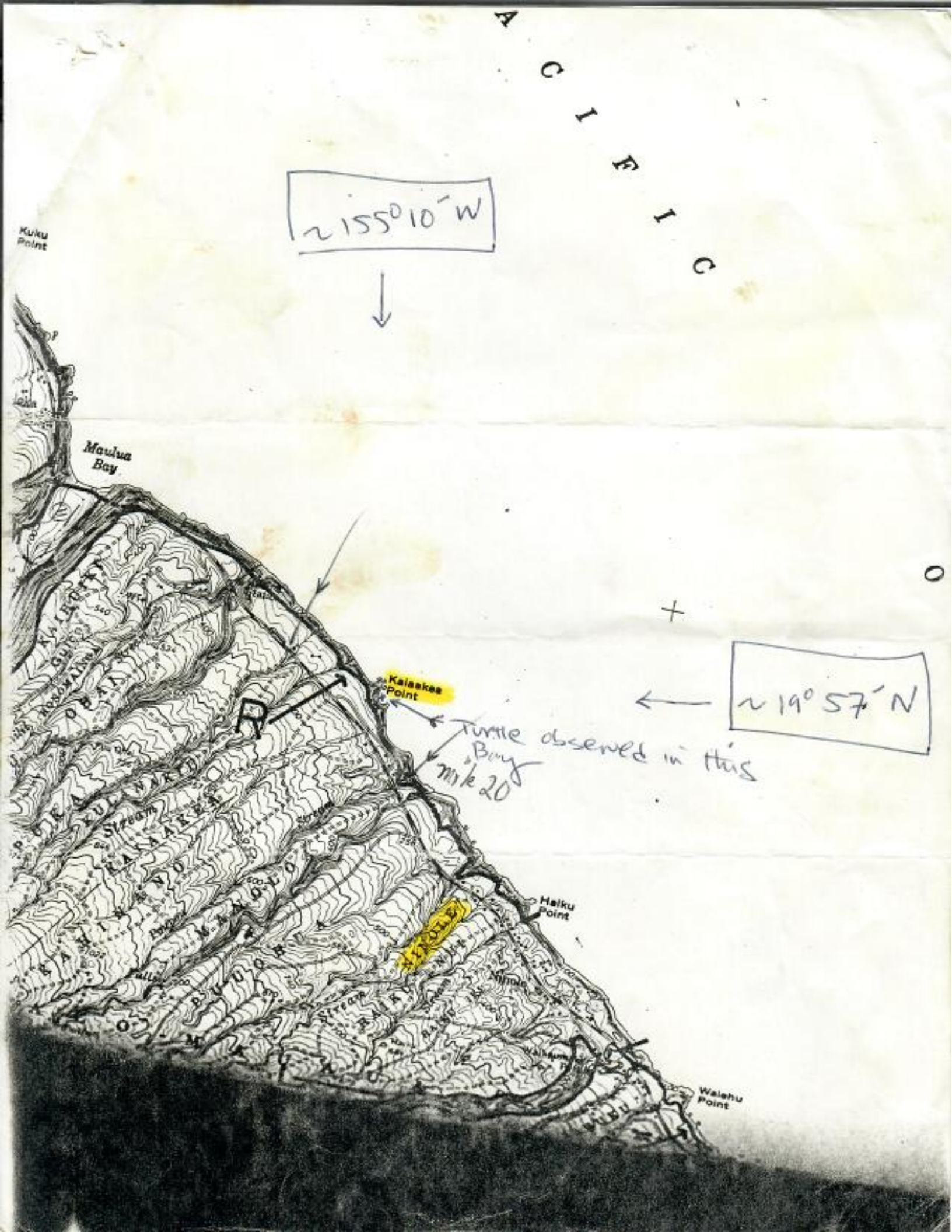
On July 10, 1984 we (Woody Dierberg and I) spotted a turtle with distinct numbers on ~~both~~ the left postero-lateral margins of the shell. We were on a vantage point (Kaiaakea Point- approximately 21 miles NW of Hilo) about 50 ft. above the water. The turtle surfaced in the middle of the Bay and floated for about 3-5 minutes. We had a lengthy discussion deciding whether the markings were artificial or natural. We both concluded that they were made with white paint (possibly with a spray can) after observing a second turtle which surfaced next to it.

We deciphered the numbers to be(blank) 6 4. I had problems discerning the number "6" but my friend could read it. The number "4" was readable. The distinctness of the number "4" was similar to the numbers on Turtle #73(slide 3). (or I said to him) On the contrary, the number "6" was difficult to distinguish and was similar to Turtle #18(slide 3). There was a smudge anterior to the number "6". Also, there were 3 indistinguishable, faded, off-white smudges on the ~~left~~ right postero-lateral edge of the shell.

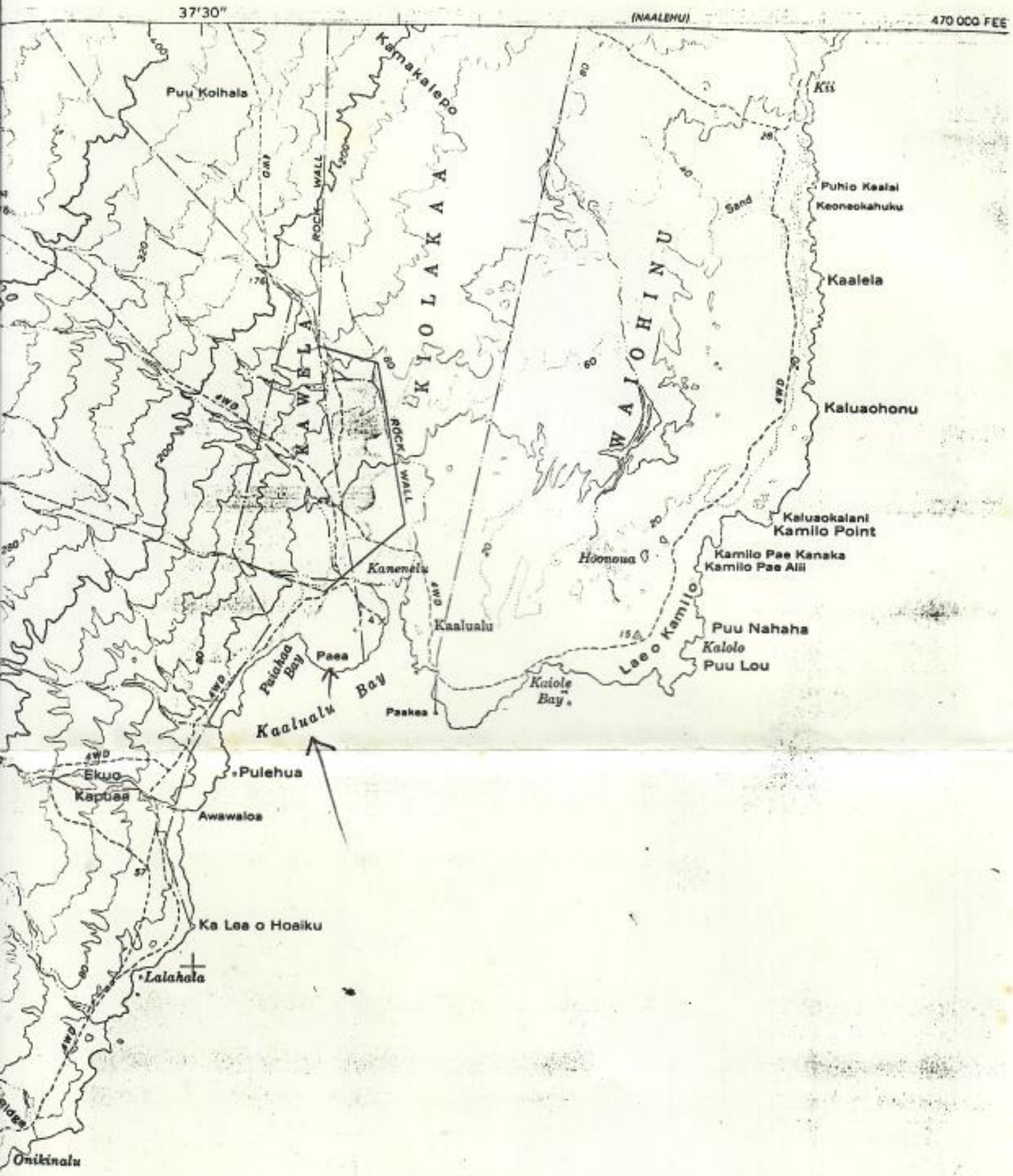
As far as I can remember turtles are frequently observed in this area.

Dr. Bob Nishimoto
Aquatic Biologist - DAR/DLNR

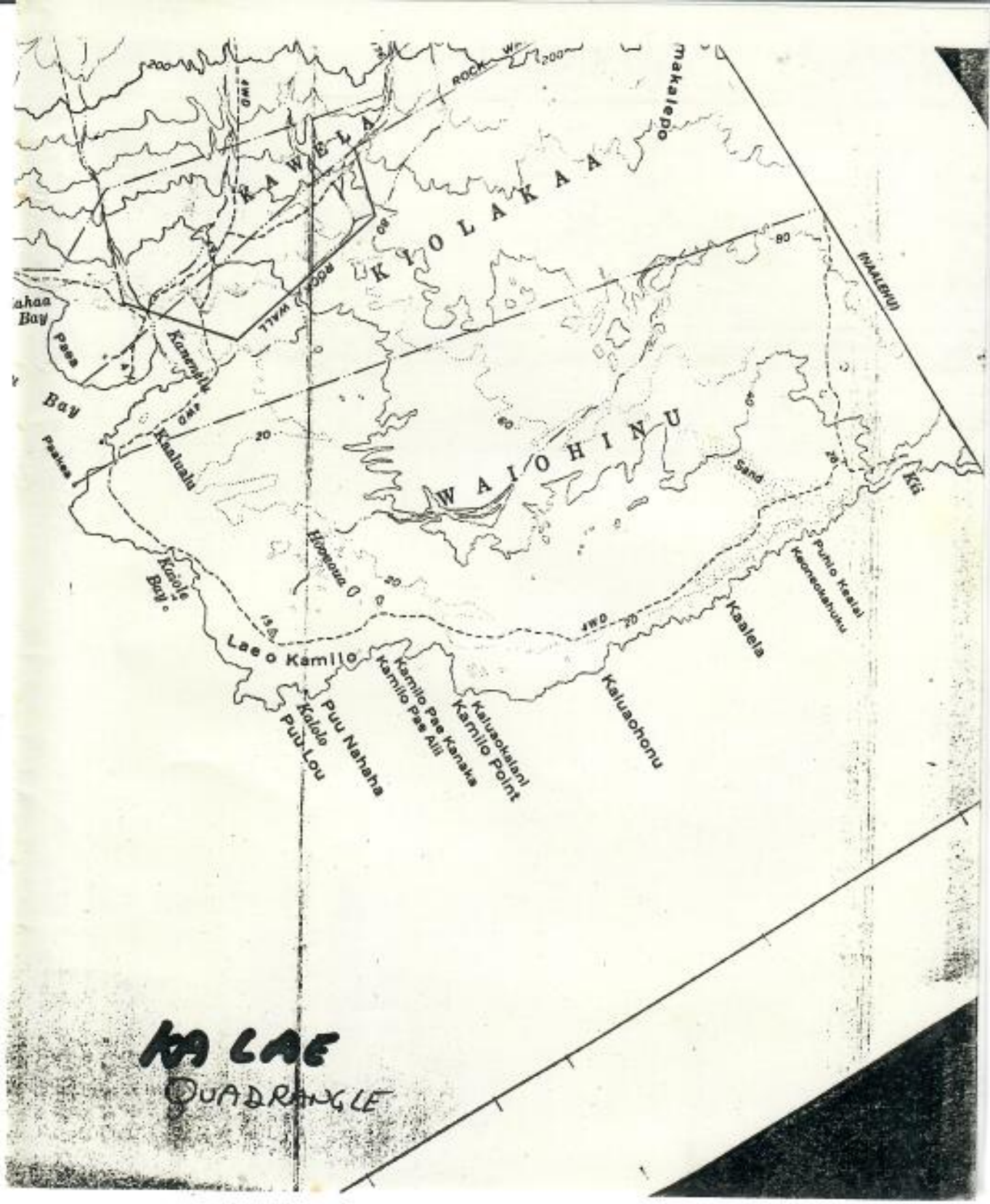

FAded, tan-white
"Smudge"

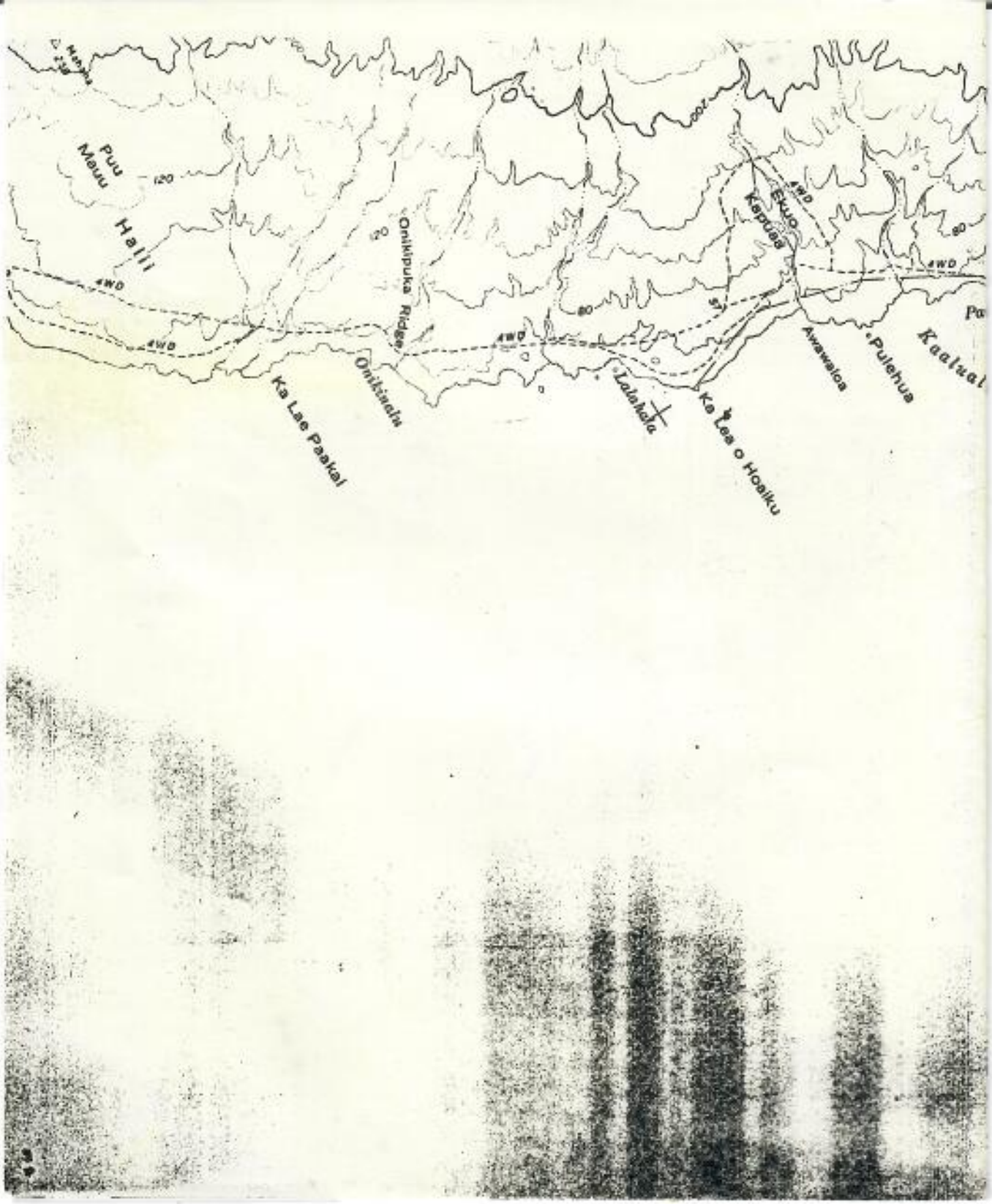

~155°10´W
~19°57´N
Kuku Point
Maulua Bay
Kalaakea Point
Turtle observed in this Bay
Mile 20
Halku Point
Waiahu Point
Stream
Pali

KA LAE QUADRAN
HAWAII–HAWAII C
ISLAND OF HAWAII–KAU
7.5 MINUTE SERIES (TOPO

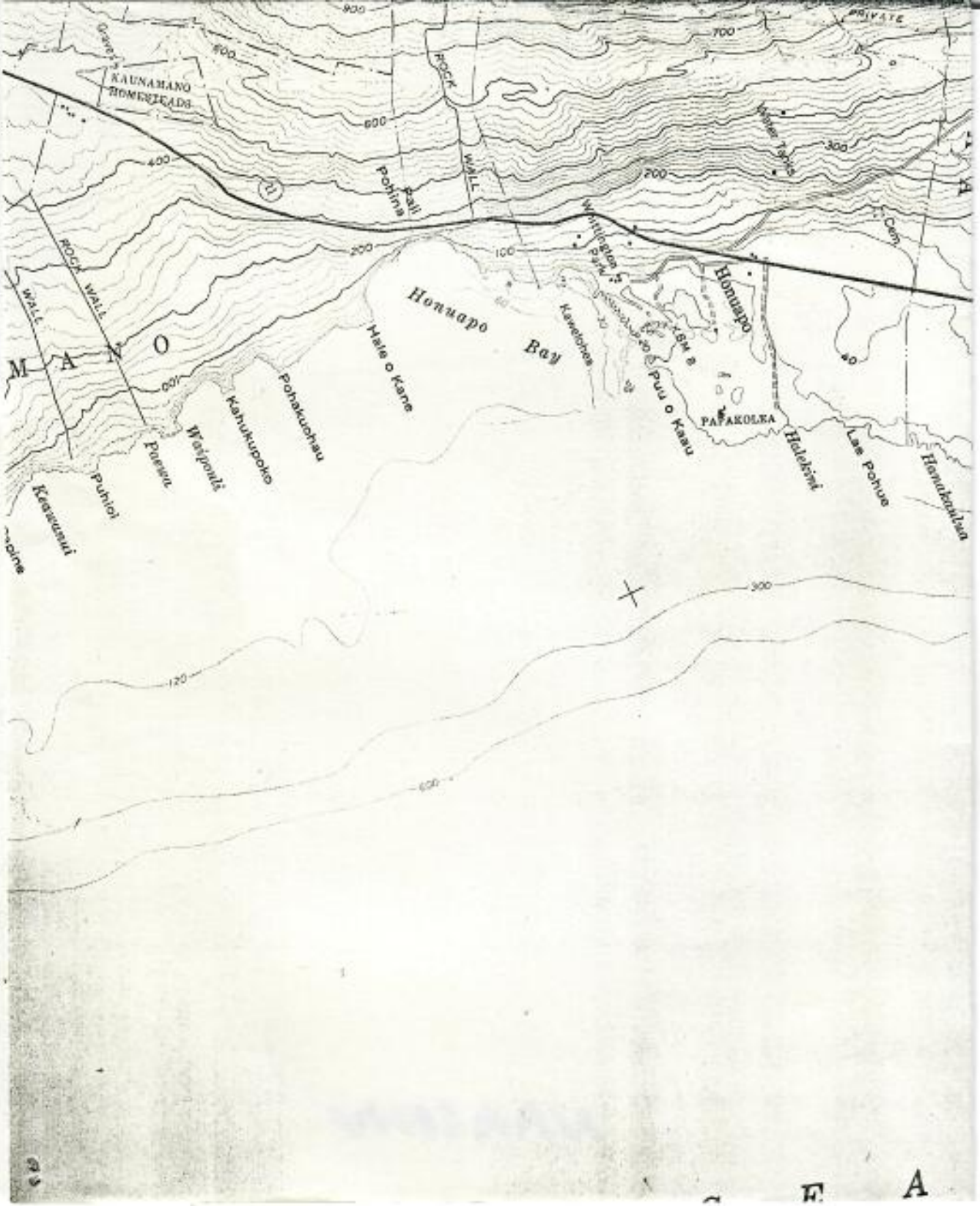


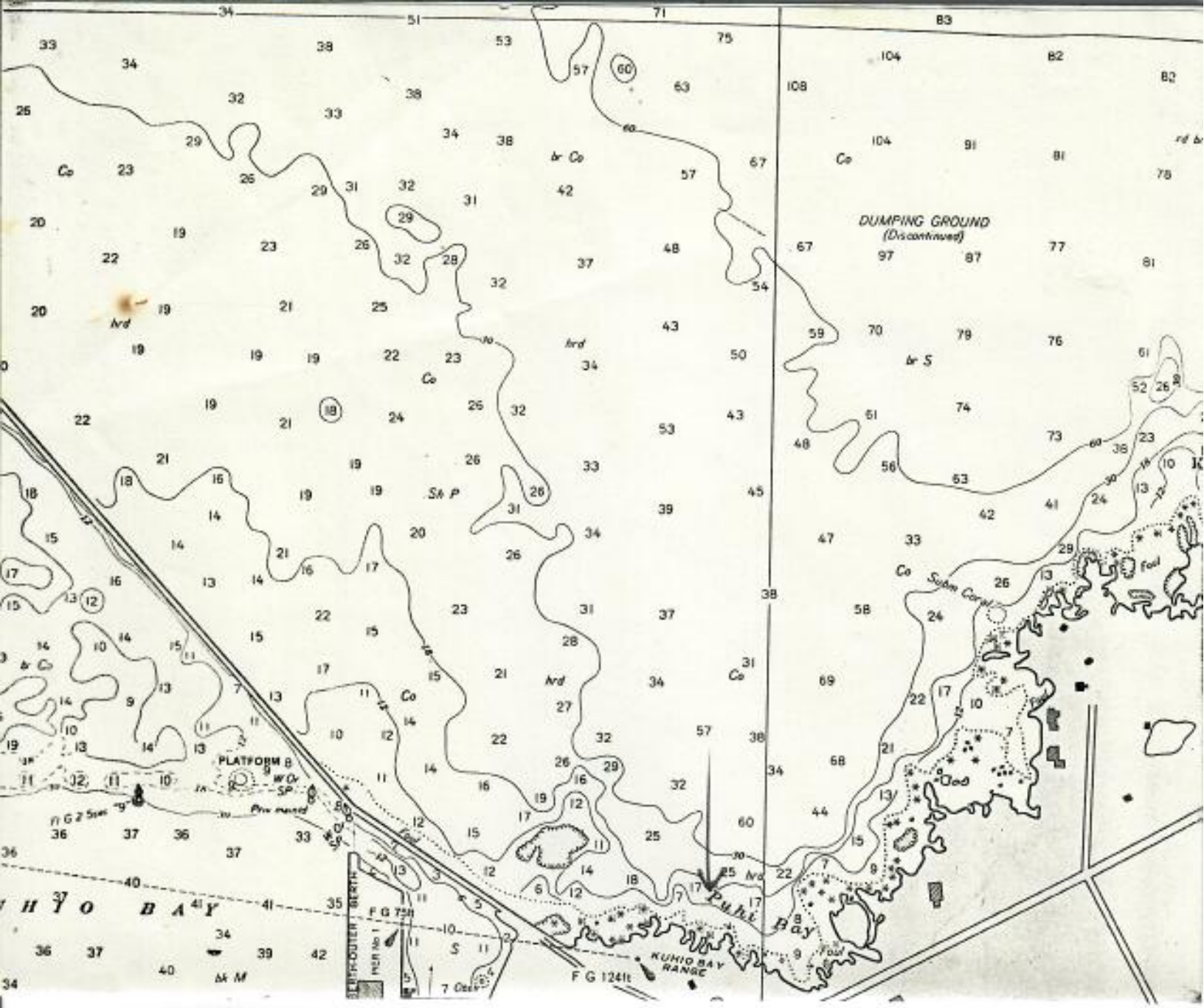
a Lae Paakai

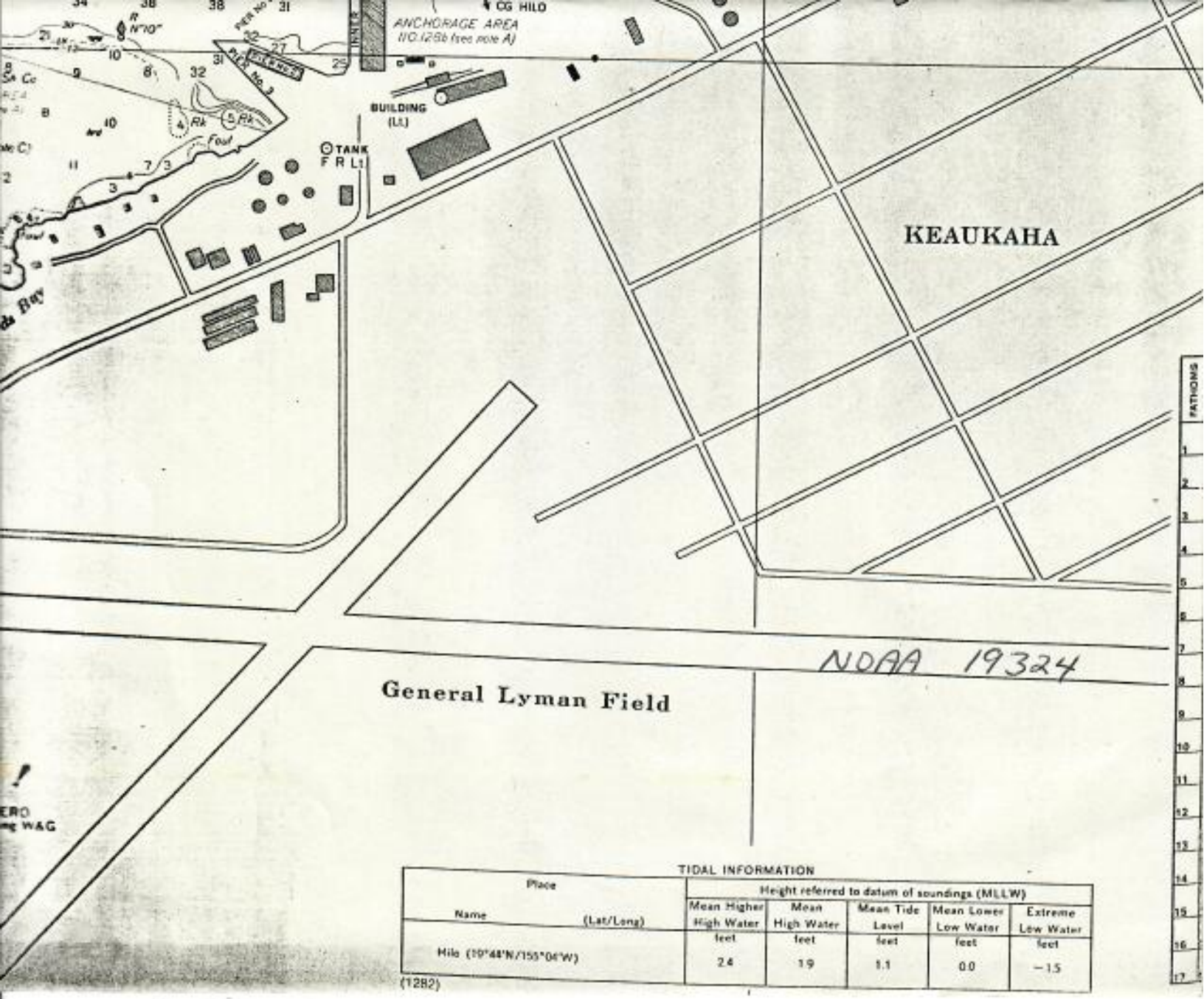

KAWELA
KIOLAKAA
WAIOHINU
Makalepo
(HAALEHU)
Kamemilu
Kealualu
Hoopuna
Kaiole Bay
Lae o Kamilo
Kalolo
Puu Lou
Puu Nahaha
Kamilo Pae Kanaka
Kamilo Pae Alii
Kaluaokalani
Kamilo Point
Kaluaohonu
Kaalela
Puhio Kealai
Kaoneokahuku
Sand
Pasture
Bay
Pass
ROCK WALL
KA LAE
QUADRANGLE


Puu Mauu
Halii
4WD
Onikipuka Ridge
Ekuo
Kapuaa
Awawaloa
Pulehua
Kaalual
Ka Lae Paakai
Onikiuaiu
Lalohala
Ka Lae o Hoaiku

NAALEHU
QUADRANGLE
N
ISLAND
7.5 MINUTE
32'30"
5.8 MI. TO HILO 60 MI. TO HAWAII 15
490 000 FEET
Water Tank
Spring
Kaiiiii
Hanai
Kauaa Bay
Puu Nahaha
Waiiea
Maakole
Hawaiiopa
Puhiopaheenee
Kamakahanoa
Hilea Gulch
Puuo Point
Kuhua Bay
HILEA
400
300
200
100
600
120
40


KAUNAMANO HOMESTEADS
ROCK WALL
Pali Pohina
Honuapo Bay
Hale o Kane
Pohakuohau
Kahukupoko
Waipouli
Paewa
Puhioi
Kealuaui
Kawelohea
Honuapo
PAPAKOLEA
Holehimi
Lae Pohue
Hanakahua
MANO

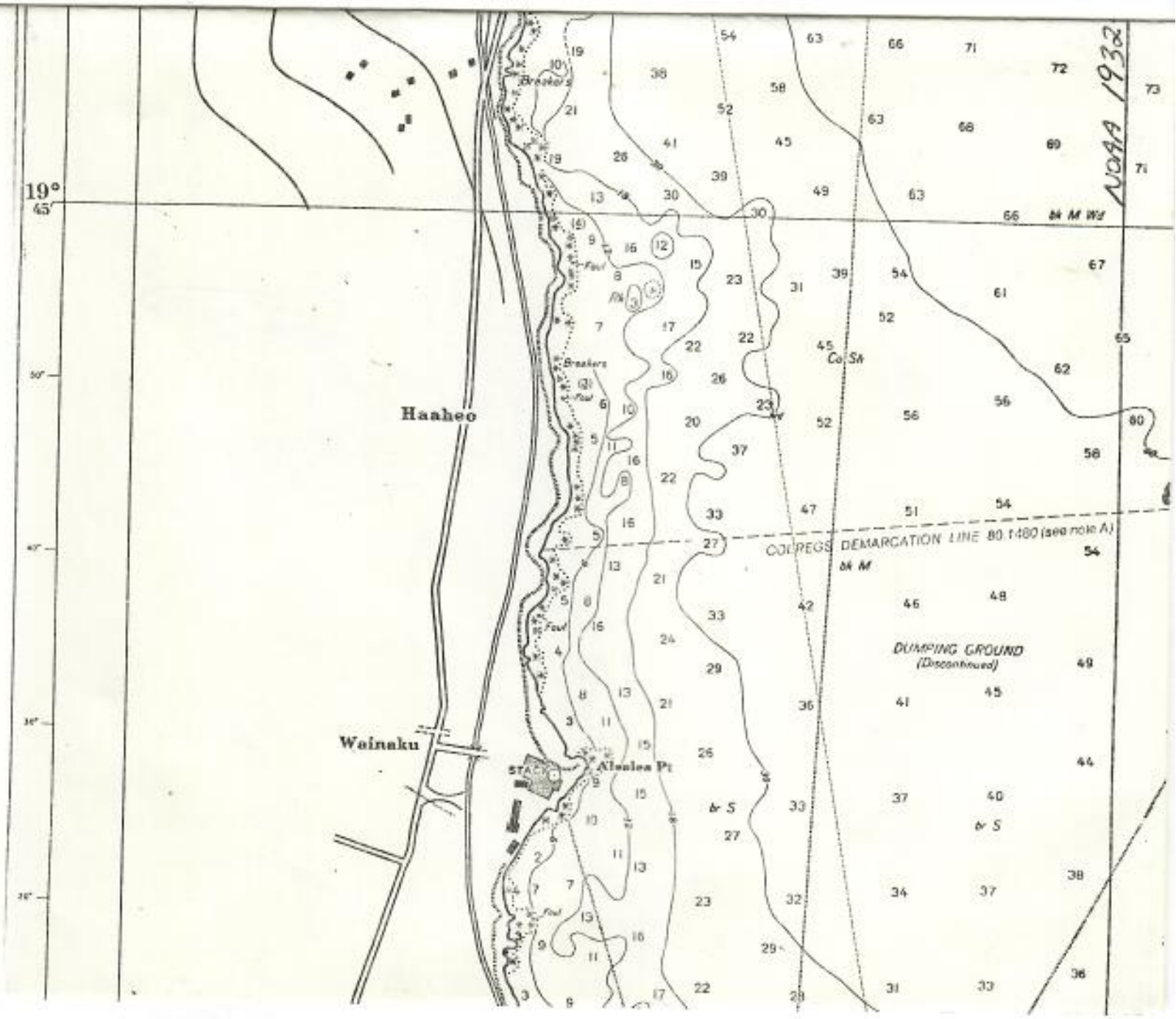

DUMPING GROUND
(Discontinued)
PLATFORM B
Puhi Bay
KUHIO BAY RANGE
F G 124ft
F G 75ft
Salem Canal
Co
Sd
Hrd
Fouls

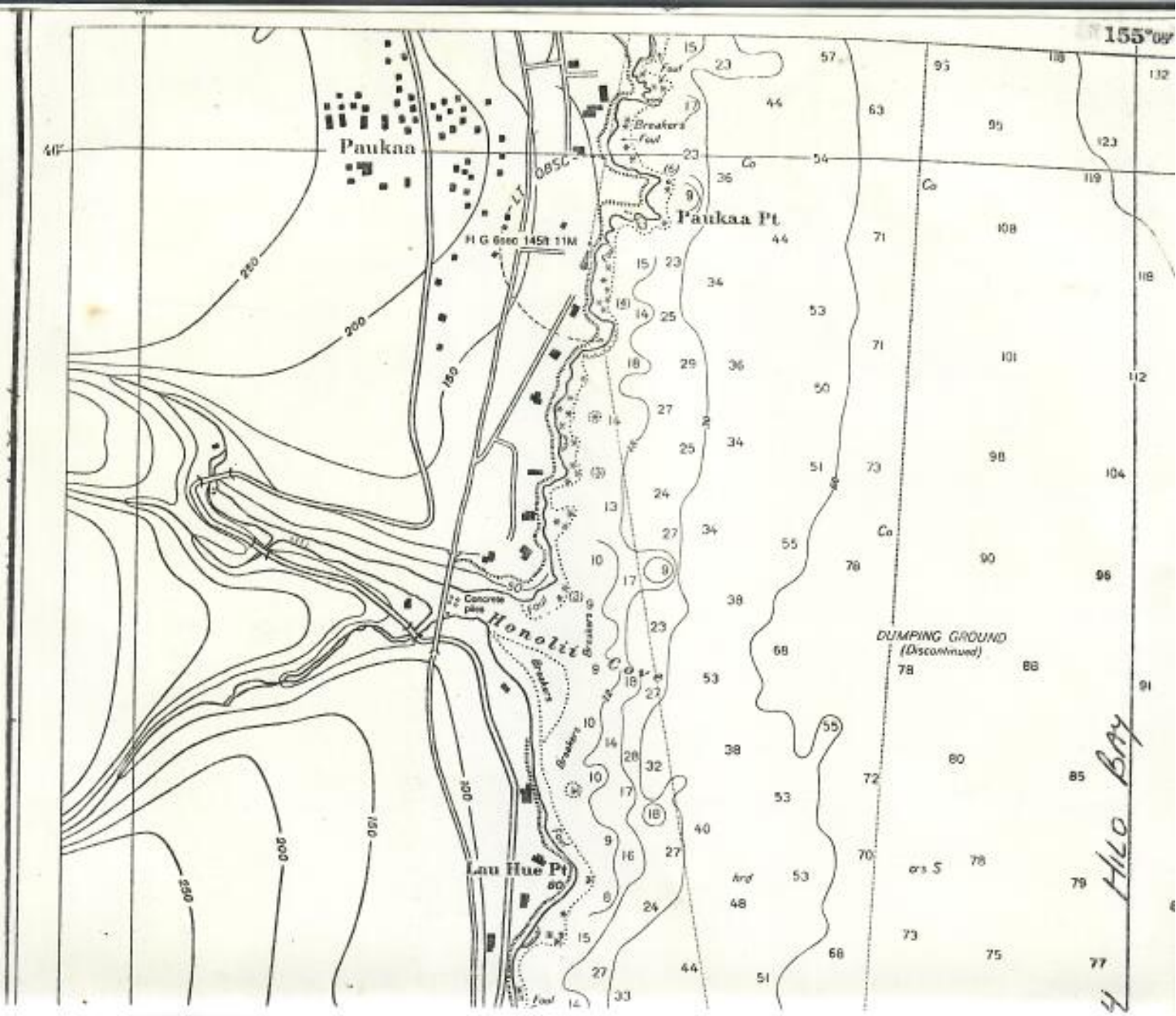


TIDAL INFORMATION

Place Name (Lat/Long)	Height referred to datum of soundings (MLLW)				
	Mean Higher High Water	Mean High Water	Mean Tide Level	Mean Lower Low Water	Extreme Low Water
	feet	feet	feet	feet	feet
Hilo (19°44'N/155°04'W)	2.4	1.9	1.1	0.0	−1.5

(1282)


NOAA 1932
19° 45′
Haaheo
Wainaku
Alealea Pt
STACK
Breakers
Foul
Co. Sh
COLREGS DEMARCATION LINE 80.1480 (see note A)
DUMPING GROUND
(Discontinued)
bk M
bk M Wd
br S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Paukaa Pt
Lt Obsc
H G Beac 145ft 11M
Breakers
Foul
Honolii Breakers
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Concrete piles
DUMPING GROUND
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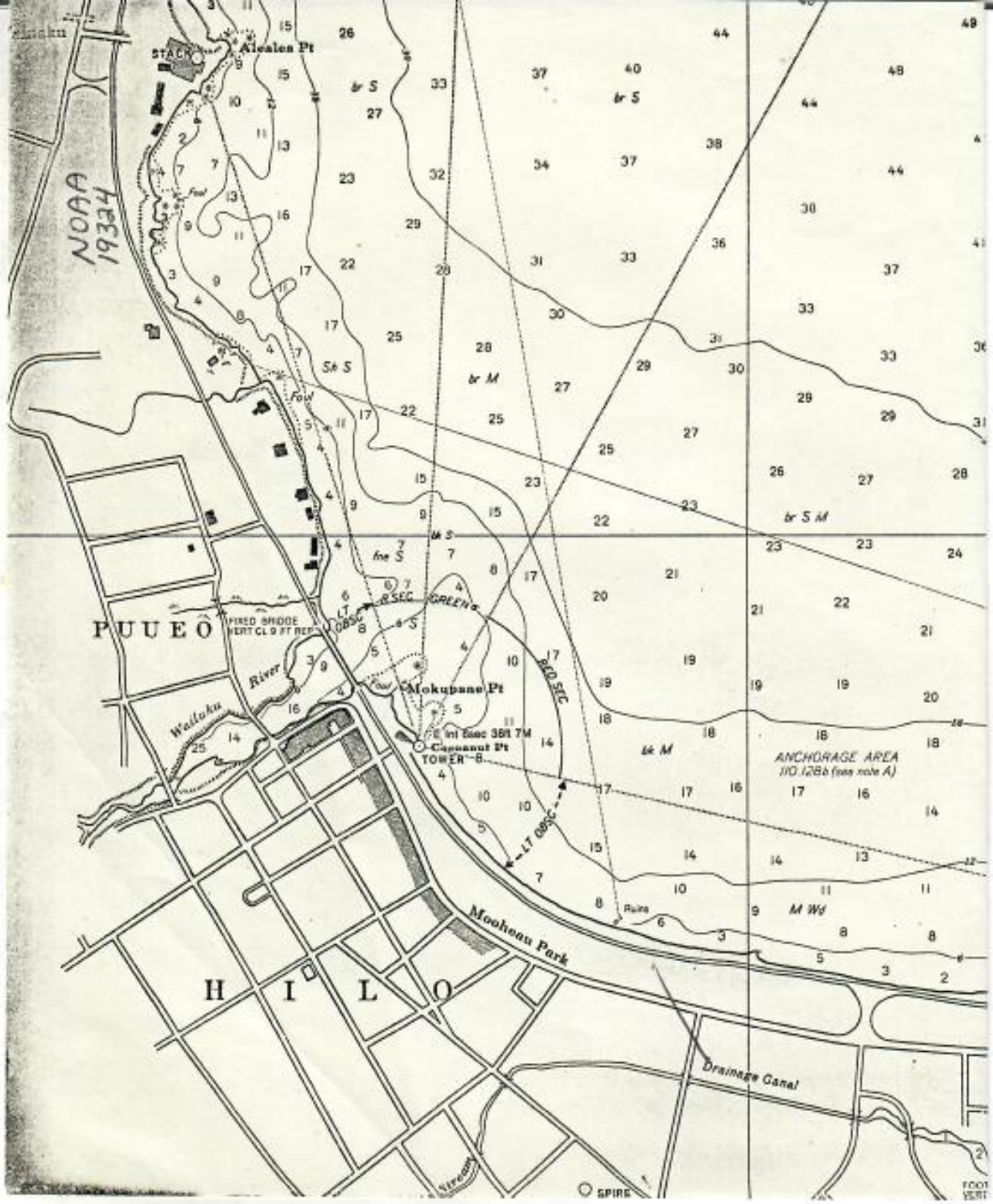
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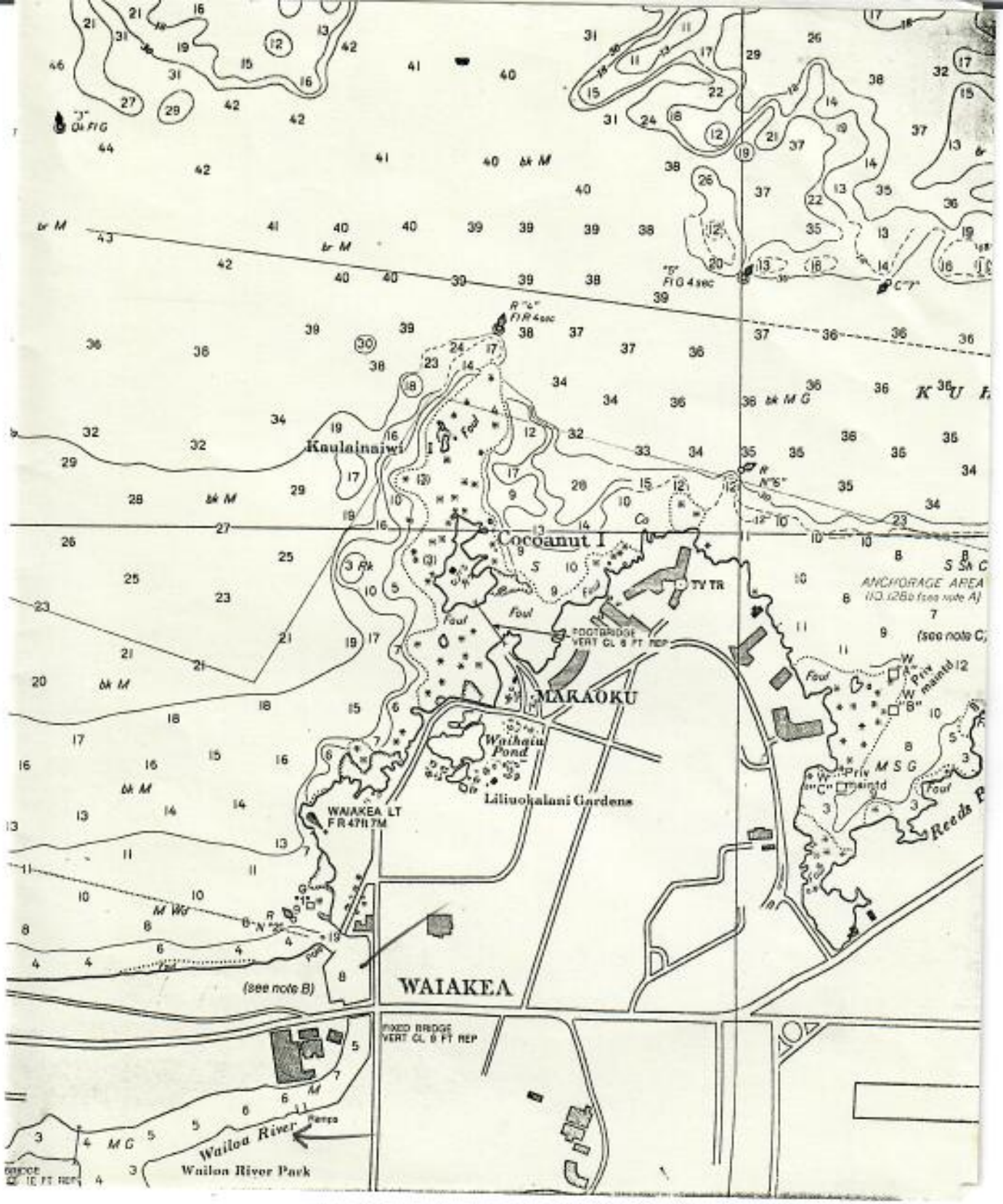
FIXED BRIDGE
VERT CL 9 FT REF
River
Wailoku
Mokupane Pt
R SEC
GREEN
RED SEC
LT OBSC
Cocoanut Pt
TOWER
ANCHORAGE AREA
110.128b (see note A)
LT OBSC
Ruins
M Wd
Mooheau Park
H I L O
Drainage Canal
SPIRE


Kaulainaiwi I
Cocoanut I
MARAOKU
Waihaiu Pond
Liliuokalani Gardens
WAIAKEA LT
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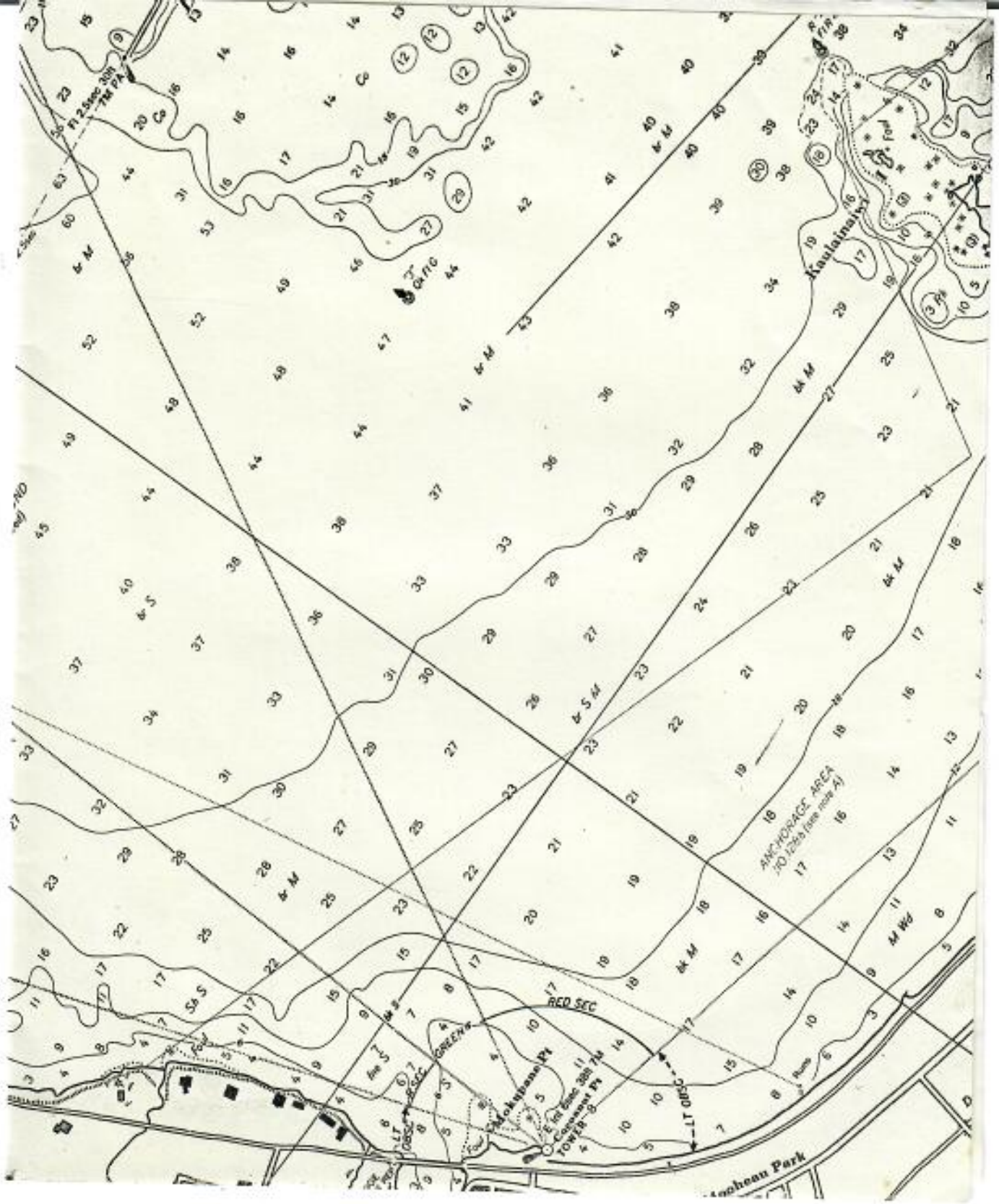
WAIAKEA
(see note B)
(see note C)
FOOTBRIDGE
VERT CL 8 FT REP
FIXED BRIDGE
VERT CL 8 FT REP
TV TR
ANCHORAGE AREA
Wailoa River
Wailoa River Park
Reeds
Foul
3 Rk


Kaulainaiwi
ANCHORAGE AREA
(10 12th fms inside A)
RED SEC
GREEN
Mokapaa Pt
Coconut Pt
TOWER
LT OBSC
Leahoau Park


HILO BAY
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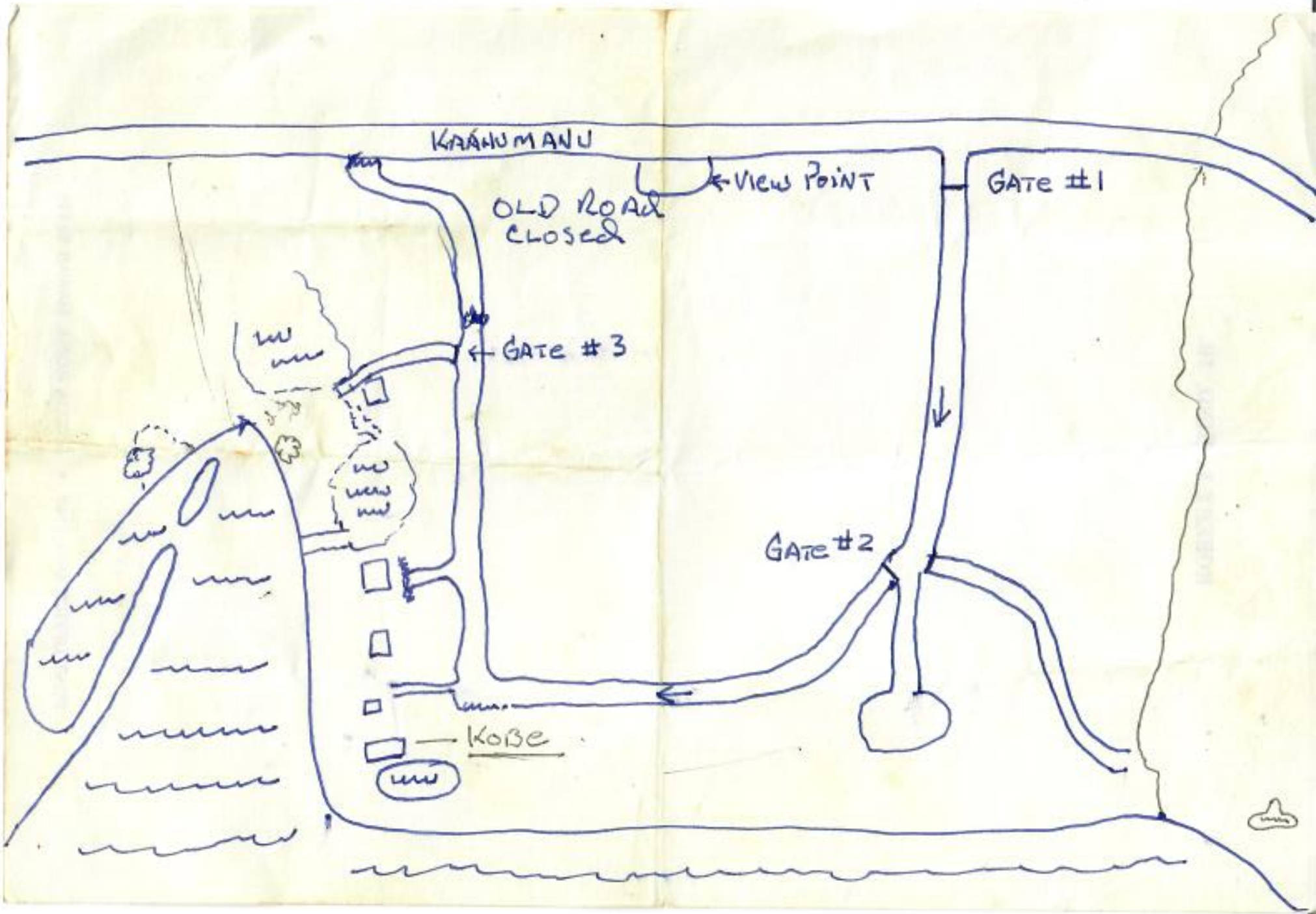
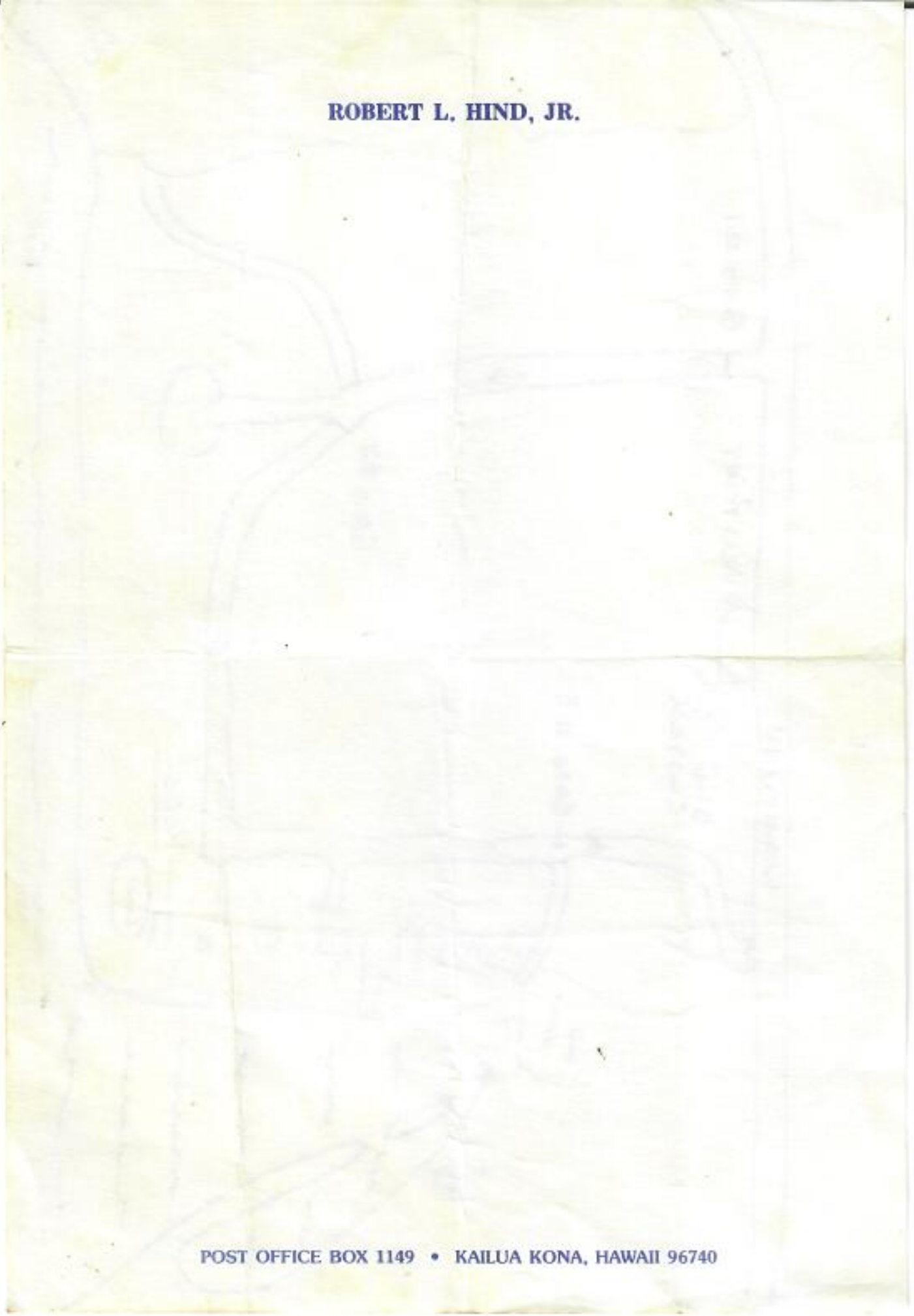
Lau Hue Pt
Haaheo
Wainaku
Alealea Pt
STACK
COURSE DEMARCATION LINE 60.1460 (see note A)
DUMPING GROUND
(Discontinued)


KAHUMANU
VIEW POINT
GATE #1
OLD ROAD CLOSED
GATE #3
GATE #2
KOBE

ROBERT L. HIND, JR.



POST OFFICE BOX 1149 • KAILUA KONA, HAWAII 96740

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(2/76)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

Hawaii Institute of Marine Biology
University of Hawaii
P.O. Box 1346
Kaneohe, Hawaii 96744

2. AUTHORITY STATUTES
16 USC 1533(d)
REGULATIONS (Attached)
50 CFR 17.42

3. NUMBER
PRT 2-3593

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
MAY 19 1983	05/31/85

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)
Dr. Philip Helfrich, Director

9. TYPE OF PERMIT
THREATENED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
In and around the Hawaiian Islands

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY OR RENEWAL OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE and any person designated in writing by the permittee to act as his agent.

D. Authorized to take green sea turtles (Chelonia mydas) for tagging, affixing depth gauges, thermometers and radio transmitters for tracking studies, making standard body measurements, sampling food sources and observing behavioral characteristics PROVIDED THAT: (1) The activities are carried out without undue harassment or handling:
(2) Basking male turtles be tagged only when it can be accomplished without disturbing hauled out and/or nursing monk seals;
(3) Nesting females be tagged only when it can be accomplished without disturbing monk seals hauled out on the upper beaches and interior of Whale-Skate Island and Trig Island, French Frigate Shoals;
(4) Landings at East, Whale-Skate, and Trig Islands, French Frigate Shoals, be kept to a minimum and consolidated where possible;
(5) Landings which displace seals be avoided and that where possible the same landing site be utilized throughout the project;
(6) No landings be made at islands in French Frigate Shoals other than Tern, East, Whale-Skate, and Trig Islands except in emergency situations;

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS A complete report of activities conducted under authority of this permit must be submitted to the Director, USFWS, Federal Wildlife Permit Office, P.O. Box 3654, Arlington, VA 22203, by January 31, following each year during which this permit is in effect.

ISSUED BY Larry LaRochelle
TITLE Chief, Branch of Permits, Federal Wildlife Permit Office
DATE MAY 19 1983

ORIGINAL

University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744-1346
Cable Address: UNIHAW

September 15, 1983

TO WHOM IT MAY CONCERN:

Under the conditions set forth in Federal Fish and Wildlife Permit PRT 2-3593, the following persons are designated to act as agents for the purpose of tagging Hawaiian green turtles (Chelonia mydas). The tagging activities undertaken will be under the guidance of George Balazs, Wildlife Biologist with the Honolulu Laboratory of the National Marine Fisheries Service.

This letter must be accompanied by a copy of State of Hawaii Scientific Collecting Permit No. SCP 84-18 during all capture and tagging activities.

Ariga, Toshi
~~Barley, Kimberly~~
Bernard, Nancy
~~Chan, Gilbert~~
~~Clements, David~~
Coney, John
Doll, Chris
Dudley, Walter
Engle, Dean
Hall, Lisa
Harlan, William
~~Johnson, Doreen~~
Kaichi, Miles
Kam, Alan K. H.
Kuamoo, Darrell
~~Lau, Kelvin~~
Laube, Robert
Mahony, Sheila
Mazarakis, Diane
McOmber, Ronald
Orcutt, Will
~~Woertendyke, John~~
Mazarakis, Loretta

Philip Helfrich
Director

mk

W.H. Shipman, Ltd.

P.O. BOX 950 • KEAAU, HAWAII 96749
(808) 966-9325

May 7, 1984

Mr. George Balazs
National Marine Fisheries Service
Honolulu Baoratory
P. O. Box 3830
Honolulu, Hawaii 96812

Dear George:

Thank you for your letter of April 16, 1984.

My wife, Jackie and I will be off island in May but should be back by May 25th or 26th. If you wish to dive along the coastline please call Mrs. Bessie Morita (966-9325) in our office and she will make the necessary arrangements.

Aloha,

Roy per bnm

Roy S. Blackshear, President
W. H. Shipman, Limited

RSB:bnm

LISA HALL 935-1737

call

BOB NISHIMOTO George, Fri July 15

10-11 AM 1. Got + enjoyed letters - informative

1:30-2:30 2. 2 Dives Puako

55' #1 Dive - 6-7 sea turtles range of sizes

Access Rd #1

dif location mostly mediums

50' #2 dive - 4 sea turtles

sitting on bottom, not in holes

access Rd #1

~~Depth~~ Turtles at 40-50'

Plenty

INTRODUCTION

PROJECT OUTLINE

DESCRIPTION OF PROJECT: The purpose of this project is to supply a workable slide collectiom of life specimens that would be observed in a Hawaiian tide pool. In this way, it would be possible to familiarize a high school class with the life forms that exist in a tide pool, before such a class has first hand experience. The advantages of such a slide show would also be reinforced by a narrative type script which would accompany each slide. This script would discuss what the subject's common name and scientific classification are. It would also discuss where it can be found, what it eats and its position on the food chain. The slide show will consist of approximately thirty (30) slides with script and directions for use.

METHOD AND MATERIALS: Most of the photography will be done underwater in such areas as tide pools. Some open water diving will also be necessary. Special underwater equipment will be necessary for the project. This special equipment will partially consist of: a Nikonos camera, waterproofed housed flash, and a VW light meter.

SUPPLIES NEEDED TO BE OBTAINED:

1. Film, Kodachrome 25 or Kodachrome 64 (36 exposures)
   $30.00 10 Rolls @ $3.00 est.

2. Film Processing Pk 36
   $42.00 10 mailers @ $4.20

3. Air fills for scuba tanks
   $12.50 10 fills @$1.25

4. Closeup lens and distance rod.
   (Marine Options Progam owns. Please send.)

Puako Hi
April 2, 1984

George H. Balazs
Hawaii Institute of Marine Biology
University of Hawaii

LEON A. THEVENIN
104 Puako Beach Drive
Kamuela, HI 96743

Green Turtles

Have you ever considered trapping young Green Turtles on islands west of Kauai and "planting" them in Turtle Sanctuaries like Kiholo on Hawaii? I imagine the mortality rate of young Turtles must be fantastic for the many reasons you give both on land and sea.

It would be ideal to have a few known ideal spots in Hawaii like Kiholo where these reptiles could be monitored very carefully. I am sure if thousands of new adults were eventually added to the Stock that at some time in the future limited catches could be allowed by permit and a good license fee. This might satisfy people like Aliba Cooper and others.

The problem of Turtles might possibly be resolved

much like people elsewhere are doing with Salmon, Trout and in some areas with exotic species of Tilapia.

I trust you can evaluate the merits of my suggestion. As a boy I relished Turtle steak but never abused the demise of species even though my family once ran a commercial fishing business.

Very truly yours,

Leon A. Theremin

August 15, 1984

Dear Mr. Balazs,

I received your letter and pamphlets concerning the green turtles and attached, you will find the map indicating where the turtle was caught and released. I still fish in the same area and also various places around the island of Hawaii but haven't caught anymore turtles. However, I still see them occassionally. I saw a couple large ones in rough water while ulua fishing off the Upolu Point airport on the north side of the island.

As for catching turtles for tagging purposes, you may be able to catch them with surround nets but there is one problem of the reef being a little short in width. The reef drops off into deeper water at the edge. One good way to catch them would be with a throw net like I did when I caught that one 8 years ago. They seem to come over the reef into shallower water to feed and do not seem to scare too easily. If you intend to return to the Big Island, I would be glad to help you if my job permits the time.

Thank you again for the information pamphlets on the green turtles.... they make good informational reading.

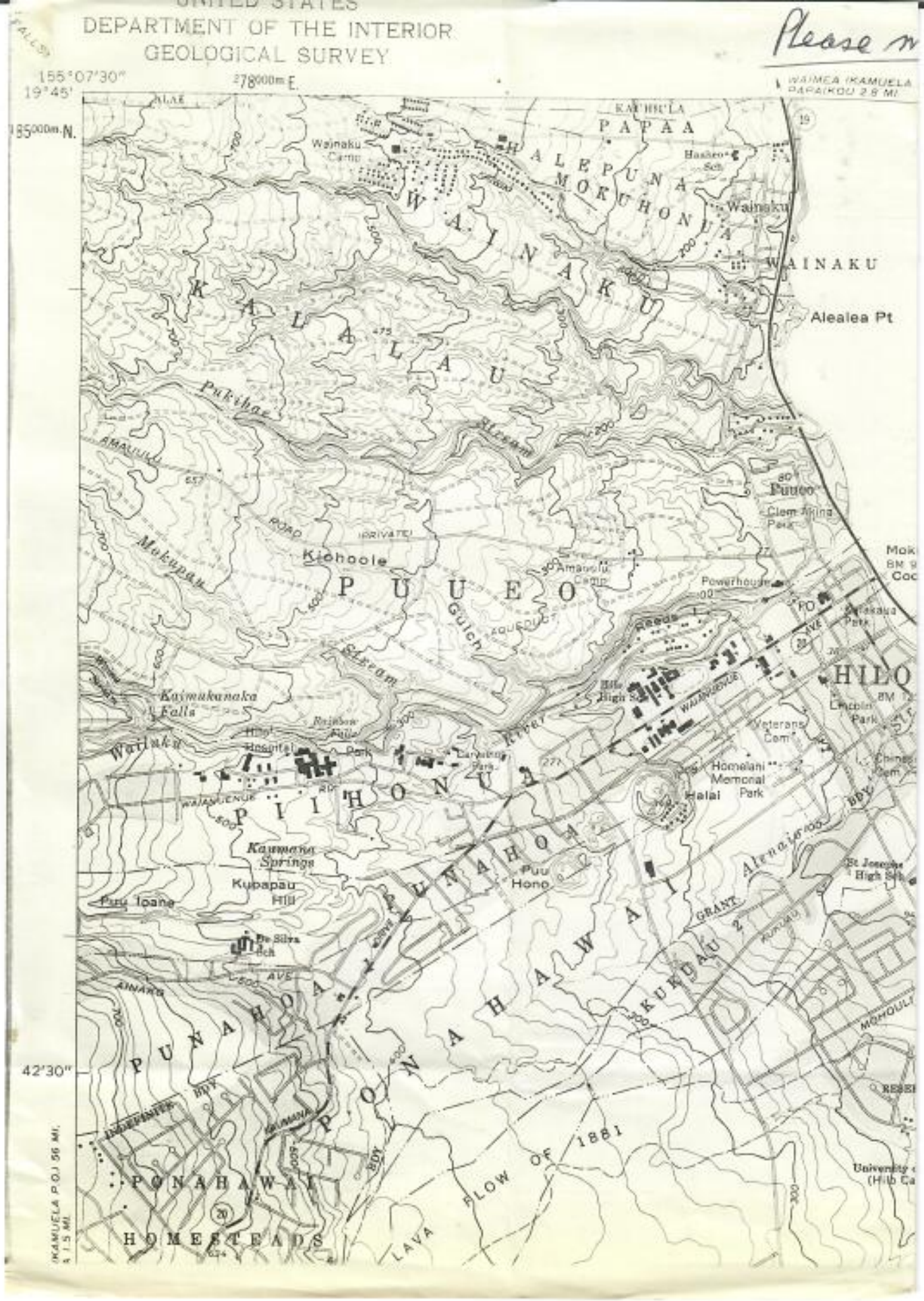
Aloha,

Orlando R. Almarza

ORLANDO R. ALMARZA
SUBSTATION NETWORK SPECIALIST

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
WEATHER SERVICE OFFICE
GENERAL LYMAN FIELD
HILO, HAWAII 96720

HOME (808) 935-6758
OFFICE (808) 935-3656
OR (808) 935-6971


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
155°07'30"
19°45'
278000m E.
185000m N.
42'30"
WAIMEA (KAMUELA
PAPAIKOU 2 S MI
KAUHUULA
PAPAA
Waiakea
Camp
HALEPUNA
MOKUHONUA
Waiakea
WAINAKU
Alealea Pt
WAINAKU
KALALAU
Pukihae
Stream
Puueo
Clem Akina
Park
ROAD
(PRIVATE)
Kiohoole
PUUEO
Mokupapa
Amauulu
Camp
Powerhouse
Reeds
Gulch
AQUEDUCT
Stream
Kaimukanaka
Falls
Rainbow
Falls
Waiakea
Hospital
Park
Carnival
Park
RIVER
HILO
Lincoln
Park
Veterans
Cem
Homelani
Memorial
Park
Halai
Waiakea
Springs
Kupapau
Hill
Puu Ioane
Puu
Hono
PIIHONUA
PUUHALAI
PUUHALAI
PONAHAWAI
KUKUAU 2
Alenaiau
St Joseph
High Sch
GRANT
De Silva
Sch
PUUHALAI
PONAHAWAI
HOMESTEADS
LAVA FLOW OF 1881
KAMUELA P.O. 5.6 MI.
3 1.5 MI.

ark and return

Puhi-nalo is the eel lover of a girl of Waianae on Oahu. Her brothers discover that he is an eel-man, fight him, and hurl his body against the cliff, where it is to be seen today.[38]

Puhi and Loli (Eel and Sea-cucumber) turn into handsome men and court two girls. Their father watches the two men turn into fish again, catches them in a net, cooks them, and serves them up to the two girls. The girls vomit, one a tiny eel and the other a sea-cucumber, which the father burns to ashes. These are the children they would have had by the two lovers.[39]

Animal forms associated with the many-bodied Pele family are the mo'o, the brindled dog, the oopu fish. A brown-haired woman (ehu) belongs to the Pele family and may be Pele herself or one of her spirit followers in human form. Brindled dogs are called ilio mo'o to this day. The fresh-water oopu fish (*Eleotris fusca*) looks something like a mo'o and hence should not be eaten by any family who have a mo'o aumakua. Molokai and West Maui people fear to eat it. The okuhekuhe or owau variety of the goby fish (oopu) is one of the forms of the god Kane-lau-apua, according to Emerson. In Tahiti, goby fish are thought to be possessed by the spirits of premature births.[40] The following stories are told of the double nature of the goby fish. Many similar tales teach a wholesome respect for those potential favorites of deity whose gods resent cruelty or greed in their treatment.

STORIES OF OFFENDED AUMAKUA

A man of Molokai catches a dish of oopu of the o-kuhekuhe or o-wau variety. He bundles the fish up in ti leaves and lays them on the fire to broil. A voice speaks from the bundle and he flees in fright.[41]

Ka-hinano (Pandanus blossom) catches a dish of goby fish, cleans and salts them, then goes after material for mat weaving.

38. McAllister, *Bul.* 104: 117–119.
39. Green and Pukui, 170–173. 40. Henry, 390.
41. Green and Pukui, 176–177; N. Emerson, *Pele*, 194 note *c*.

A brown-haired woman comes to the house, calls to the fish, and replaces them alive in the creek.[42]

(*a*) Pae is the name of a brindled dog that used to come from the Koolau hills on Oahu to the villages at the sea. The chief's servants one day catch the dog and are carrying her away to bake for a feast when a brown-haired (chu) woman appears and calls the dog to her. The tying strings drop off, and woman and dog disappear in a pool.[43]

(*b*) A spirit dog of kindly nature named Pae lives on Hawaii. She is once playing about in her dog body when an old couple catch and fatten her for a feast. A brindled dog comes to her aid at the last moment. They kill the old people and make their way to Oahu, where they live in the Nuuanu valley and Pae becomes "the dog of Koolau."[44]

A turtle kupua named Ka-wai-malino is picked up and brought home by an old couple. The children play with it and poke out an eye. The mother has a dream in which a beautiful woman with one eye inflamed begs her to take the turtle back to its home in the Wailuku river in Hilo, Hawaii.[45]

Manoanoa, a woman of Molokai, eats squid eagerly. Once when she has cut up a squid and placed the tentacles on a tree to dry she hears a voice say, "Eat the tentacles but spare the head!" and the squid jumps into the spring and disappears.[46]

Puni-he'e (Squid lover) has an inordinate fondness for squid. A neighbor warns him to beware lest the gods be angry. One day the squid comes to life in the pot and hangs itself over the door, and Puni-he'e flees in terror.[47]

Kumu-hana, a bird hunter, recklessly slaughters the plover (kolea) even when he does not need them to eat. His neighbor, who worships the plover god Kumu-kahi and has been made ill

42. Green, 111–112.
43. *Ibid.*, 48–49.
44. Green and Pukui, 178.
45. Pukui MS.
46. Green and Pukui, 175.
47. Green, 46–47.

July 84

ROBERT L. HIND, JR.

Pidowe: 329-8981

George- ITS ALL OK FOR Kiholo. CALL ME FOR DETAILS ON THE KEY. THERE IS A WHOLE NEW SYSTEM OF ROADS THERE. WILL EXPLAIN —

ALOHA.

BOBBY

POST OFFICE BOX 1149 • KAILUA KONA, HAWAII 96740

FRIDAY NOV. 17, 1967 HONOLULU ADVERTISER

764-Pound Turtle Caught

HILO — One of the largest turtles ever caught here was brought in yesterday by the fishing sampan Mona H.

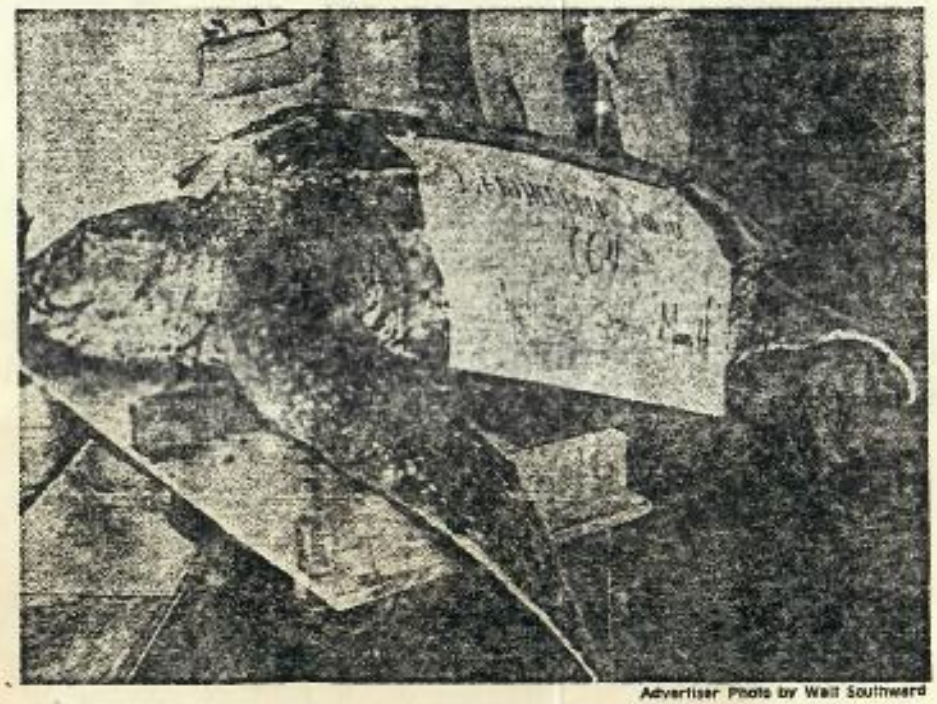
The turtle, a Pacific Leatherback, weighed 764 pounds.

The turtle was caught on one of the Mona H's flaglines off the Big Island.

A 300-pound turtle is considered large.

The Leatherback species of turtle gets as big as a 1,000 pounds and is found only in warm waters. It deposits its eggs almost exclusively on one beach in Malaysia and has never been raised in captivity.

The Sumida Restaurant here bought the turtle. It was auctioned yesterday morning by the Suisan Co., Ltd.



Advertiser Photo by Walt Southward

Next stop: Pots and pots of turtle soup and piles of cutlets.

935-1502 97 961-3848 Mainichi Sun

State Land Dept. Urges Fines for Big Isle Ranch

9/26/84 HSB

By Harry Whitten
Star-Bulletin Writer

The state Board of Land and Natural Resources on Friday will be given a staff recommendation that fines be imposed on Puuwaawaa Ranch, Big Island. The staff, however, declined to recommend that the lease of state land be canceled.

The recommendations will be submitted at a meeting of the board to be held, starting at 9 a.m., in the State Office Building, Lihue, Kauai.

It will hold a public hearing at 6 p.m. tomorrow in the same building concerning four conservation district use applications (CDUAs). The Puuwaawaa case involves allegations by conservation organizations that the ranch engaged in illegal logging of koa trees and violated various state regulations.

Also at issue are efforts to establish a sanctuary for the alala, or Hawaiian crow, an endangered species, and a natural area reserve for rare dryland plants and trees.

Puuwaawaa Ranch is in North Kona, northwest of Hualalai. It includes about 600 acres owned in fee and 105,796 acres leased from the state. The 40-year lease was purchased in 1960 by Dillingham Ranch and assigned in 1972 to F. Newell Bohnett, present owner of the ranch.

LEASE RENT on the state land was set at $30,000 a year, with the rental rate to be renegotiated in 1980. For various reasons, the new rate has not been settled but should be soon, according to James J. Detor, land management administrator in the land department.

The lessee is to pay the retroactive difference in rent back to 1980.

Spokesmen for the Conservation Council for Hawaii and the Hawaii Audubon Society have urged the land board to cancel the ranch's lease of state land, if violations are proved.

Their recommendations were contained in letters to Susumu Ono, DLNR chairman, sent July 25 by Richard J. Scudder, Conservation Council chairman, and Sept. 12 by F.R. Warshauer and W.C. Gagne of the Audubon Society's conservation committee.

They allege unauthorized koa logging and use of a portable sawmill; construction of a water system, airstrip and hangar buildings without prior approval; use of water from a state-owned well without authority; and laying of a pipeline across state land without obtaining an easement.

THEY ALLEGE that the ranch continued logging of koa trees despite cease and desist orders from Chairman Ono. Bohnett, the ranch owner, said that only fallen and dead koa logs were removed, which he was allowed to do for pasture improvement. He admitted that he allowed five or seven live koa trees to be cut down for the Kauikeaouli Canoe Club.

Reporting on the staff investigation, Detor said the exact number of logged koa trees is yet to be determined but the logging did take place on conservation land without a conservation use permit.

Use of a portable sawmill, he said, would lend credence to the charge that logging was not strictly in support of pasture operation.

The Audubon Society says it has aerial photos of the portable sawmill.

Detor said there are several gray areas that need further examination. However, "staff investigation efforts to date fall short of providing a basis for canceling the lease," he said.

DETOR recommended that fines be imposed on the ranch for logging in a conservation zone without a permit and for constructing the pipeline without authorization.

He also recommended that the state be paid for the logged koa trees and for use of water from the state-owned Kiholo Well. The amount of fines and payments is yet to be calculated.

The investigation showed that two wells Bohnett drilled were on fee land and not on state land.

Detor also recommended that 3,400 acres of state land at Puuwaawaa be withheld for the wildlife sanctuary for alala and other rare birds and that the staff be directed to prepare a detailed proposal for withdrawal of lands containing rare plants and trees. He also recommended preparation of a detailed proposal for withdrawal of lands for game management.

The alala is one of the most endangered birds in the world, with some estimates putting the number in the wild at 25 birds. The state Senate in the last session passed a resolution urging the land department to establish an alala sanctuary on state-owned lands on the northwest slope of Hualalai.

Marine visitors add a ray of excitement for Big Island hotels

By Susan Scott
Special to the Star-Bulletin

Some rather unusual families have checked in at various hotels along the Big Island's Kona coast. These non-paying visitors arrive in the evening, eat all night, and then leave at first light.

The hotels extend a warm welcome to these extended families — granddad, mamma, papa and keikis — and visitors and locals alike come for an evening glimpse of these celebrities.

The families are groups of manta rays that are attracted to the hotels by large spotlights that cast light on the rocky shoreline.

MANTA RAYS are fish that live on the surface of the sea. They get a lot of attention from humans because of their large size, their unusual shape and the fact that they are anatomically related to sharks.

Because the large pectoral fins of these fish look like wings, their swimming motion resembles graceful flight. Manta size, therefore, is usually discussed in terms of "wingspan."

Huge mantas called "devil rays" are found in all the world's tropical seas and can reach a wingspan of more than 20 feet.

Some have been estimated at 30 feet wide with a weight of 4,000 pounds or more. These giant mantas feed on surface fish and plankton and are rarely seen near shore.

MANTAS POSE no threat to humans and don't deserve the nickname "devilfish."

It's not hard to imagine, however, why 16th century European sailors feared these huge animals and thought them "sea monsters."

Two smaller species of manta rays can be seen near the shores of our islands. They are small, however, only when compared to the giant manta — wingspans of these two types measure 8 to 12 feet.

All three species have very small, flat teeth for grasping small prey and unusual fins at the side of the head for guiding prospective food into the mouth. These horn-like fins are responsible for the strange shape of this animal's head.

ONLY ONE OF the three species of manta rays seen in Hawaii has a spine at the base of the tail like their bottom-dwelling cousins. Mantas are gentle creatures, however, and are not aggressive toward humans.

Sharks and rays are grouped together because they all have a skeleton made of cartilage. Their lack of bones as we know them separate them from all the other fishes in the sea.

It is difficult to say which species of manta ray visits the Big Island hotels.

Some accounts say that one "granddad" has a wingspan of at least 18 feet. This would suggest that a giant manta has come inshore to feast on the planktonic goodies that the lights attract.

MAMMA, PAPA and the keikis are probably the other smaller species of manta.

Hotel workers say that the mantas visit nearly every night except during a full moon when plankton is abundant at the surface offshore.

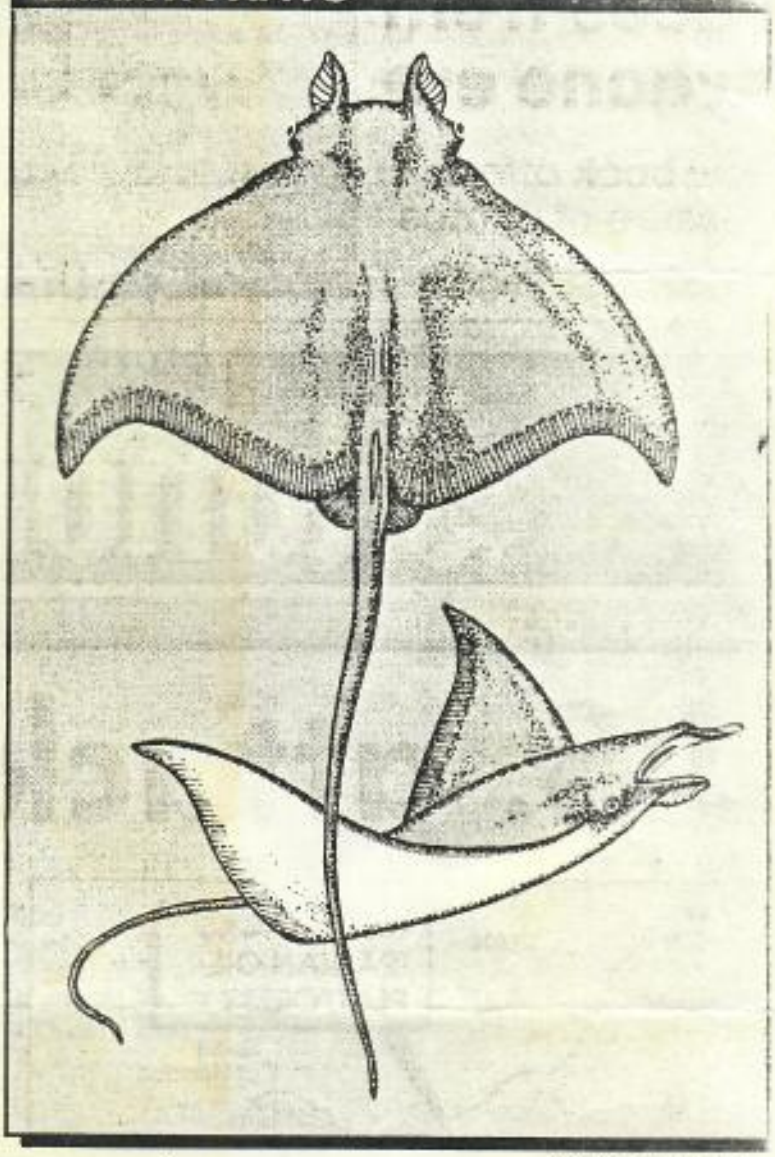
A good view can be had from hotel lanais, or more adventurous souls can slip into the water quietly to snorkel with these graceful visitors.

The mantas are busy patrolling for dinner and ignore human swimmers.

Hotel staffers are proud of their manta guests and welcome those who are interested. The sight of these friendly giants is unforget table.

Susan Scott is a marine biologi and free-lance writer. Her Ocean Watch column appears Monday in th Star-Bulletin.

MANTA RAYS



By Ray Higuchi, Star-Bull

TRAVELING TROUPE—Manta rays, attracted by lights shining on the ocean, have become a prime nighttime attraction a various hotels along the Kona coast of the Big Island.

SCALE 1:24,000

HILO AREA COMPREHENSIVE STUDY

LOCATION MAP

U. S. ARMY ENGINEER DISTRICT
HONOLULU, HAWAII

encl.

LETTERS

FRIENDLY DOLPHINS

In connection with the friendly dolphins [September-October 1988], I have enclosed a photograph of a very friendly dolphin that has been patrolling the beaches of Pine Cay and Providenciales in the Turks and Caicos Islands for the past two or three years. We swim with him in shallow as well as deep water, and he is a great friend of the Labrador in the photograph.

W. Brooke Fox
New Orleans, LA

BLEACHING AND POACHERS

Regarding "Coral Reef Bleaching" [March-April 1988], I did not see any mention of the most horrible crime in the seas. Poachers have been using household bleach for years to chase out spiny lobsters from coral heads. Apparently, they squirt the bleach from a squeeze bottle under the coral, and the lobsters run out into the open to escape the bleach. I have heard on more than one occasion about Bahamian lobsters being poached this way, and have seen many of these "bleached out" areas you mention. Some were completely devoid of life. I had always assumed it was from the poachers.

Bill Branch
Jupiter, FL

Editor's note: Chlorine bleach used by poachers is a poison and, in large doses, can kill corals and other marine animals. Its effects are limited to the area of contact. The "coral reef bleaching" described in the March-April issue is an environmental problem that mimics the effects of bleach by removing the colored zooxanthellae from the live corals, and is widespread in its occurrence.

GIANT CLAM MYSTERY

In answer to question 4005 about *tasua* [Sea Secrets, March-April 1988], you stated that five other species of giant clams are also known from Fiji. Unfortunately, one species that has been listed from Fiji, *Tridacna gigas*, either never occurred there or has recently become extinct.

From 1972-1975, I worked at the University of the South Pacific and traveled throughout the islands gathering specimens for the university's reference collection. One of my objectives was to confirm the presence in Fijian waters of *T. gigas*, which had been reported to occur there. Very large *Tridacna derasa* were common in some areas, but I never did find any *T. gigas*. It is possible that *T. gigas* has been fished to extinction in Fiji, but I doubt this because large *T. derasa* can still be found in some quantity, especially in remote locations. I am more inclined to believe that *T. gigas* never did occur in Fiji and that reports of it being found there are either inaccurate data records from collection expeditions or misidentifications of very large *T. derasa*. I am interested in knowing if anyone has in fact documented the existence of a true *T. gigas* in Fijian waters.

Bruce A. Carlson
Waikiki Aquarium, Honolulu, HI

TRINDADE—A FAMILIAR SHAPE

On May 1, 1932, I left Port Victoria, South Australia on the full-rigged sailing ship *Grace Harwar*, built in 1889, with a cargo of wheat bound for England by way of Cape Horn, which we sighted June 21. Our next sighting was De Los Estados approximately 56° South. After that, the Captain checked our position at Trindade Island. However, we only saw its outline.

Seeing the close-up of Trindade Island in the photos in the March-April [1988] issue brought back vivid memories of my youth aboard one of the last so-called "Grain Racers."

I am a member of the A.I.C.H.—the Association of International Cape Horners. There are not many of us left.

Charles Gulden
Pomfret, Connecticut

A NEW CAREER?

I am delighted that you saw fit to publish some of my reminiscing about eels in "Tales from the Taffrail" and was overwhelmed by the $50 check in payment.

This makes a definite milestone for me—the first time I ever wrote something that has been published and the first time I've been paid for something I enjoy doing! Now comes the real test—to think of something else that you might find of interest!

Robert J. de Trey
Bodega Bay, CA

MISS PIGGY

We erred in attempting to identify the turtle "Miss Piggy" from photographs submitted by a member [Sea Secrets, March-April 1988, question 4006]. Lisa Choquette reports that Hawaiian turtle expert George Balazs has identified "Miss Piggy" as a green sea turtle, not a hawksbill. Choquette says this friendly turtle loves to have its neck scratched, sits on people's heads, and swims with her boat dog Scruffy. A most unusual turtle! ■

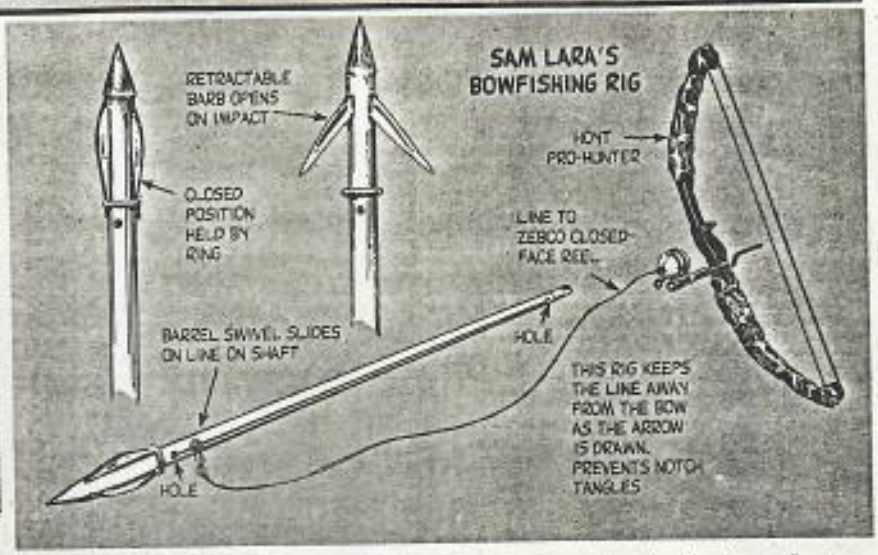
Letters to the editor should be sent to the Editorial Office, Sea Frontiers, 3979 Rickenbacker Causeway, Miami, FL 33149. Due to space limitations, not all letters can be printed; those that are may be excerpted and edited. All letters must be signed, but names will be withheld if requested.

Hawaii Fishing News

Bowfishing the Big Island

by Sam Lara

Sam gets straight to the point: Bowfishing takes a good eye and a good wall. He shot this uhu off the Kalapana coastline.



■ An irresistible array of colors lit up the arid landscape as the blue-green uhu (parrotfish) frolicked in the frothy white water. My Tre-Bark camouflage T-shirt blended well with the a'a shoreline as I knelt in a crevice. I was perched on a cliff about 8 feet above the water's surface, and my wary prey was feeding in about 4 feet of water. I resisted the urge to take too deep of a shot; I held my ground until the uhu's dorsal fin broke the surface as a wave swelled and brought the fish within bow-and-arrow range. I steadily drew back my 80-lb Pro Hunter compound bow and then released. The white fiberglass fishing arrow flew the distance in a blink of an eye. It penetrated the parrotfish's armorlike scales and held tight. In an instant my line zipped off, and I held on with all my worth. My bowfish line sang as it cut through the water. After what seemed an eternity, I reeled the fish up the cliff and claimed my prize.

Bowfishing the waters of the Big Island is an adventure, and the thrill of capturing a fish in this way is not easily forgotten. Successful bowfishing, however, requires extreme patience and perserverance. You usually have only one shot, so patience is the key. I have waited for 45 minutes before I was presented with the perfect shot.

The novice bowfisher should look for cliffs that overlook a reef or coral heads. My favorite area to bowfish is the Kalapana coastline. My technique is to very slowly walk along the shoreline and study the water for flashes of color. Fish are surprisingly alert and will dart away at a moment's notice. I also wear a camouflage T-shirt which I feel helps me stay hidden. The trick is to hide and stalk the fish until it surfaces to feed when the water swells with a wave.

When aiming, one must compensate for the refraction of the image in the water. That is, the water makes the fish appear to be in position different from where it actually is, so one has to aim accordingly. The general rule is that one must aim the same distance below the fish as the fish is from the surface. For example, if the fish is 3 feet below the surface, you have to aim about 3 feet below the fish to make a hit. Wait until the fish turns broadside to you so that you'll have a wider, bigger target. Also, it is sometimes necessary to "lead" your shot (aim ahead of the fish) because fish are usually on the move. Polaroid sunglasses help cut the glare of the water. After some practice, and in my case, quite a few misses, you'll develop an instinct for the correct place to aim.

Successful bowfishing also requires an adequate bowfishing rig, one with at least a 55-lb draw weight. A bow of this size is needed to penetrate thick scales like the uhu's. Heavy fiberglass arrows with large, fast-holding barbs are recommended. The type of archery equipment you should choose depends on your own physical limitations. Try to get a bow as powerful as you can draw without sacrificing accuracy. A 55-lb bow cannot shoot as deeply as an 80-lb bow. Also, compound bows tend to shoot deeper than recurve bows. A compound bow works with pulleys and cables which make it easier to hold your aim. A simple recurve bow is better for fast-snap shooting because it is easier to draw.

My equipment for bowfishing consists of an 80-lb pull compound bow and a Zebco closed reel. I like this setup because I've found that heavy draw weight allows for deeper than average shots and the automatic reel retrieves fast and allows for quick second shots. I use fiberglass arrows which have a good weight and penetration potential. I use sharp, retractable barbed heads which allow me to remove a fish from the arrow easily.

The illustration here shows the manner in which I rig my fishing arrow. The reason I attach a line along the arrow shaft and use a barrel swivel is so that when the arrow is drawn, the excess line is kept at the front of the bow, away from your face. The swivel helps to keep the line from tangling when the fish takes out line, too.

Bowfishing can be an exciting sport. There is nothing like the thrill of making the perfect shot after a successful stalk of a large game fish. Try it and see. I'm sure you'll get "hooked" on bowfishing, like me!

. . . Sam

Two species of surgeon fish from Waiohinu Beach Park.

An arrow finds its mark—a large, tasty goatfish.

Stalking the Hilo Breakwall

■ Amid Hilo Bay on the Big Island lies the Hilo breakwall. On this wall of stone and concrete thrives an abundance of game for the novice and the experienced fishermen. The waters along the "Great Wall of Hilo" teem with a variety of fish such as uhu, kala, papio, palani, and if you're lucky, kumu and tako.

The Hilo breakwall stretches out for approximately 2 miles into the middle of the bay. This gives the promising bowfisherman a fine opportunity to shoot a nice bagful of fish if his aim is true. My most memorable experience at Hilo's breakwall was when I found a rock that housed a "nest" of palani in the 16- to 17-inch range. I settled myself in the rocks near the nest and waited until the fish emerged to feed. I arrowed a total of six large palani. The few remaining fish in the nest became suspicious about the disappearance of their peers and they became harder and harder to sneak up on. The ones I did get were good-eating, though.

Patience is your best ally in bowfishing. If you can learn to be patient and wait for the best shot, bowfishing can be a great way to spend the day.

. . . Sam

Summary of 24 green turtles tagged and resighted
at Kiholo Bay, Hawaii, 18-20 October 1989

Compiled by George H. Balazs
National Marine Fisheries Service, NOAA

Inconel tag No.	Carapace length (cm) Straight standard/notch	Curved	Weight (lb)	Notation
	18-19 October 1989 (5 turtles)			
8702, 03 (Y251LH)	49.0/48.7	52.0	34.5	NP; a; photo of 8702
8909, 10	49.0/48.8	52.0	41.0	NP; a
Y252, 53	44.8/44.4	48.0	25.5	NP
8712, 13	47.7/46.7	50.5	32.0	NP; a
8709, 10, 11	56.6/56.2	60.5	58.0	NP
	19-20 October 1989 (19 turtles)			
8934, 35, 7782, 3317	65.9/ --	70.0	86.0	
7751, 52, Y1	48.2/ --	52.0	34.0	LHF line mutilation
7785, 86, Y303	59.6/59.2	63.0	67.0	NP; a
8935, 36, 7774	57.9/ --	62.0	58.0	a
8937, 38	44.3/44.1	46.5	31.0	
Y105, 06	47.9/ --	51.0	34.0	a; photo of Y105
Y111, 12	44.5/44.2	47.0	27.0	
8716, 17	49.1/ --	52.5	43.0	a; damaged PC's
Y124; 25	48.8/ --	51.0	37.0	a; damaged PC
7770, 71, Y25	47.9/47.7	51.5	38.8	
Y255, 56	41.8/41.5	44.5	21.0	P
Y248, 49	49.2/48.8	51.5	37.0	a
Y2, 3	53.0/52.7	56.0	53.0	P; a
8903, 04	43.5/42.8	45.0	27.0	a
Y245, 46	51.7/51.4	55.0	44.0	a
Y257, 58	53.5/53.0	56.5	40.5	NP
Y259, 60	41.8/41.4	44.5	23.0	P
Y261, 62	42.4/41.7	44.5	22.0	NP; 3.5 cm barn
Y263, 64	49.5/49.0	52.0	41.0	NP
	Hawksbill hand-captured, 19 October 1989, at 2230 hours			
Y254, DO95, DO97	32.9/31.2	34.5	9.5	Photos

NP = Nonprudent behavior (9 total).
P = Prudent behavior (3 total).
a = Turtle also captured during HPA No. 7, 3-5 May 1989 (12 total).

All turtles deeply engraved with Dremel moto tool on first lateral left. All HPA No. 7 turtles had been engraved on second lateral left. Substantial regrowth apparent during the 5-month interval.

New tags applied during HPA No. 8 = Y251-Y264 (14 total).

reign of Kamehameha I. It was a fishpond in which many of the deep sea fish were kept and in this year, in the reign of Kamehameha IV, Kiholo is closed by the lava. It is now only a heap of lava rocks.

This is another thing. The Protestant church that stood at Kiholo was removed when the lava flow drew near. The people thought that it would be burned down, so they razed it and took the lumber away lest it be destroyed. There is a circle of lava rocks surrounding it and the spot where the church stood remains like a grave. I believe that if the church had not been razed, it would not have been destroyed anyway.

Lae Hou is marked on most maps today as Hou Point. Kamehameha I's fishpond at Kiholo, destroyed by the 1859 lava, was one of the wonders of its day. Missionary William Ellis described the pond during his circle-island journey in 1823:

> About four in the afternoon I landed at Kiholo, a straggling village, inhabited principally by fishermen. This village exhibits another monument of the genius of Tamehameha. A small bay, perhaps half a mile wide, runs inland a considerable distance. From one side to the other of this bay, Tamehameha built a strong stone wall, six feet high in some places, and twenty feet wide, by which he had an excellent fish pond, not less than two miles in circumference. It was well stocked with fish and water fowl were seen swimming on its surface.

Though the lava destroyed the immense fishpond and dramatically altered the entire shoreline, Kiholo continued to provide a haven for a small community of fishermen who relocated their homes to an untouched point of the bay south of the flow. During the 1890s, this area developed into a commercial landing after Robert Hind and Eben Low acquired the lease for Pu'u Wa'awa'a Ranch from the Republic of Hawai'i. Located directly *mauka* of the bay, the ranch used Kiholo as its cattle-shipping point. Living accommodations were built in the area where the private homes are located today, and this site served also as a base of operations on the shoreline. The cattle were herded to Shipping Pen Beach, the black sand beach before Laahinewai, where they were tied alongside lighters and rowed to the steamers waiting offshore. Pu'u Wa'awa'a Ranch discontinued use of this landing about 1935 when improved roads made it possible to truck the cattle to the pier in Kailua.

Commercial activity continued on a smaller scale at Kiholo with the annual harvesting of *awa* and *moi* from the comparatively small fishponds left in the wake of the 1859 lava flow. Pigs were raised, and small herds of cattle were fattened on *kiawe* beans. The tsunami of 1960, however, ended all commercial operations at Kiholo, wiping out everything there in its path. Since then, a few of the private shoreline homes have been rebuilt. The part of the bay fronting the homes is a poor swimming beach, being very shallow and rocky. Copious fresh water intrusion is encountered in the nearby ponds and lagoon, as well as in many parts of the bay. As a result, a surface layer of fresh water, often several degrees colder than the bottom water, commonly floats over much of Kiholo Bay, especially near Hou Point.

Summary of green sea turtles, Chelonia mydas,
and resighted at Kiholo Bay during the
NOAA Fisheries/Hawaii Preparatory Academy research project.

compiled by
George H. Balazs
Southwest Fisheries Center Honolulu Laboratory
2570 Dole Street
Honolulu, HI 96822-2396

3 days/2 nights Study dates	Total no. captured	No. newly tagged	No. tag resighting	Total no. tagged in population to date	Petersen population index estimate
Oct. 87	6	6	-	6	-
Feb. 88	13	13	0	19	-
April 88	10	9	1	28	190
June 88	11	4	7	32	44
Oct. 88	21	15	6	46*	112
March 89	29	24	5	70	266
May 89	37	17	20	87	130
October 89	24	6	18	93	116

* Total number of tagged turtles reduced by one as of 8/19/88 when an individual tagged in 6/88 was found dead from gillnet entanglement.

Beaches of the Big Island

John R. K. Clark

(69)

Kiholo

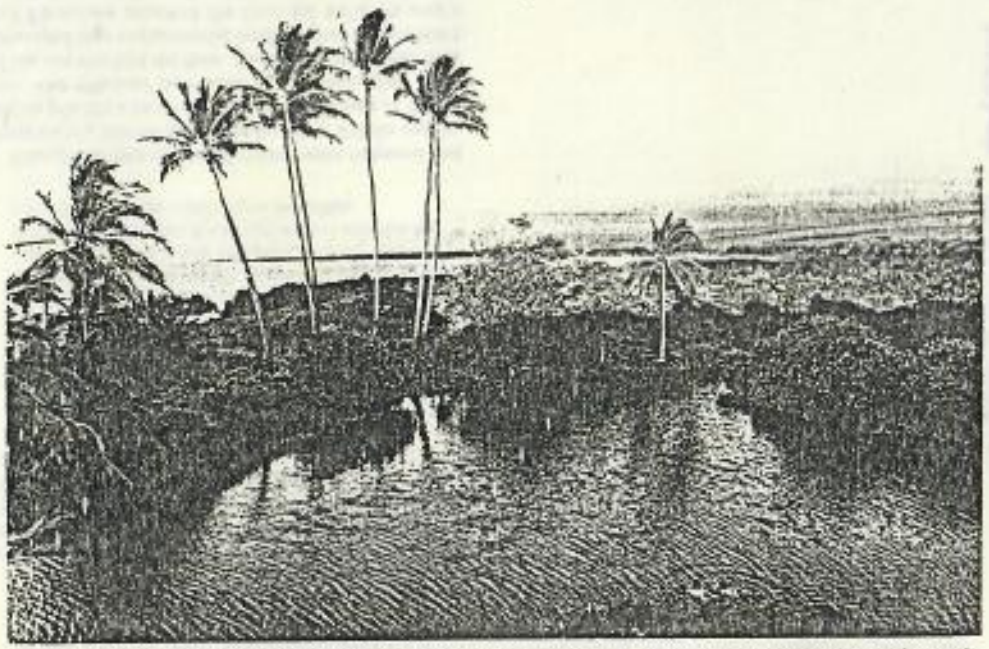
Ke pā mai nei e ka Mumuku,
Ka makani o laonia o Kekaha
Ka hea mai a Kiholo i ka la'i
Anuu i ke kai konahenahe.

The Mumuku wind is blowing.
The coconut leaf-rustling wind of Kekaha
The serenity of Kiholo calls us
To swim in the gentle sea.

"Pu'u Wa'awa'a"
Traditional song

Kiholo Bay is a long, wide bay that stretches for 2 miles from Luahinewai Pond at the south to Wainānāli'i Pond at the north. Along the backshore are several private homes, many archaeological sites, and a long expanse of undeveloped shoreline that offers a wide variety of recreational opportunities. Many fishermen and campers visit the area, particularly on weekends and holidays. They come for swimming, snorkeling, spear fishing, lay-netting, throw-netting, pole fishing, salt gathering, hiking, and occasionally surfing.

Probably the most popular spot at Kiholo is Luahinewai, the huge spring-fed pond located at the southern end of the bay. Coconut and *naupaka* surround this beautiful, pristine pond set between a black sand beach and the edge of a rugged lava flow. Luahinewai attracts not only the campers at Kiholo, but also many boaters who anchor off the beach and swim ashore. Apparently, this oasis was just as popular in times past with the Hawaiians. In his book *Ruling Chiefs of Hawaii*, Samuel Kamakau, reporting on a journey to Kawaihae by the high chief Keoua and his party, noted that "they left Kailua and went as far as Luahinewai at Kekaha, where they landed the canoes." In another account in *Fragments of Hawaiian History*, John Papa Ii observed, "Early Thursday morning, the ship sailed, pausing at Luahinewai (Kiholo) to bathe and visit that strange water in the lava. After an enjoyable stop at the water with the pretty pebbles, they again sailed."



Kiholo. Luahinewai, a deep, cold freshwater pool on the shore of Kiholo Bay, is a traditional swimming site for travelers passing through the area. A black sand beach separates the pool from the ocean. Lae Hou, "New Point," the long promontory in the distance across the bay, was formed during an eruption of Mauna Loa. When the lava reached the shoreline in 1840, it filled an enormous fishpond that had belonged to Kamehameha I.

Three black sand and pebble beaches are located along the southern margin of Kiholo Bay near Luahinewai. All drop quickly to overhead depths, but during normal, calm water periods, swimming is good at all of them. Hazardous conditions occur when high surf and winter storms generate heavy shorebreaks and rip currents. The remaining shoreline to the small embayment where the private homes and fishponds are located is mostly rocky, with many tidepools and scattered pockets of black sand and coral rubble. Along this reach, a large coconut grove, the landmark for the favored surfing break in Kiholo Bay, grows near the water's edge. Surfing conditions on the shallow reef shelf in this part of the bay are generally best early in the morning during the winter months. As the rising sun begins to warm the land, the difference in temperature between the land and the ocean results in an onshore sea breeze that causes choppy, poorly shaped waves.

At the northern end of Kiholo Bay, a shallow sheltered embayment adjoins a large brackish-water lagoon, Wainānāli'i Pond. Both the bay and the pond are important feeding and sleeping sites for sea turtles, especially the green sea turtle. The migrant green sea turtle travels regularly from its breeding grounds in French Frigate Shoals in the Northwestern Hawaiian Islands to the eight major islands in the Hawaiian Archipelago. This turtle, as well as all sea turtles and their nests, are protected by state and federal wildlife laws and may not be harassed or harmed in any way. Other important nearshore feeding and sleeping areas on the Big Island where turtles seek sanctuary are Pelekane in South Kohala and Kamehame, Punalu'u, and Ka'alu'alu in Ka'ū. People who are concerned with protecting these animals from human predators have proposed that turtle habitats such as these be designated as marine sanctuaries for all sea turtles.

Wainānāli'i Pond, the 5-acre lagoon at Kiholo, lies between the edge of the 1859 lava flow from Mauna Loa and a sand and boulder spit approximately a quarter of a mile in length. The flat-bottomed pond, lined with several small coconut palms, averages 10–12 feet deep and opens into Kiholo Bay at its southern end. The pond is an easily recognizable landmark from the Kiholo Bay Lookout on Queen Ka'ahumanu Highway, the aqua-colored pond waters a bright spot of color against the dark lava.

One of the most interesting descriptions of the 1859 lava flow that formed the northern margin of Kiholo Bay is found in the November 9, 1859, edition of the Hawaiian newspaper *Ka Hae Hawai'i*. The original Hawaiian account, by J. H. Kaakua, was translated by Mary Kawena Pukui:

Concerning the Lava Flow

It will be well for me to tell what I have seen concerning the lava flow at Wailea and at Kiholo in North Kona, and you will tell those who have not seen it. The flow began to go seaward in the month of Febeuary of this year, from the northwest side of Mauna Loa. It reached Wailea first, and from there it turned south to Wailoa, and continued on to the deep sea, smooth lava extending into it to about forty chains or more in length. This new point has been named Lae Hou. There is a long point there called Koena Limu. It is an old point and shorter than Lae Hou. The flow turned on the south side of Wailoa and went to Kiholo where it covered the pond. Then it turned again to the west, where a new point is burning now. Lae Hou is a long point, but this one is shorter. The lava has not finished building it, but it is now in the depths of the sea. I think it is about forty or more fathoms deep where it is burning, and from that burning spot it is about fifty fathoms to shore. The sea there is very hot and any fish that comes there dies. This is the news concerning these doings of the volcano.

In the year 1810, the Kiholo pond was built, during the

– OVER –

Summary of green sea turtles, Chelonia mydas,
and resighted at Kiholo Bay during the
NOAA Fisheries/Hawaii Preparatory Academy research project.

compiled by
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Big Is file

United States Department of the Interior

NATIONAL PARK SERVICE
HAWAII VOLCANOES NATIONAL PARK
HAWAII 96718

IN REPLY REFER TO:

November 26, 1981

N1415

University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P. O. Box 1346, Coconut Island
Kaneohe, Hawaii 96744
Cable Address: UNIHAW

Dear Mr. Baley:

Mr. Reeser passed your request for Halape log entries concerning sea turtle sightings to me. I'm the new Backcountry District Ranger and seem to have more opportunities to venture to the various backcountry sites than Mr. Resser.

A check of the Halape log found no sea turtle sighting entries since September 3, 1978. On that day an entry stated, "several turtles passing on beach at night. Seventeen baby turtles herded into the sea by mother in morning." All other recorded sightings were prior to September 1978.

If I can be of further assistance please contact me.

Sincerely,

Bob

Bob Seibert
District Ranger

George Balaz

Enclosed are the recent sightings of turtles at Halape I was telling you about over the telephone. We'll send you copies of any future reports too.

Don Reeser

Halape was visited by a turtle in search of a nesting site. Left tracks on the beach which scribed a crescent pattern. Found fragment of turtle shell where it appeared turtle started to dig for another generation. (No eggs found)

Greg Herbst
Hawaii Volcanoes National Park,
employee
July 24, 1978

Last night was the night of the turtle. I knew she was coming because I saw her on the way as I fished up the coast and a cloud remarkably shaped like a turtle floated over me as the full moon rose and I waited for the last daylight to cease. While I was eating dinner she came upon the left side of the beach and walked clear to the right and layed her eggs in a spot only known to her and I. Then she split in much the same direction. When I checked the sand at about 10:00 p.m. she had gone leaving her kids behind and quite a beach full of turtle prints. I'm glad she chose this beach.

Bill Keye
August 18, 1978
2312 Via Carnillo
Palos Verdes, California
(213) 377-5407

Chris Rathbun
General Delivery
Honokaa, Hawaii
96727

Came down yesterday and stayed overnight. We had Halape all to ourselves, Mary and I had a great time. Must have been time for the turtles. Several passed by us as we slept on the beach. Next morning there were about 17 stranded turtles which we helped to the sea. The night was real beautiful and all the stars could be seen.

Kent Tsutsui
P. O. Box 254
Pahoa, Hawaii 96778
Telephone: 965-8235

Mary Nielson
no address or telephone indicated on backcountry registration form

September 3, 1978

United States Department of the Interior

NATIONAL PARK SERVICE

HAWAII VOLCANOES NATIONAL PARK

HAWAII 96718

IN REPLY REFER TO: N/A

Aloha George Balazs, 9-5-84

Thankyou for being patient. We have had a busy summer. I have spoken with Ed Ladd, the pacific area archeologist (NPS) about the turtle petroglyph. Nikther he or I recall seeing the one you are interested in. I have been in the lava tube petroglyph site that was rediscovered in 1975, though I don't recall the turtle. Ed felt it could possibly be in there because he is familiar with most known petro's in the park. Sorry I cant be of more help.

Thank you so much for the sand samples. I have done a quick survey of the bags. There are shell remnants in some - I am amazed at how sun bleached the coral is. I will get back to you with

over

Daily Log

8-16-82

Hawk resting at Apua Pt

Ranger Francis Kuailani

14 July 82 P. 65

Mrs. J. Ke of Kau

928-8917

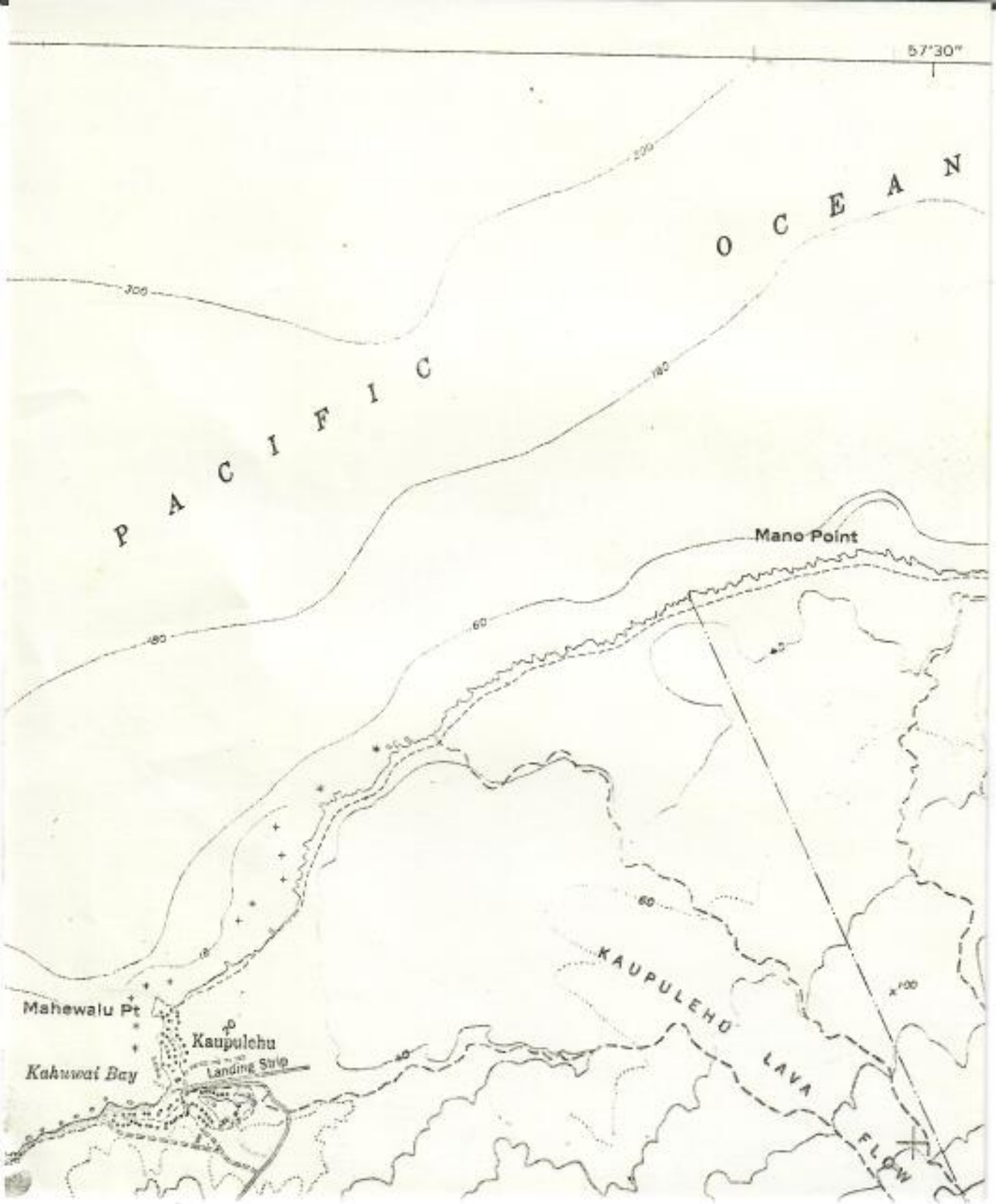
Turtle resting at Honaunau

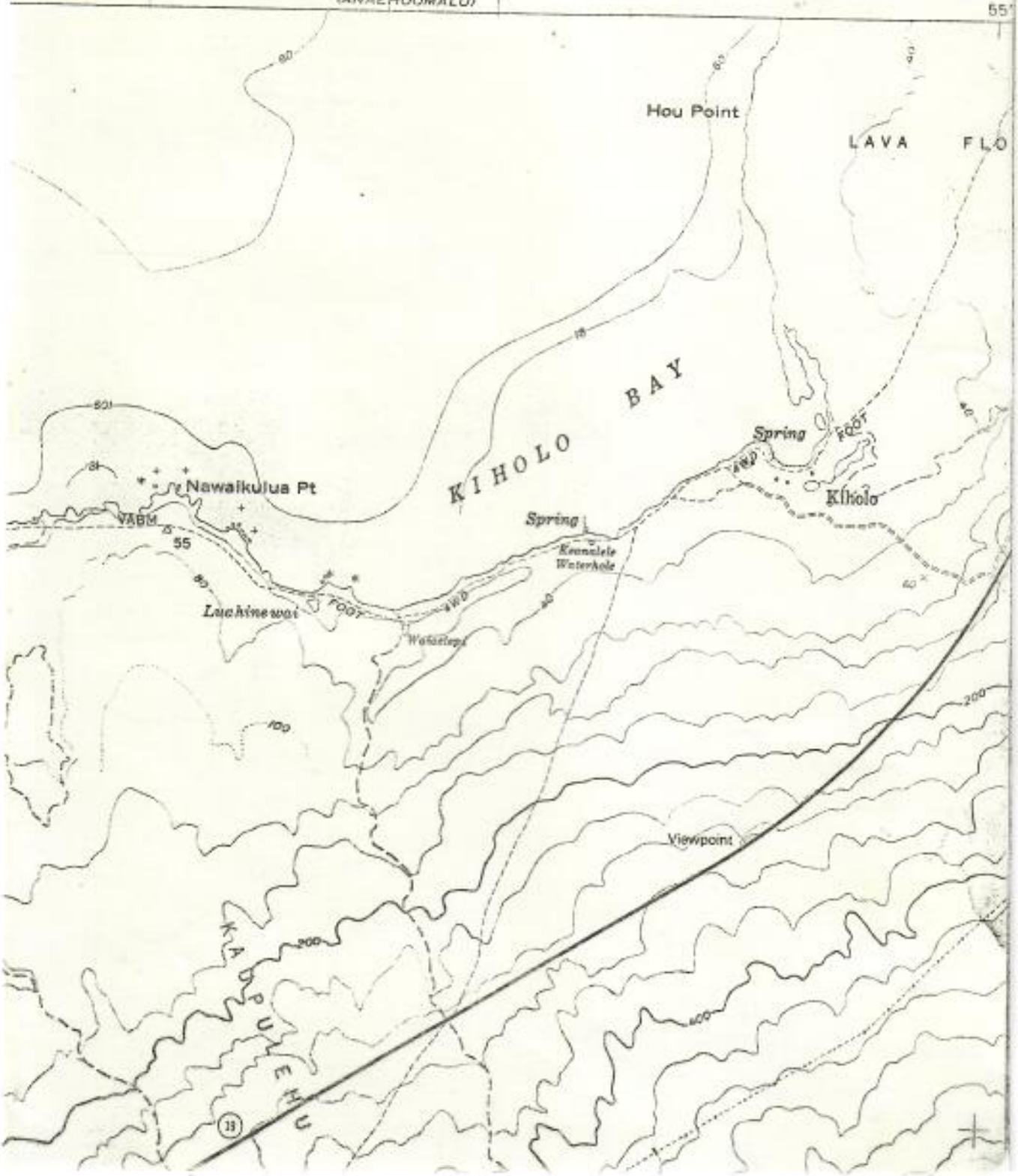
Bud & Virginia Doty

address

Box 726

PAHOA 96772


57'30"
PACIFIC OCEAN
300
180
60
Mano Point
Mahewalu Pt
Kaupulehu
Landing Strip
Kahuwai Bay
KAUPULEHU LAVA FLOW


Hou Point
LAVA FLO
KIHOLO BAY
Spring
FOOT
Kiholo
Spring
Kaanalele Waterhole
Nawaikuiua Pt
VABM
55
Luahinewai
FOOT
Waiaelepa
100
200
Viewpoint
KAPUEHU
200
400
19

TAG RETENTION OF SIZE 681 INCONEL TAGS ON IMMATURE

GREEN TURTLES RECAPTURED AT PUNALUU, HAWAII

G. H. Balazs
July 1984

	No. of tags applied	Elapsed time in the wild (years)	Growth in straight carapace length (cm)	No. of tags shed
1.	2	5.3	41.3 → 60.3	0
2.	2	6.0	57.2 → 78.0	1
3.	4	2.4	68.1 → 75.3	0
4.	2	5.5	39.4 → 61.5	0
5.	2	6.1	39.0 → 65.5	0
6.	2	5.6	42.9 → 69.5	0

Tag retention data for green turtles recovered at Kiholo Bay, Island of Hawaii, during August 1984.

Recovery	Number of tags applied	Elapsed time in the wild (years)	Growth in straight carapace length (cm)	Number of tags shed
1	2	4.4	42.3-53.4(11.1)	0
2	2	3.8	52.9-62.3 (9.4)	0
3	3	3.8	58.5-69.6(11.1)	0
4	2	3.8	57.9-68.0(10.1)	0
5	2	4.4	49.4-63.5(14.1)	0

Summary of long-term recoveries of green turtles made at Kiholo Bay, Island of Hawaii.

Tag No.	Tag loss	Date recovery and length (cm)	Date/location originally tagged and length (cm)	Interval		Mean yearly growth rate	
				Months	Years	(cm)	(in.)
3313, 3314	0	8/8/84 (53.4)	3/21/80 Kiholo (42.3)	53	4.4	2.51	0.99
3496, 3497	0	8/8/84 (62.3)	10/17/80 Kiholo (52.9)	46	3.8	2.45	0.96
3478, 3479, 3480	0	8/8/84 (69.6)	10/15/80 Kiholo (58.5)	46	3.8	2.90	1.14
3487, 3488	0	8/8/84 (68.0)	10/16/80 Kiholo (57.9)	46	3.8	2.63	1.04
3317, 3318, 7782	0	8/9/84 (63.5)	3/21/80 Kiholo (49.4)	53	4.4	3.19	1.26

JOHN WAIHEE
GOVERNOR OF HAWAII

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

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

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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.

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."

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 621
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DIVISIONS:
CONSERVATION AND ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

May 4, 1981

Mr. George H. Balazs, Assistant Marine Biologist
University of Hawaii at Manoa
Institute of Marine Biology
P. O. Box 1346
Kaneohe, HI 96744

Dear Mr. Balazs:

Thank you for your letter of April 13, 1981 concerning a proposed State Park at Kiholo Bay, North Kona, Hawaii.

Though Kiholo is a proposed State Park, we do not have any development plans. The acquisition of the private inholdings will be required before a park can be realized, and we usually don't begin with detailed planning until acquisition is assured. As yet we have been unable to move the project to a sufficiently high priority to accomplish the land acquisition.

After acquisition, we would proceed with research and assembly of data on the natural and historical values and characteristics of the area, which are then evaluated in the light of the various public concerns before any management and development plans can be prepared.

So, we are as yet a long way from development plans for this proposed park. Your concern is timely however, as we appreciate receiving any authoritative data at anytime ahead of this planning process. You are pointing out a very interesting value concerning green sea turtles, and one that will need to be considered with great sensitivity during the planning process and ensuing management as a park. By law, we are responsible for protection and preservation of such resources as well as for public enjoyment.

Please keep us posted on your work in Kiholo.

Sincerely,

James J. Yamashiro
State Parks Administrator

cc: Milton Hakoda, S. Kamimura

THE NATION

Florida rogue wave hits beach, injures 75

DAYTONA BEACH, Fla. (AP) – A wall of water as much as 18 feet high rose out of a calm sea and crashed ashore, smashing hundreds of vehicles parked on the beach and causing 75 minor injuries, officials and witnesses said.

An undersea landslide apparently caused the 27-mile-long rogue wave late Friday night, a federal seismologist said yesterday.

"I saw this huge wall of white water," said Roy Bennett of South Daytona Beach, who was walking on the beach with his wife. "I told my wife to run and I ran behind her. If we hadn't run, we'd have been pinched in between cars or cars would have been on top of us."

Bennett said he saw people bleeding and many car windows smashed after the water receded. Other witnesses said sailboats were piled on top of vehicles on the drive-on beach. Tow trucks yesterday pulled out cars shoved under the boardwalk.

"The wave was huge. It went completely over my van," said Jim Amburgey, who watched from a beachside nightclub. "Cars were going every which way and people were running from all over to get their cars after the wave went back."

The freak wave, estimated at 27 miles long and 250 feet wide, apparently was caused by shifting sands from an underwater landslide, said Frank Baldwin, a senior seismologist for the U.S. Geological Survey in Washington, D.C.

Baldwin estimated the wave peaked at 18 feet high. Seas otherwise were 1 to 2 feet at the time, the National Weather Service said.

Authorities ruled out a tidal wave and no seismic activity was recorded in the Atlantic Ocean at the time, Baldwin sa A weather service meteorologist said wasn't weather-related.

HANDSTAMPS

BOX 1118 VOLCANO, HI 96785

HAWAIIAN NATURAL HISTORY

Kukui
Candlenut
#HN 108 $10

'Ohi'a lehua set
(2 stamps)
#HN 103 $14

Hala
#HN 107 $10

Kohola
humpback whale
#HN 101 $10

Koa
#HN 106 $10

Honu
green sea turtle
#HN 102 $8

'Ohelo
#HN 105 $8

Pu'u 'O'o / Fountain of Fire set
(2 stamps)
#HN 100 $18

Uluhe fern
#HN 104 $8

HANDSTAMPS

BOX 1118 VOLCANO, HI 96785

DESIGNS FROM HAWAI'I

Canoe paddlers petroglyph
#H 103 $10

Hula Kahiko
female
#H 100 $10

Sea turtle petroglyph
#H 107 $8

Hula Kahiko
male
#H 101 $10

Shark fishhook
#H 108 $8

Solo paddler petroglyph
#H 104 $8

Canoe sail petroglyph
#H 106 $8

Tapa stamp
star
#H 109 $7

Ka wahine petroglyph
#H 102 $8

Tapa stamp
wana (sea urchin)
#H 110 $7

HANDSTAMPS

BOX 1118 VOLCANO, HI 96785

DESIGNS FROM ASIA

Chinese Frog
right
#A101 $7

Japanese Caligraphy
"Dream"
#A103 $7

Chinese Frog
left
A102 $7

Japanese bamboo
#A106 $8

Chinese dragonfly
#A105 $8

Japanese koi
(carp)
#A104 $8

Japanese crest
ocean wave
#A107 $8

Japanese crest
three moons
#A108 $8

HANDSTAMPS

BOX 1118 VOLCANO, HI 96785

DESIGNS FROM HAWAI'I

Canoe paddlers petroglyph
#H 103 $10

Hula Kahiko
female
#H 100 $10

Sea turtle petroglyph
#H 107 $8

Hula Kahiko
male
#H 101 $10

Shark fishhook
#H 108 $8

Solo paddler petroglyph
#H 104 $8

Canoe sail petroglyph
#H 106 $8

Tapa stamp
star
#H 109 $7

Ka wahine petroglyph
#H 102 $8

Tapa stamp
wana (sea urchin)
#H 110 $7

HANDSTAMPS

BOX 1118 VOLCANO, HI 96785

EARLY AMERICAN WEATHERVANES

Mermaid weathervane
#W 101 $8

Dove of Peace weathervane
#W 102 $8

Flying angel weathervane
#W 103 $8

Brig Topaz weathervane
#W 104 $8

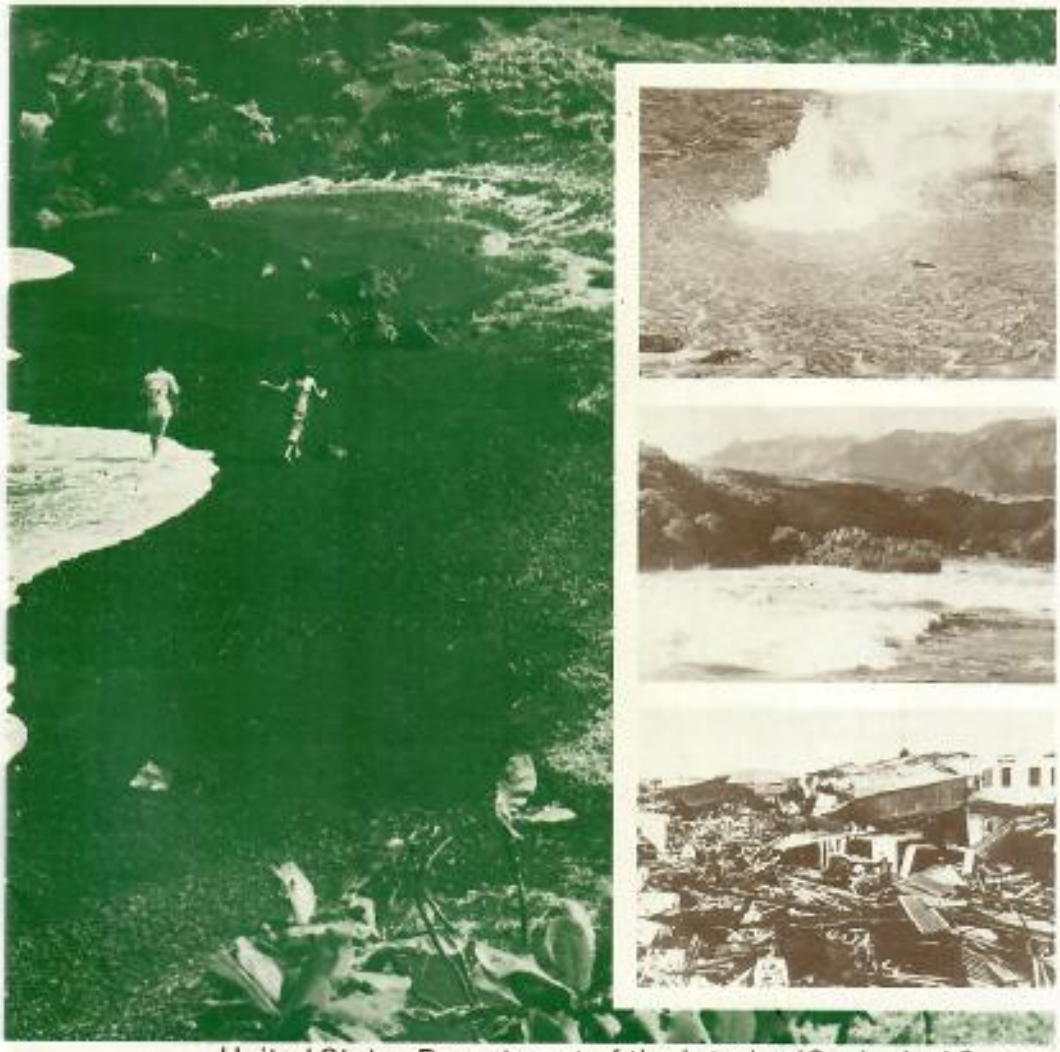
Angel Gabriel weathervane
#W 105 $8

Blue whale weathervane
#W 106 $8

Sea dragon weathervane
#W 107 $8

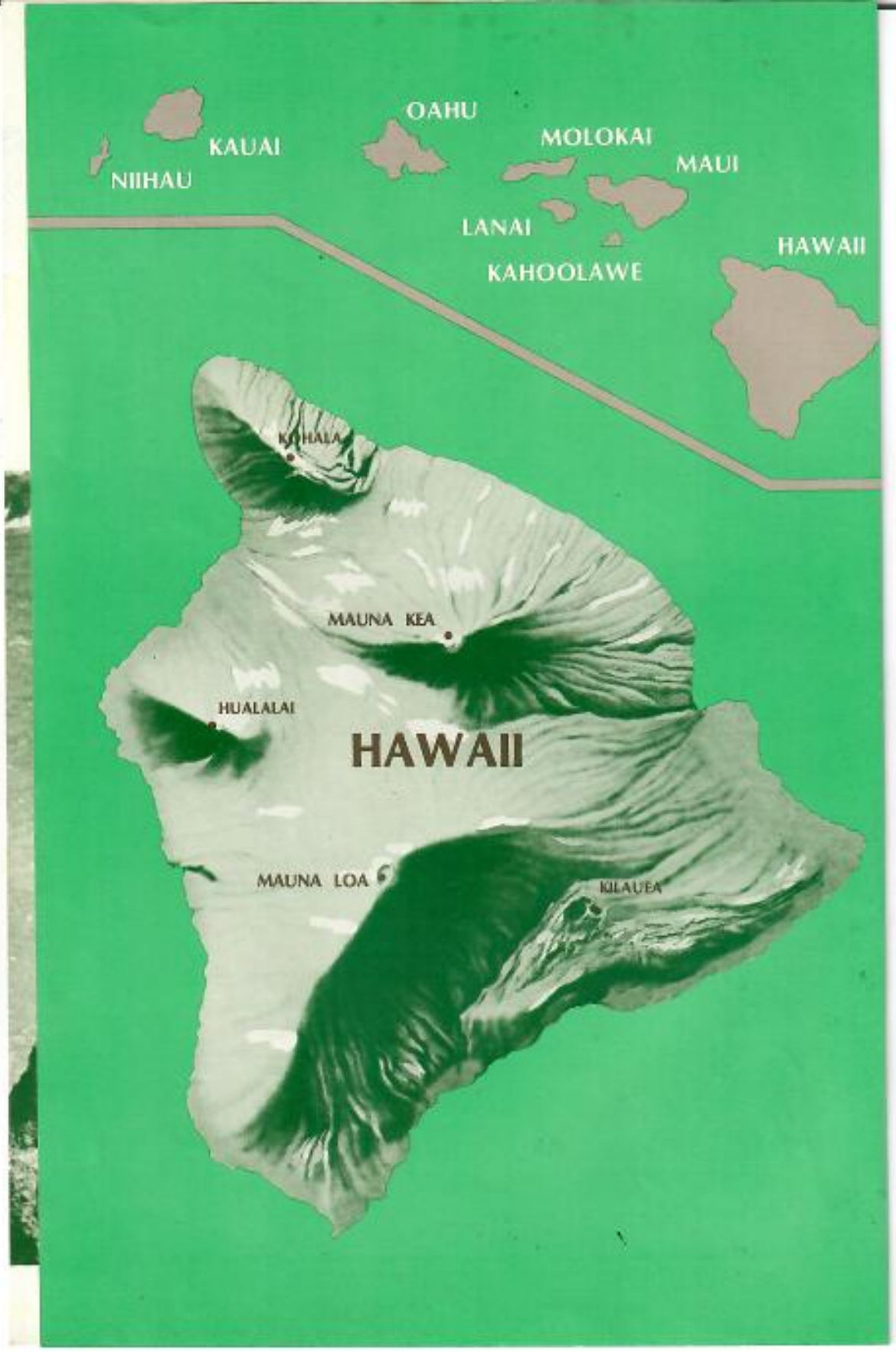
NATURAL HAZARDS

on the Island of Hawaii



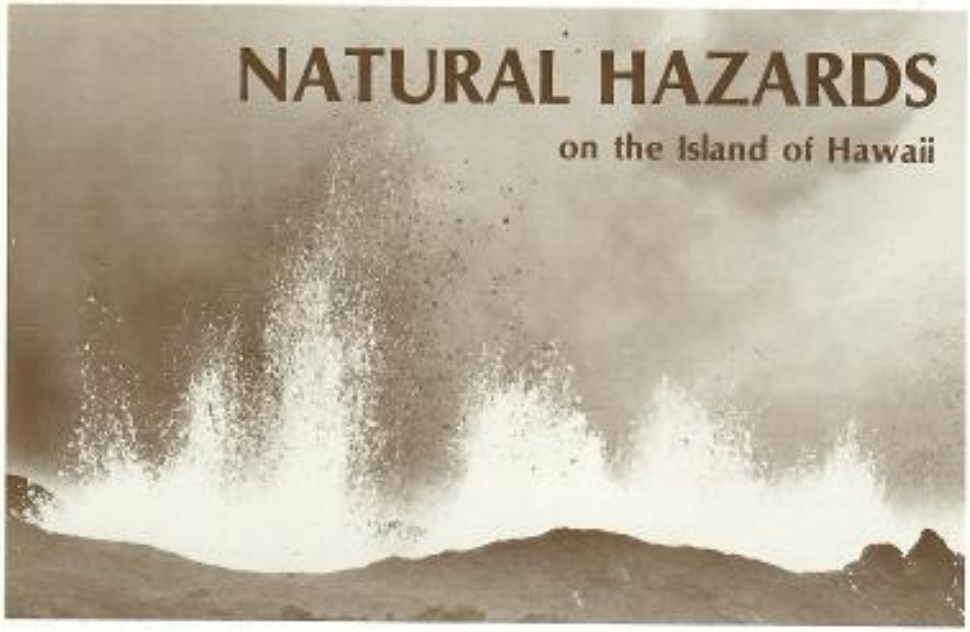
United States Department of the Interior/Geological Survey

USGS: INF-75-18


OAHU
KAUAI
NIIHAU
MOLOKAI
MAUI
LANAI
KAHOOLAWE
HAWAII
KOHALA
MAUNA KEA
HUALALAI
HAWAII
MAUNA LOA
KILAUEA

NATURAL HAZARDS

on the Island of Hawaii



The island of Hawaii and the other islands of the Hawaiian chain are products of volcanic eruptions. Lava flows from hundreds of thousands of eruptions through countless centuries have built the Hawaiian Islands. Some volcanoes on the island of Hawaii have been very active during historic time, and similar activity is expected to continue throughout the foreseeable future.

Volcanoes have always been an important element in the lives of Hawaii's inhabitants. Volcanic rocks are the raw materials from which the rich soils are derived that are the basis of Hawaii's largest industry—agriculture. Tourism, the island's second largest industry, also benefits from the volcanoes; the eruptions provide unsurpassed spectacles that attract visitors.

Hawaiian volcanic activity, however, as well as other natural events such as earthquakes and tsunamis (earthquake-triggered sea waves), can be hazardous to people and property. Even though no place on Earth is immune from some sort of natural hazard, the island of Hawaii has its own individual blend. But when the hazards are clearly recognized, careful planning can minimize any possible disturbance and damage. The benefits of living, working, and visiting in Hawaii are well known. They can be enhanced by recognizing and realistically considering the existing hazards.

This booklet discusses some common questions about some natural hazards on the island of Hawaii. The replies are brief and generalized; further information may be obtained from one or more of the references listed at the end of this booklet.

1. How great are the hazards from Hawaii's volcanoes?

The hazards are severe enough to have caused property losses on certain parts of the island throughout Hawaiian recorded history. The village of Hoopuloa on Mauna Loa's west flank was buried by a lava flow in 1926. Much property in the Puna District was destroyed by flows in 1955, and even more property, including the village of Kapoho, was destroyed by flows in 1960. In spite of such losses, most areas on the island have been free of damage. Thus, it is crucial to identify the hazardous areas to avoid losses without overreacting to danger. Generally there is very little direct danger to human life, but the risk to property is great enough that volcanic hazards should be considered in all plans for land use—even

though such consideration for many places will quickly determine that the risk is low.

Hawaii has been inhabited for perhaps a thousand years, and people have lived successfully beside and on the active volcanoes. The early Hawaiians quickly learned, however, to adjust their lives to the threat of volcanic activity. They either avoided certain areas or entered them briefly with awe and respect. Even so, their activities were sometimes abruptly curtailed by lava flows and other effects of volcanic activity. Recent residents of Hawaii have had similar experiences. They, too, recognize that certain areas are particularly susceptible to volcanic disturbances. Many of these areas have never been inhabited, but as the population increases, the desire to move into previously little used or unused land increases. Under the pressures of a growing population and expanding economy—especially during prolonged lulls in volcanic activity—the potential hazards tend to be forgotten or underestimated.

2. What kinds of hazards do the volcanoes present?

Lava flows are the most common volcanic hazard in Hawaii. Other hazards include lava spatter, corrosive volcanic gases, ash particles and—rarely—explosions of turbulent clouds of gas that may carry dust, rock fragments, and large blocks. Related hazards are ground shifts that cause unequal settling, fractures that break the Earth's surface, and earthquake shaking.

3. How may volcanic events endanger people?

Eruptions may endanger people's property, livelihood, and peace of mind, but seldom their lives. The vast majority of Hawaiian eruptions are gentle; the lava moves slowly, and warnings of impending eruptions allow people to reach places of safety. No human lives have been lost to lava flows during the 19th and 20th centuries.

Explosive eruptions are rare in Hawaii, but they are potentially lethal. A gas-cloud eruption about 1790, in a normally uninhabited area, killed many members of a traveling Hawaiian army. Another explosive eruption in 1924 threw large blocks of rock into the air and claimed the life of a spectator who failed to heed warnings to leave. But the overall threat to life by explosive eruptions is relatively low, both because of their infrequency and because of warnings.

4. How may volcanic events endanger property?

The principal effect is the burial of land and the works of man by flowing lava. Less commonly, property may be blanketed by falling spatter from fountains or by ash and larger fragments expelled by rare explosive eruptions. Other effects include the damage to buildings and roads caused by ground cracking, corrosion of materials by volcanic gases, fires started by lava, and abrasion of plants and goods by erupted particles. Risks to property are high compared with risks to life, simply because land and buildings cannot be moved from the path of an advancing flow or other destructive agent. Destruction of the works of man and agricultural soils by a flow of lava can be complete, whereas damage from particles and gases is generally less serious. Reduction of such risks is possible when the hazards are understood well enough to predict—at least in a general way—what areas are most likely to be affected and how often.

5. Should vulnerable areas be abandoned?

No. For each area, however, the risks should be compared with the potential gains from developing and using the land. Even in areas of relatively high risk, certain types of land use may be appropriate. Many other factors must be considered by planners and local government officials in deciding how land can best serve the needs of the people. Nevertheless, sensible decisions on land use can best be reached with full awareness and adequate knowledge of the nature and degree of natural hazards. If the hazards are ignored, the results can range from inconvenience to catastrophe.

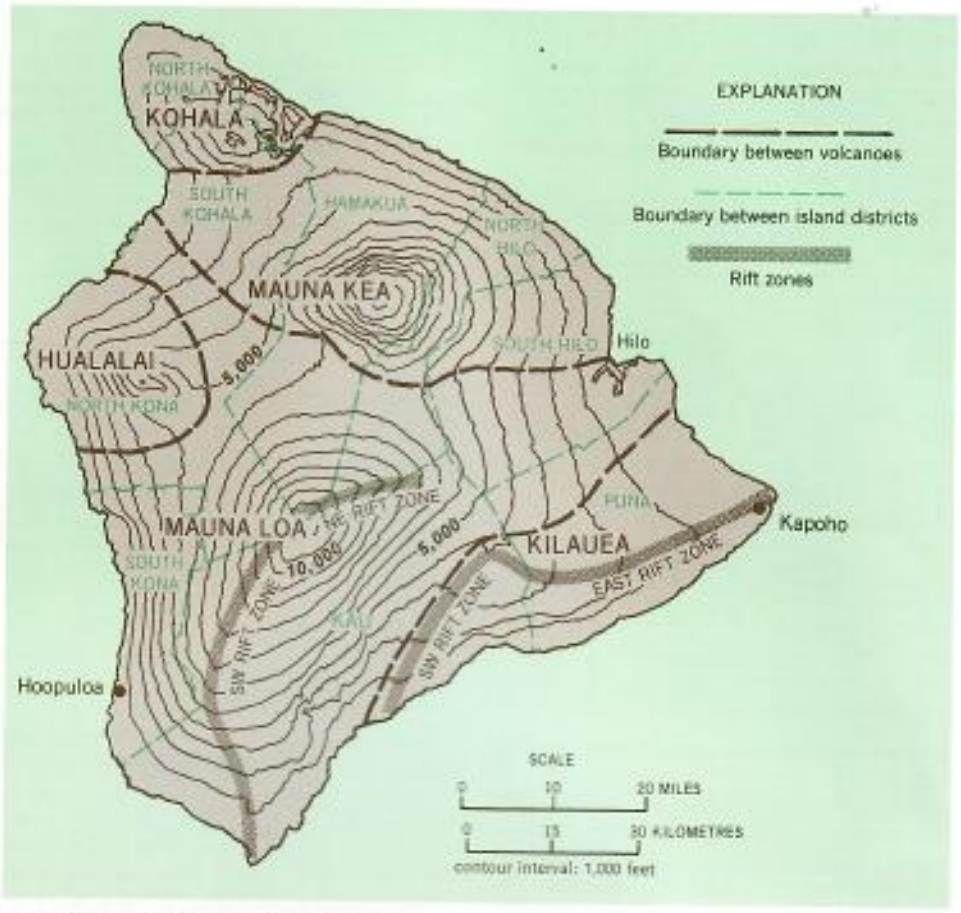


Figure 1.—Index map of the island of Hawaii.

6. Can eruptions occur anywhere on the island?

Probably not. Only two of the island's five volcanoes, Kilauea and Mauna Loa (fig. 1) have erupted often during the 19th and 20th centuries. The location and frequency of past eruptions are the best clues as to where new eruptions are likely to occur, and the present behavior of Mauna Loa and Kilauea indicates that they will be the source of most of Hawaii's future eruptions.

Hualalai Volcano last erupted about 1800, and will probably erupt again, but its history suggests that future eruptions are not likely to be frequent. Mauna Kea last erupted between 3,000 and 5,000 years ago and might possibly erupt again. But the probability that it will

Table 1.—Physical dimensions of the parts of Hawaii's volcanoes (fig. 1) that are above sea level.

Volcano	Elevation of highest point		Area		Percent of area of island
	Feet	Metres	Square miles	Square kilometres	
Mauna Loa	13,677	4,169	2,035	5,271	50.5
Kilauea	4,090	1,247	552	1,430	13.7
Hualalai	8,271	2,521	290	751	7.2
Mauna Kea	13,796	4,205	919	2,380	22.8
Kohala	5,480	1,670	234	606	5.8
Total island	——	——	4,030	10,488	100

erupt in the near future must be considered as very small. Kohala's last eruption took place about 60,000 years ago, and chances for activity during the next several decades are virtually nil. Table 1 lists some geographical facts about the five volcanoes.

7. What areas are most susceptible to volcanic hazards?

The summits and rift zones of Kilauea and Mauna Loa are the areas of highest risk. Rift zones are long, narrow belts of structural weakness that include cracks, fissures, craters, spatter cones, and cinder cones. Kilauea and Mauna Loa each have two major rift zones that extend from the summit to points far down the flanks of the volcanoes (fig. 1). Hualalai and parts of the flanks of Kilauea and Mauna Loa have less risk, and Mauna Kea and Kohala are the areas of least risk. Specific areas have been outlined to designate relative degrees of risk (fig. 2), which increase progressively from areas marked A through those marked F.

8. How are volcanic hazard areas designated?

Volcanic hazard areas are designated principally by the location and the frequency of past eruptions. Major criteria are listed below; additional information in table 2 is an aid to understanding the relative degree of hazard within each of the areas.

Area F, the area of highest risk, includes the summit areas and major rift zones of Kilauea and Mauna Loa. Most of the land labeled F has a historic and recent prehistoric record of active volcanic vents, cones, and craters; ground cracking and subsidence; and burial by lava flows. Narrow coastal regions on parts of Kilauea and Mauna Loa are also labeled F because they lie within belts of frequently active faults in which the land is subject to cracking, abrupt subsidence, and possible flooding by locally generated tsunamis.

Area E includes the flanks of Kilauea and Mauna Loa that lie directly downslope from the summit areas and rift zones where lava flows originate. Land labeled E is susceptible to burial by lava flows erupted within the summit and rift areas labeled F. In addition, vents along minor rift zones on Mauna Loa have erupted a few times within area E. Degree of risk within this area varies widely, but in general, it becomes less with increasing distance from the summits and major rift zones.

Area DE, Hualalai Volcano. Lava flows have buried land in this area more recently than in area D. Yet the frequency of eruptions of Hualalai is much less than Kilauea and Mauna Loa. Moreover, vents are not confined to rift zones. Risk on Hualalai is rather poorly defined because of the sparse historic record, but it probably spans a range equivalent to those in area D and the low risk parts of area E.

Area D includes selected areas on the flanks of Kilauea and Mauna Loa that are somewhat protected by topography from burial by lava. No historic or recent prehistoric flows have invaded these areas.

Area C is the summit region and upper flanks of Mauna Kea. The latest eruptions within this area took place between 3,000 and 5,000 years ago. They consisted of small lava flows and moderately explosive emissions of spatter and particles that built cinder cones. Volcanic ash was spread widely by air currents. Future eruptions will probably be similar, although the eruptive frequency is now so low that the hazard must be regarded as very small.

Area B consists of the lower flanks of Mauna Kea. No eruptions have occurred in this area during the last 10,000 years. This land could be buried only by relatively long lava flows issuing from vents in area C.

Area A, Kohala Volcano. No volcanic activity has occurred in this area for about 60,000 years.

9. How dangerous are the areas of high hazards?

A careful study of figure 2 and table 2 and their implications is perhaps the best way to answer this question. For example, since about 1800 A.D., lava flows from 35 different eruptions have covered parts of area E; only one eruption on the north flank of Mauna Loa, in 1859, originated within area E. About 15 percent of area E has been covered by lava during this 175-year period. In

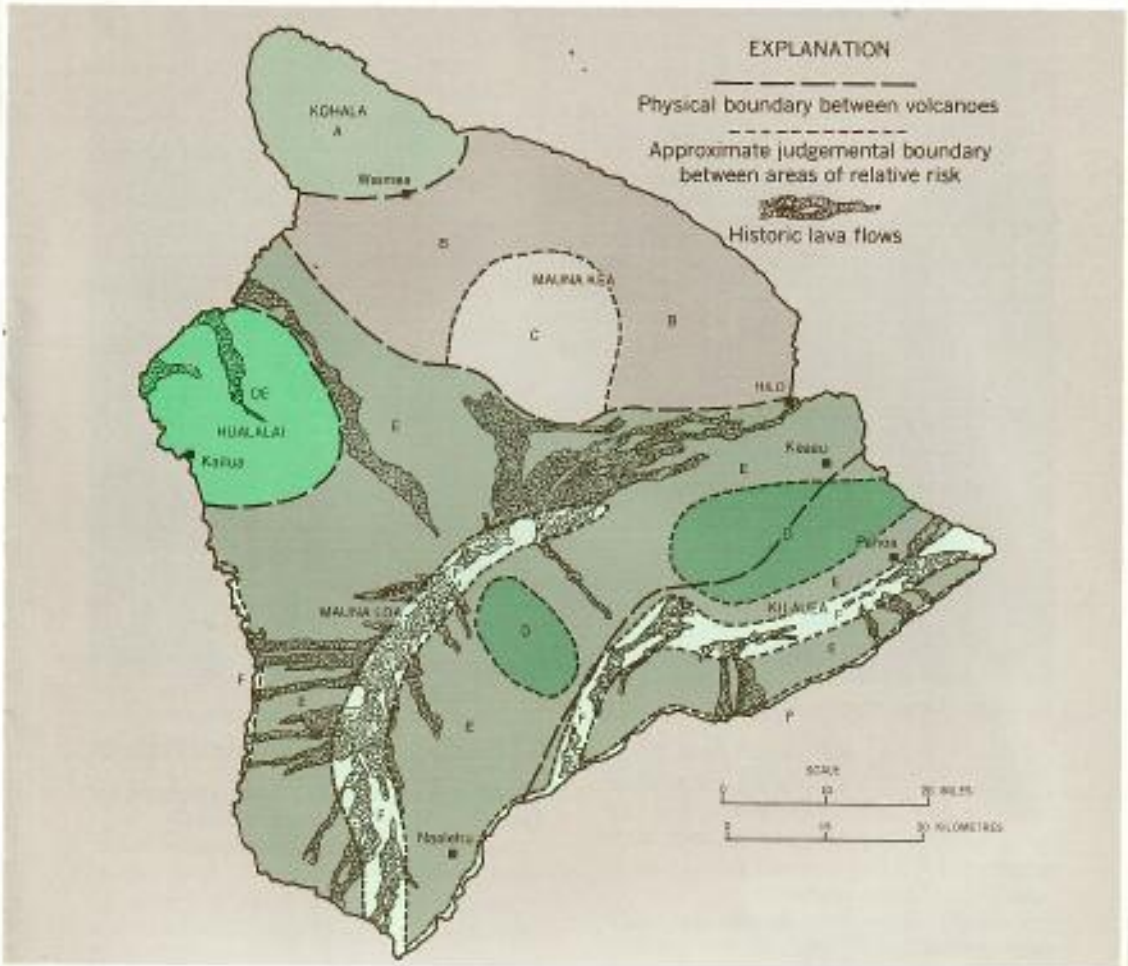


Figure 2.—Areas of relative risk from volcanic hazards. Risk increases from "A" through "F". Map shows lava flows erupted between the years 1800 and 1974.

Table 2.—Number of eruptions originating within hazard areas and number of times lava flows have covered land within hazard areas during historic and recent prehistoric time.

	Historic time (since approximately 1800)			Recent prehistoric time (5,000-year interval prior to 1800)	
Area	Number of times vents have erupted within area	Number of times lava flows have covered land within area	Percentage of land covered within area	Number of times vents have erupted within area (estimated)	Number of times lava flows have covered land within area (estimated)
A	0	0	0	0	0
B	0	0	0	0	Less than 5
C	0	0	0	Less than 5	Less than 5
D	0	0	0	0	More than 10*
DE	1	2	6	More than 10	More than 10
E	1	35*	15	About 10	More than 100*
F	80	More than 80	50	About 2,000	More than 2,000

*Most lava flows that entered areas D and E erupted from vents in area F.

Geological Survey scientists examining hot cinder cone.

contrast, during the same period approximately 80 eruptions originated within area F, and some land within the area was buried by lava during each eruption. Lava has covered about half of area F during this period.

Records show that during each 20-year period from 1830 to the present, between 25 and 75 square miles (65 and 195 square kilometres) of land have been covered by lava. This is approximately 1 to 3 percent of the region occupied by Kilauea and Mauna Loa. Area F occupies about one sixth of the area of Kilauea and Mauna Loa. Yet nearly 40 percent of all land covered by lava that erupted during historic time has been in areas designated F. This indicates that roughly 3 to 8 percent of the land in area F has been buried during any given 20-year period. In this area of highest hazard, roughly 92 to 97 percent of the land remained free from lava burial during any specific 20-year period. Similarly, from about 0.5 to 3 percent of the land in area E has been buried during various 20-year intervals, leaving 97 to 99.5 percent unaffected. Although it is not certain that this pattern will be maintained, past behavior still provides the best clue to future behavior.

10. Once an area has been covered by lava, is it safe from future burial?

No, although many people mistakenly think so. The entire island is made up of a succession of lava flows, attesting to repeated stacking of one flow over another throughout the volcanic history of the island. Some areas near Kilauea's summit and along the upper east rift zone have been covered repeatedly during the past few years. Recent flows across an area are no guarantee against future burial.

11. Are the risks uniform within a particular hazard area?

No, the risks may be quite variable throughout any hazard area, depending chiefly on the local topography and the distance from potential source vents. For example, the risk is greater on low ground than on higher ground in the same vicinity. Risks tend to be greater on steep slopes than on gentle slopes. And risks gradually decrease as the distance from eruptive vents increases. All of these factors vary throughout each of the designated hazard areas and, in particular, are important for those areas

with historic activity. This variability shows that the classification of hazards is chiefly appropriate when applied to the area as a whole. Detailed studies of certain specific sites, however, might suggest a degree of risk either higher or lower than that designated for the area in which the site falls.

12. How are the risks evaluated for land close to area boundaries?

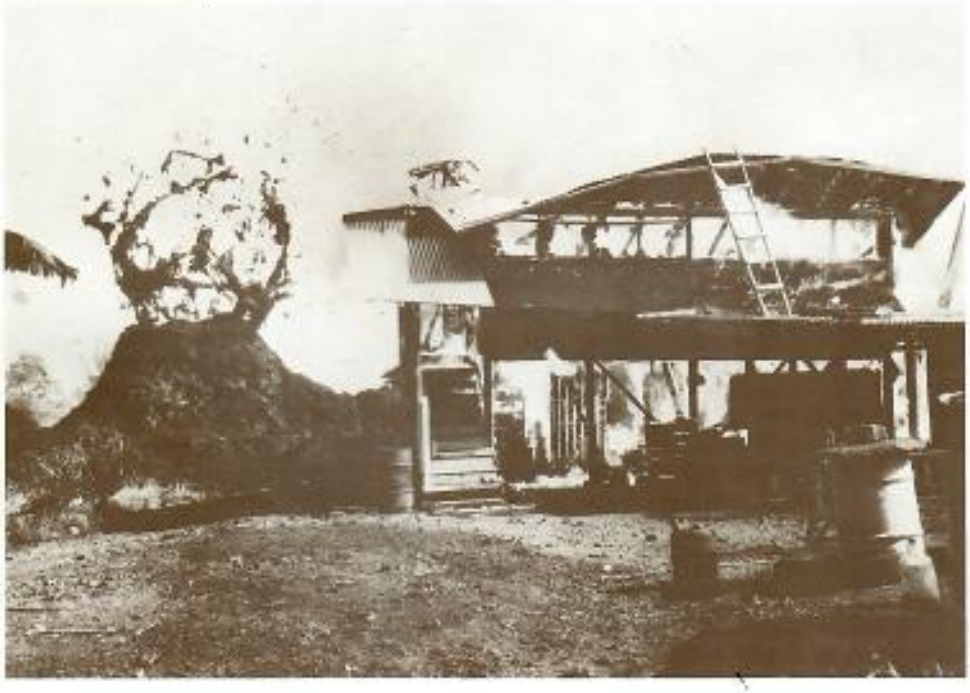
The risks can change either abruptly or gradually across area boundaries, depending upon the kind of boundary involved. Abrupt changes in risk occur across boundaries that are determined according to topographic features, such as the trough formed by the junction of the slopes of Mauna Loa and Mauna Kea. The trough itself may be threatened by lava flows from Mauna Loa, but risk from lava flows only a short distance up the adjoining flank of Mauna Kea is very low. Thus, a site only a short distance on one side of that boundary has an easily recognized and markedly different risk than a site a short distance on the other side of the same boundary.

Some area boundaries, however, have been designated according to judgmental factors instead of specific topographic features. For example, the designation of the outer limits of rift zones is subject to considerable interpretation. The boundaries around areas somewhat protected from the direct paths of potential lava flows (such as areas marked D) are designated only by exercising a substantial amount of judgment. The approximate placement of such boundaries shows that the degree of risk applicable to two pieces of property close to each other, but on opposite sides of a judgmental boundary, cannot be considered to be significantly different. Boundaries designated as "judgmental" in figure 2 should be regarded as both approximate and gradational.

13. How serious is the earthquake danger on the island?

Strong earthquakes have occurred in the past and can be expected in the future. The strongest earthquake in historic time occurred in 1868 and was centered along the island's south coast (fig. 3). This earthquake had a Richter magnitude of about 7½ and caused serious damage across the entire island. Recent quakes caused significant damage

Spatter fountain in eruption.



in 1951, 1973, and 1975. Figure 3 shows the approximate locations and the dates of some of the strongest historic earthquakes on and near the island. The frequency of these earthquakes and their widespread distribution show that the island faces an ever-present possibility of earthquakes strong enough to cause extensive damage.

Large earthquakes, unlike volcanic eruptions, are not confined to any particular part of the island. Furthermore, shaking may cause damage far from the point where the quake is centered. For this reason, it is not feasible to draw an "earthquake hazard map" of the island, such as figure 2 that illustrates the volcanic hazards. Risk of major damage from strong earthquakes is considered to be relatively high across the entire island. The risk is perhaps most severe in areas of steep and unstable slopes where landslides and rockfalls are likely to be induced by earthquakes. The risk from earthquakes on the island is comparable to that in many regions on the mainland United States and elsewhere that have high seismic hazards.

Danger from earthquakes can be minimized by careful site selection and proper earthquake-resistant design of man-made structures. Such matters as the angle and stability of slopes and the firmness of foundation sites vary widely from one locality to another. Competent evaluation of individual sites during land-use planning can do much to reduce earthquake risks. Local officials have the responsibility of maintaining proper standards of site selection and earthquake-resistant construction.

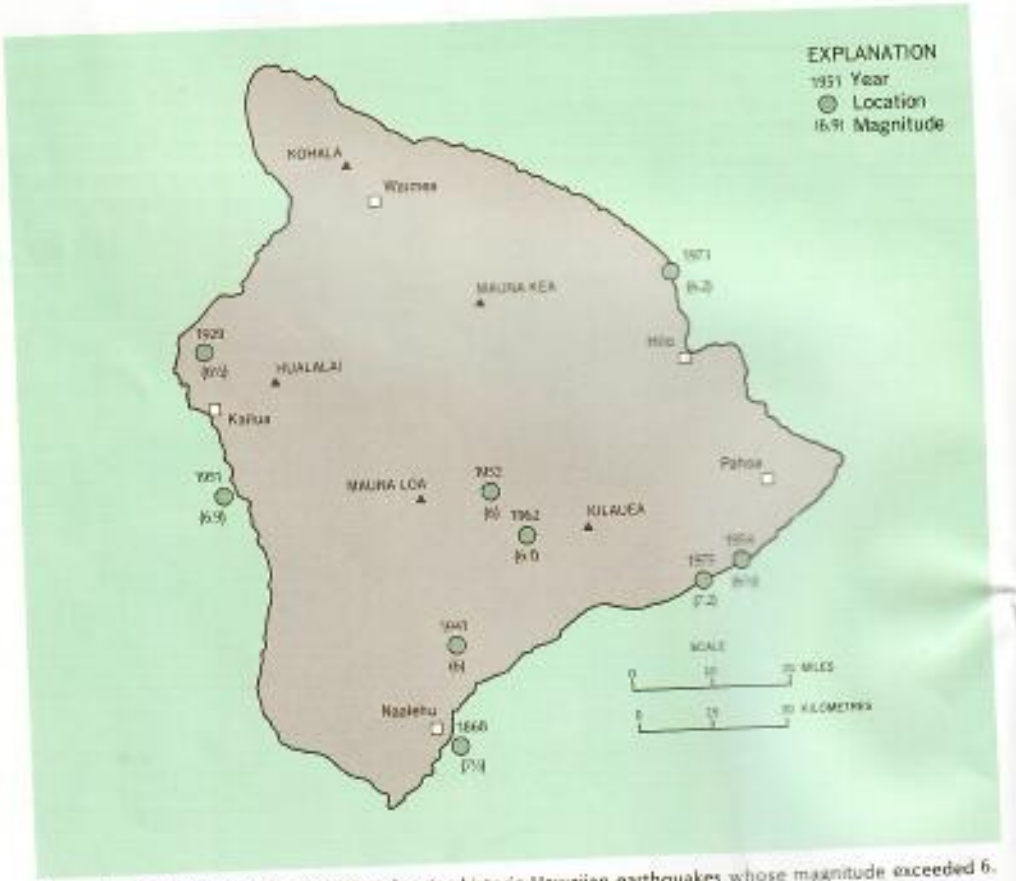


Figure 3.—Location of points of origin of major historic Hawaiian earthquakes whose magnitude exceeded 6. Locations and magnitudes for earthquakes prior to 1960 are highly approximate because instrumental data are sparse, therefore fractions are used.

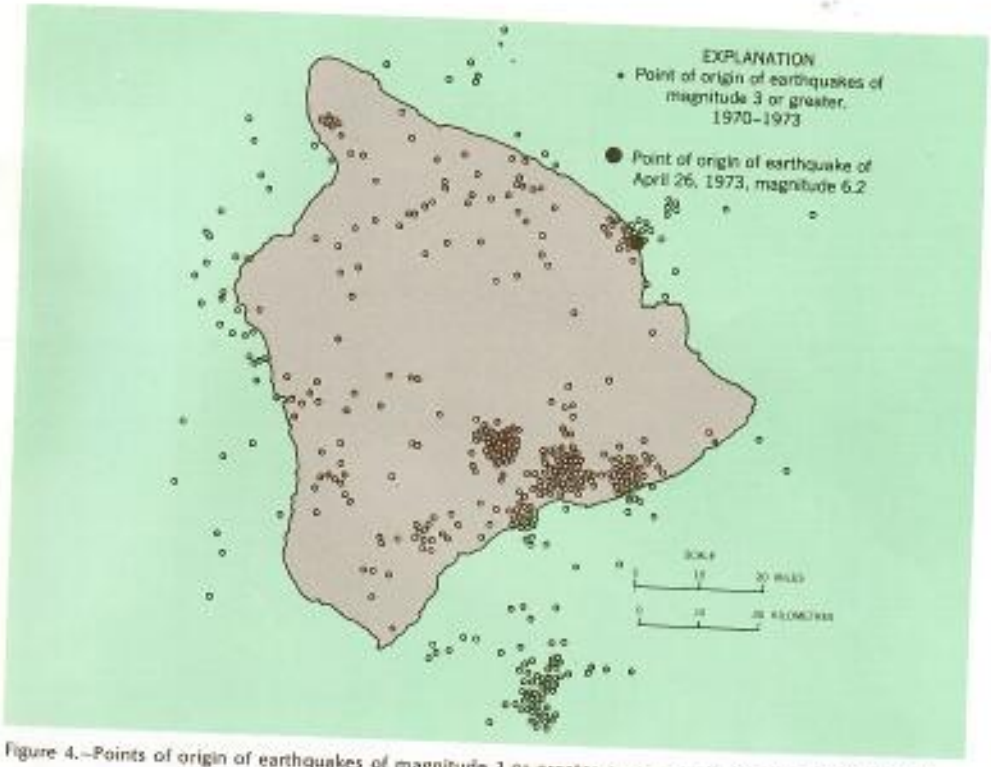


Figure 4.—Points of origin of earthquakes of magnitude 3 or greater on or near Hawaii from 1970 to 1973.

14. Aren't many Hawaiian earthquakes concentrated in certain areas?

Yes. In recent years the greatest number of earthquakes on the island have occurred on or near Kilauea, but earthquakes also tend to be concentrated in other specific areas. An example of how earthquakes are concentrated is the map of figure 4, which shows the distribution of earthquakes of larger than magnitude 3 that occurred from 1970 to 1973. Maps for other periods of time may show different distributions. Most of these earthquakes are much smaller than the major earthquakes previously discussed, and few caused damage. Of the earthquakes shown in figure 4, only the one of April 26, 1973, caused any significant damage. However, hundreds of those shown in the figure were strong enough to be felt. Thousands more, not shown on this map, were so small that they were detected only by sensitive instruments. Quakes smaller than about magnitude 5, even those that can be felt, do not pose a substantial hazard to life and property. When they occur in swarms, however, such as those on Kilauea's southwest rift zone in December 1971 and January 1975, the earthquakes can be conspicuous, annoying, and sometimes frightening.

Ground failure caused by an earthquake.

Damage caused by a tsunami.

15. What is a tsunami?

A tsunami is a giant wave or series of waves produced by a large-scale disturbance of the ocean floor. "Tsunami" is the Japanese name for these waves; the term "tidal wave" is also used, but it is misleading because the waves have no relation to tides. Most tsunamis are generated by the sudden movement of the ocean floor along a fault—a submarine earthquake. Others may be caused by abrupt subsidence of the ocean floor or a submarine volcanic eruption. Tsunamis spread outward in all directions from their source. In the open ocean they may travel for thousands of miles at speeds of several hundred miles per hour.

16. How does a tsunami do damage?

When a tsunami reaches some coastlines, it may rush ashore at high speeds, flooding and smashing all in its path. While at sea, a tsunami is scarcely noticeable. As the wave enters shallow water or is funnelled into a bay, it can build to great heights. Some have been recorded at more than 100 feet (30 metres) above normal sea level. Reaching a shoreline, a tsunami advances inland at velocities of 30 to 60 miles (50 to 100 km) per hour, endangering life and destroying property. They can be powerful enough to smash buildings and toss anchored ships ashore. As they recede, people, animals, and property may be swept into the sea. A tsunami may include several waves, separated by intervals of 5 to 40 minutes. Areas that escape early waves may be damaged by those later in the series.

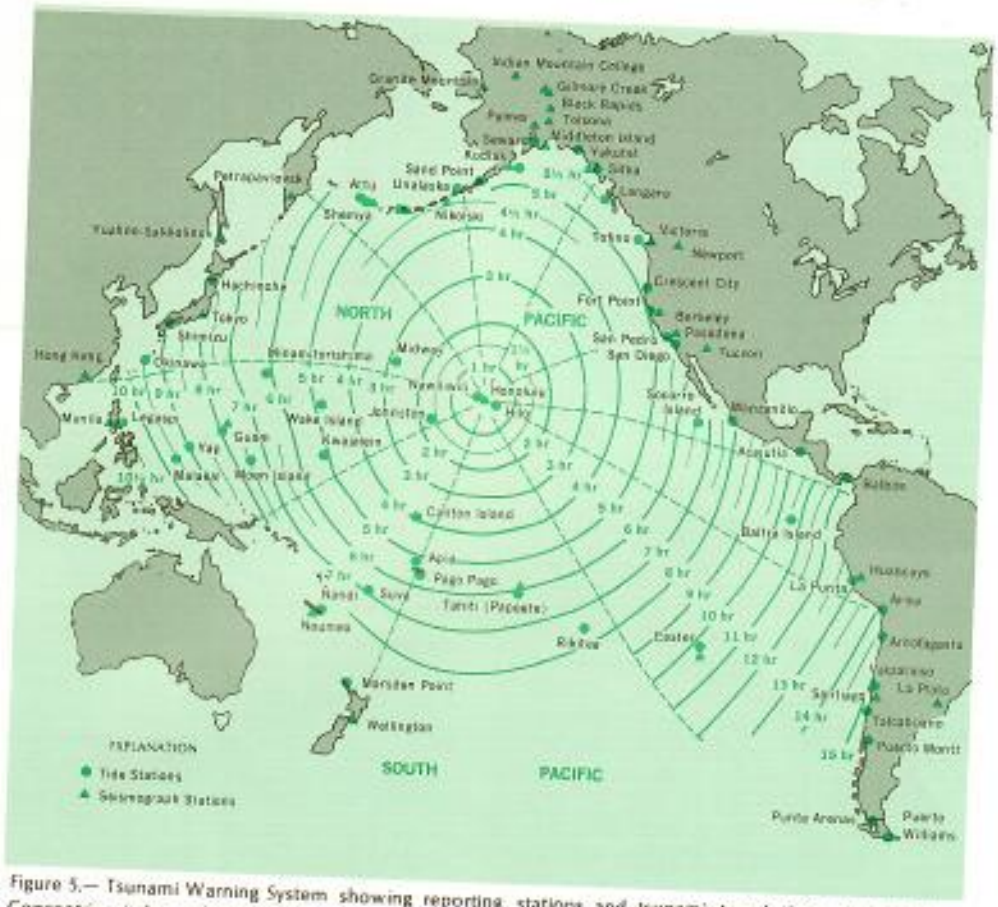


Figure 5.— Tsunami Warning System showing reporting stations and tsunami travel times to Honolulu. Concentric circles radiating from Hawaii like a gigantic spider web show seismic sea wave travel times to Honolulu. Reporting stations in the tsunami warning system are encompassed by a great ring bounded by such diverse locales as Alaska, China, and Chile.

17. How serious is the tsunami threat to Hawaii?

Hawaii is vulnerable to destructive tsunamis of distant origin, as well as less frequent ones that originate close to the island. The Pacific Ocean is ringed by a belt of active faults that may cause ocean bottom displacements, but, fortunately, few circumpacific earthquakes generate tsunamis. Since the early 19th century, about 40 tsunamis have been large enough to be reported in Hawaii. Of these, seven caused severe damage; five of the seven were generated by earthquakes thousands of miles away, such as the 1946 tsunami that originated in the Aleutian Islands and the 1960 tsunami that originated near Chile. Each killed many people and caused millions of dollars worth of damage. The tsunamis of 1868 and 1975 were of local origin. The tsunami of 1868, the most severe, devastated the entire southern coast of the island, killing about 80 people and destroying several villages. The tsunami of 1975 claimed two lives, and although it caused widespread damage, its strongest effects were in uninhabited areas. Tsunamis are a great, though infrequent, danger to both people and property in coastal regions of Hawaii, perhaps greater than that posed by either volcanoes or earthquakes.

18. Are advance warnings of approaching tsunamis possible?

Yes. Following the very destructive tsunami in 1946, a warning system was developed by the U.S. Coast and Geodetic Survey (fig. 5). The system is now administered by the National Weather

Service of the National Oceanic and Atmospheric Administration (NOAA) and is closely tied to the International Tsunami Information Center. When a strong earthquake is centered under or near the Pacific Ocean, a "tsunami watch" is issued advising that a tsunami is possible. If large waves are subsequently detected at tide stations near the source of the earthquake, a "tsunami warning" is issued. For any tsunami generated along the margin of the Pacific Ocean, such a warning gives several hours of notice to Hawaii. This permits safe evacuation of people and movable property from low-lying coastal areas. Warnings now include the advice that most tsunamis consist of a series of waves that may continue to arrive during a span of several hours; the first wave may not be the strongest.

For locally generated tsunamis, such as those of 1868 and 1975, little or no advance warning is possible. A fast-acting warning system for the State of Hawaii is being developed by the National Weather Service, but, even when operational, the warning will be very brief. Any earthquake strong enough to cause difficulty in standing or walking should be regarded as a tsunami warning by people in coastal areas. Long-term protection from locally generated tsunamis will be aided by careful planning of the location of structures and developments, particularly for activities associated with high concentrations of people.

19. What do volcanic and other natural hazards mean for people who live, work, and visit on Hawaii?

It is important for people to be aware of the hazards and also to realize that it is possible to plan and carry out their affairs in ways that can minimize the effects of the hazards. Often, sensationalistic publicity has drastically overstated the potential hazards—doomsday-type statements are misleading, irresponsible, and damaging. On the other hand, complacency is equally undesirable and may court disaster. The areas that are relatively susceptible to natural hazards should be sensibly recognized. Policies on land use should be adopted that insure that new developments are planned for minimum risk to life and property. Obviously, for some areas, it is impossible to avoid some degree of risk. In some places the degree of risk may indicate that low-density development requiring few people and only light construction is more appropriate than high-density development. Individuals and firms contemplating the purchase of property should have full access to reliable facts so they can understand the nature of the hazards problem. Taxpayers should be aware of the possible costs of publicly funded relief projects that assist affected property owners. Adequate public knowledge should not only dispel over-reaction to the hazards but should also eliminate apathy. The problems should be openly acknowledged and discussed and not hidden or dismissed by wishful thinking.

Natural hazards and the problem of response are not unique to Hawaii. Many densely developed areas on mainland North America are subject to hazards such as floods, earthquakes, and violent storms. Experience has taught important lessons and has also shown that proper planning and construction can markedly reduce the risks. Hawaii, still relatively undeveloped, has the opportunity to make wise choices on patterns of land use that will minimize the effects of natural hazards and protect the livelihood and welfare of residents and visitors.

20. What are other sources of information about volcanoes, earthquakes, and tsunamis of Hawaii?

The following selected references describe these natural hazards in more detail than is possible in this short booklet. Additional information on tsunamis may be obtained by writing to the International Tsunami Information Center, P.O. Box 3650, Honolulu, Hawaii 96811.

(From material provided by D. W. Peterson and D. R. Mullineaux)

Photo Credits

Cover: Right center, U.S. Army Corps of Engineers; bottom, Rev. S. N. McCain, Jr. Others: Honolulu Advertiser; Hawaii Tribune-Herald, Larry S. Kadooka

References

Ayre, R. S., 1975, Earthquake and Tsunami Hazards *in* the United States—a Research Assessment: Univ. of Colorado, Inst. of Behavioral Science, Program on Technology, Environment and Man, Monograph 005, 150 p.

Bolt, B. A., and others, 1975, Geological Hazards: New York, Springer-Verlag, 328 p.

Coffman, J. L., and von Hake, C. A., 1973, Earthquake History of the United States: U.S. Dept. of Commerce, Nat'l. Oceanic and Atmospheric Admin. Publication 41–1, 208 p.

Macdonald, G. A., and Abbott, A. T., 1970, Volcanoes in the Sea: Honolulu, Univ. of Hawaii Press, 441 p.

Macdonald, G. A., and Hubbard, D. H., 1973, Volcanoes of the National Parks in Hawaii (6th edition): Hawaii Nat. Hist. Assn., 56 p.

Macdonald, G. A., 1972, Volcanoes: Englewood Cliffs, N. J., Prentice-Hall, Inc., 510 p.

Mullineaux, D. R., and Peterson, D. W., 1974, Volcanic Hazards on the Island of Hawaii: U.S. Geol. Survey Open-File Rept. 74–239, 61 p. (Out of print, but available for consultation in certain U.S. Geol. Survey Offices and in Hawaiian libraries.)

Richter, C. F., 1958, Elementary Seismology: San Francisco, W. H. Freeman, 768 p.

Stearns, H. T., 1966, Geology of the State of Hawaii: Palo Alto, Calif., Pacific Books, 266 p.

Warrick, R. A., 1975, Volcano Hazards in the United States—a Research Assessment: Univ. of Colorado, Inst. of Behavioral Science, Program on Technology, Environment and Man, Monograph 012, 144 p.

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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

Thomas S. Kleppe, Secretary

U.S. Department of the Interior

V. E. McKelvey, Director

Geological Survey

A note from ...
Diane Mazarakis

Hi George, Sept 20, 84

Here are the tumor slides from the turtle that I gave you the large tumors. Hope that's clear.

What did you think that Mauna Lani ponds article?

Enjoy the slides ☺

WHOLE Body Needed Aug 4 4 4 4.

Dina

By the way,
This Sat Sept 22 we are going to help John Ono haul

Sand. For kicks. Supposed to be a nice beach. He seems to be an intelligent man.

But what about the rain, wind + surf on a small strip of fine sand?

Anyway, hope it does. I cross what ever you told him.

Need
Tel. Jackson
& or note to ORR

DIANE MAZARAKIS

Interview Guidelines

Follow outline of interview sheet. In addition, think of these questions.

1. Frequency of marine activities. "Do you go out alot? How often to the same place?"
2. What size turtle? What was the turtle doing? i.e., feeding, diving, only in 1 spot.
3. Try to get names so we won't duplicate data. If really "hot" information, see if you can contact the individual at a later date if you need to.
4. Reassure that we are not involved as an enforcement agency.
5. Cultural/Historical information. i.e., is the turtle blood as a cure for asthma a Hawaiian or Chinese custom? Question about old time methods of capturing and killing.
6. Turtles in Hawaiian fishponds. What was their role?
7. Recognizable increases or decreases in populations of Green Sea Turtles since the old days?
8. Use discretion and tact. Let the interviewee talk.
9. Don't try to get everything in one session.
10. Be sincere.

Main goal is to properly record for history what their interactions have been with sea turtles and turtle egg sites - nests.

PETROGYPHS TOO. (TURTLE)

KNOWING THE NATURE + EXTENT OF HUMAN EXPLOITATION + ANY OTHER FEATURES THAT MAN AFFECT SEA TURTLE POPULATIONS

ALL SEA TURTLE OBSERVATIONS, WHETHER A SINGLE SIGHTING OR THE RECORDS OF AN ENTIRE SEASON'S NESTING, ARE POTENTIALLY OF GREAT VALUE.

EST. AGE OF MAN INTERVIEWED, TIME LIVED IN AREA
HIS OCCUPATION IN HIS EARLY + MIDDLE YEARS
WHERE HIS FATHER LIVED, STABILITY OF COMMUNITY

DIANE MAZARAKIS

Kuamoo's

50 yr old /her father harpooned off the breakwater

How many / month

How cook

Eat it often; nite or day; gas lamp

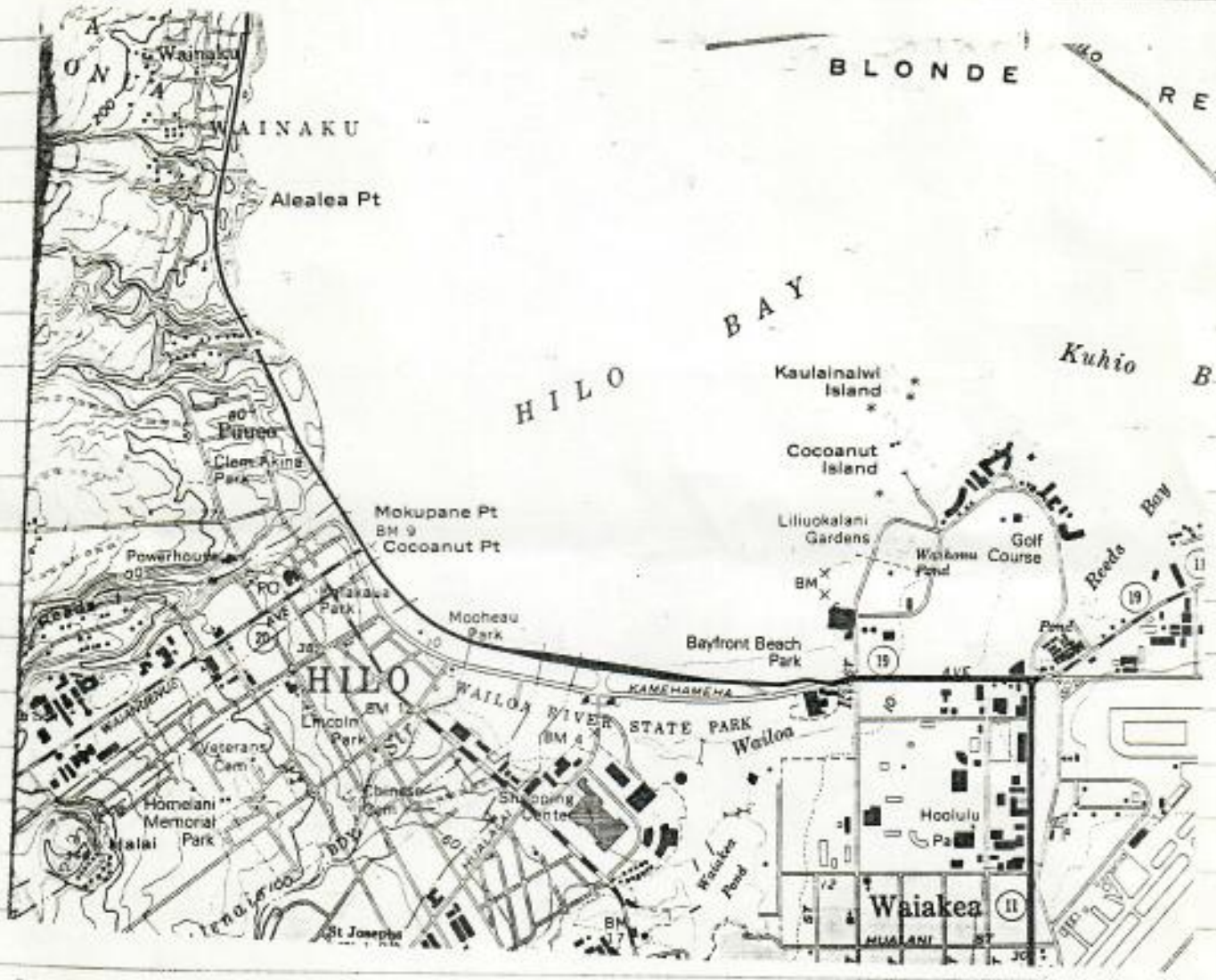
Kalei's

55 yr old Mr Kalei grew up on Oahu + speared turtles from Black sand point.

There used to be many turtles in the water off Makapuu when he was a young boy of 15 yrs old + early manhood.

where is it?

ISLES - POPULAR MULLET FISHING SPOT IN HILO BAY



Dec 1.

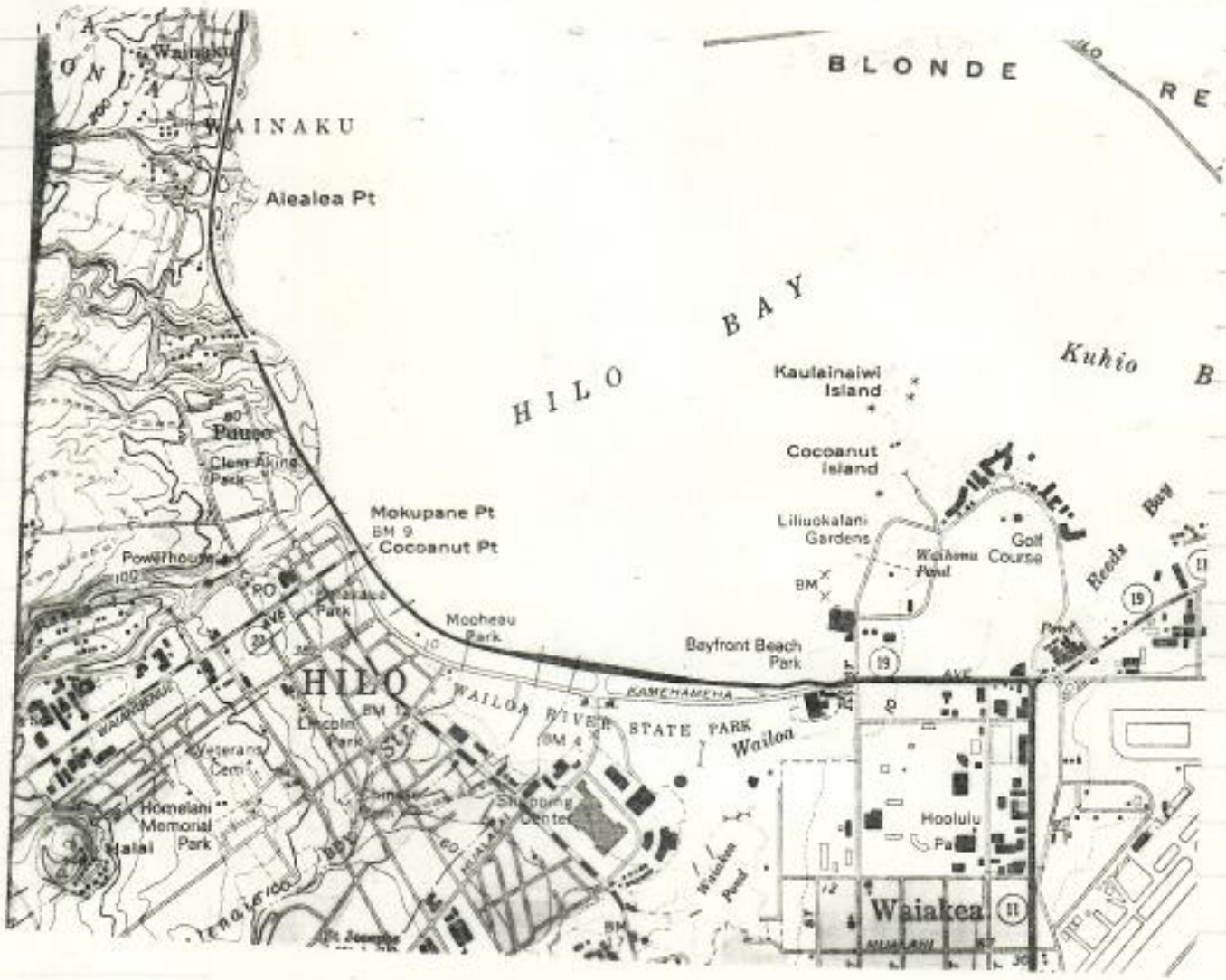
@ 11:00 AM - 1 SMALL GREEN @ 1¼ foot long ?
Floating on surface @ 5 mins. then gone
Old-time fisherman comment they SELDOM SEE TURTLES THERE
Young 20 yr old girl says often see [illegible]

ISLES 2-20-84 witness - Roxanne Adams

3 INTOXICATED young men grab small (1ger than 35cm) turtle w/ scoop net + spray white w/ spray can

They try to carve initials but can not contain turtle - They release it into Hilo Bay

ISLES - POPULAR MULLET FISHING SPOT IN HILO BAY



Dec 1.

@ 11:00 AM - 1 SMALL GREEN @ 1¼ foot long
Floating on SURFACE @ 5 mins. then dove

Old time fisherman comment they SELDOM SEE TURTLES THERE

Young 20 yr old GIRL SAYS OFTEN SEE SMALLER TURTLES THERE

FRONT STREET on HWN. HOMES LAND

MARCH - MAN SETS NET — GOES TO PICK IT UP + IT'S GONE (ONE COVE OVER THE NEXT DAY); he figures shark or something ; ANOTHER MAN FINDS THE NET W/A DEAD TURTLE ENTANGLED. A VERY LG. TURTLE WHOSE BODY ALMOST EXCEED A PLYMOUTH [illegible]

APRIL HEARD OF APPROX. 3 different accidental turtle captures in nets ; ALL HWNS.

MAY 84 - HWN MAN catches turtles IN his net "3 large ones" Tries to sell meat to local people but price too high $1.50/lb Price eventually drops to 5¢/lb but meat already spoiled. WASTED Local people very angry at the MAN

MAY - HWN MAN CATCHES TURTLE IN NET — TAKES IT OUT ALIVE → THROWS IT IN HIS TRUNK - STOPS AT A PAVILION TO USE REST ROOM → RUNS INTO A FRIEND + TALK STORY → 'TIL THE TURTLE BEGINS BANGING AROUND IN THE TRUNK TO WHICH HIS FRIEND ASSUMES THE POACHER HAS HIS WIFE IN THE TRUNK.

* The Turtle Bob Laube found dead w/ tumors

FRONT STREET

Dec 12 - 1g. 3½ foot turtle caught in nets
Hwns. rel it
Threw down the flippers
Barbecued the night

Nov. 27. 2.30pm - Scuba - @ 55'
3 turtles inside 2½ ft, 2½ ft - ?
largest one - resting not in hole


BLONDE
REEF
MILO
BREAKWATER
Puhi Bay
Puhi Bay
BAY
Kuhio Bay
Kaulainaiwi Island
Cocoanut Island
Liliuokalani Gardens
Golf Course
Waikanu Pond
Reeds Bay
Pond
Bayfront Beach Park
Light
Naval Reserve Electronics Facility
BM 7
BM 8
BM 6
KAMEHAMEHA
STATE PARK
Wailoa
Waiakea
Hoolulu Pa
Waiakea Pond
HUALANI ST
KEKUANAOA ST
Shopping Center
MANONO
LEILANI
LAUKAPU
HINANO
KILAUEA
STREET
LANIKULA ST
EAST
Hawaii Community College
BM 42
Quarry
GENERAL L
AVE
ST

MYRTLE 2-1-84

KUHIO GARDEN - RESTAURANT

35 cm. baby FOR 4 MONTHS

given to owners by Reeds Bay

very tame, very cold water

Feed fish scraps [illegible] -very EAT

LIVES w/ CARP + MINNINI

[illegible] LIKE MAHI-MAHI, ALL MEAT

RICE, BOILED PUT INTO POND

ALL FISH GUTS PUT INTO POND

6-8-84 38yrs. old

WALTER _____ brought Myrtle from Reeds Bay Nov 1983 - guesstimate 22 lbs.

- she was covered w/ grey slime

- she was eating Aku heads + was skinny + sunken

- took 1½ MONTHS 'TIL Her shell was clean

Pohnpei

Sept 1983

Net set on reef - drowns a small green - the Huns. eat it.

May 1984 - 3 small turtles apparently feeding on reef to right of the bay.

Pterocladia is growing but the water is very rough

POHOIKI

MILES

NOV 13, 1983 · DAYTIME

SCUBA DIVING 40 FEET DEEP / 100 yds. OUT
W/ SUNGS + FISH BAG

SAW 3 IMMATURES @ 2 FEET IN LENGTH
1 IN HOLE · SLEEPING - WOKE HIM UP
2 SWIMMING

DOVE POHOIKI ONLY 6 X - 4 OUT OF 6 X SAW TURTLES

August 1982

Large loggerhead turtle became entangled in the parachute of a fishing boat.

The Capt. shot the turtle; put it in the back of his DATSUN pick-up truck + it filled the entire bed.

He took it home + used it for whatever he could.

The local fisherman who saw him do it were alarmed + dismayed.

The Capt. didn't WANT THE TURTLE TO WRECK HIS PARACHUTE

6-8-84

Walter Kuhio Garden 38 yrs old
Works at Zales Jewelers

Japanese man - always caught turtle until was outlawed.

pre: 1978
- when cleaning turtles from Ophikao - ULUA - sea lettuce in stomach always Pterocladia

- SEES HIS BIGGEST TURTLES IN KALAPANA
- SAYS THERE IS A lg. green IN Hilo Bay now "the head the size of lg coconuts"

pre: 1978
- used to hook turtles in mouth w/ squid bait but only in Kapoho 2x only
- hook in fins on Hamakua coast

- DAY time dive beneath turtle + then come up under it to ~~get~~ capture

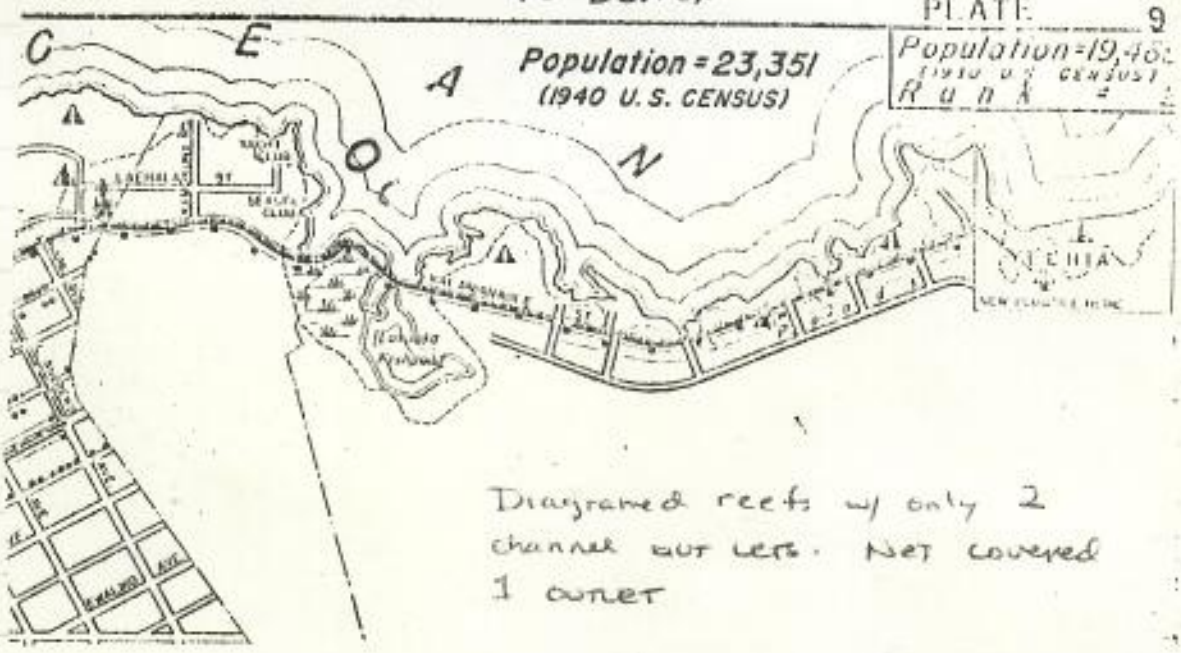
- his Grandmother lived next door to Chinese-Hawn family + the Chinese side gave his grandmother turtle blood (dk. black) for him because he was a sickly child (wheezing, coughing) - was something for children who were sickly - he figures it was Chinese.

- Spoke of man, _____ _____, w/ a pond in Kapoho w/ 2 - 3 turtles that he feeds swt. potatos, papayas + lettuce

- Punaluu - HWN man w/ ponds that hand feeds fish + Turtles (near - say)

- Reported a turtle net in 4 mile Bay - floats down - filled w/ algae - been there over 1 week - was empty on Thurs. - 1g eye 12" (I called enforcement) SANDY Sugiyama

O = SCOUT Island
NET 1A10 FROM ISLAND TO BEACH



Diagramed reefs w/ only 2 channel out lets. Net covered 1 outlet

- Reports many small turtles behind Orchid Manor in small bay - by Baker's Beach

TOSHI ARIGA - MEMBER OF DIVE TEAM - 23 YRS old

NOV. 26

PUNALUU BEACH - IN TURTLE BAY OUTSIDE

SAW 3 GREENS 2½ FEET

2¼ FEET

SCUBA @ 55' RESTING NOT IN HOLES

NOV 29

RICHARDSON'S TOWARDS LEFT BAY

SAW 2 ON SURFACE - COULDN'T MAKE OUT SIZE

@ 2:30 PM FROM A ZODIAC

PUNALUU

NOV 26 1:20PM

3 TURTLES IN HOLES @ 60cm [illegible]

MEASURED @ [illegible] 2½ FEET

SIGHTED 2 TURTLES ON SURFACE - 1 IN A LITTLE [illegible]

[illegible] 3

KUAMOO'S

50 yr old / her father HARPOONED OFF THE BREAKWATER

HOW MANY / MONTH

HOW COOK

EAT IT OFTEN ; NITE OR DAY; GAS LAMP

Kalei's

55 yr old Mr Kalei grew up on Oahu - speared turtles from Makapuu point.

There used to be many turtles in the water off Makapuu when he was a young boy of 15 yrs old + early manhood.

Isles 8-20-84 - Kenny

3 intoxicated young men grab small (less than 25 lb.) turtle w/ scoop net + drive w/ them

They [illegible] turtle - [illegible]

Pohoiki.

of 1983
Net set on reef - drowns a small
.ern - the Huns. e.t.c.

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2-1-84

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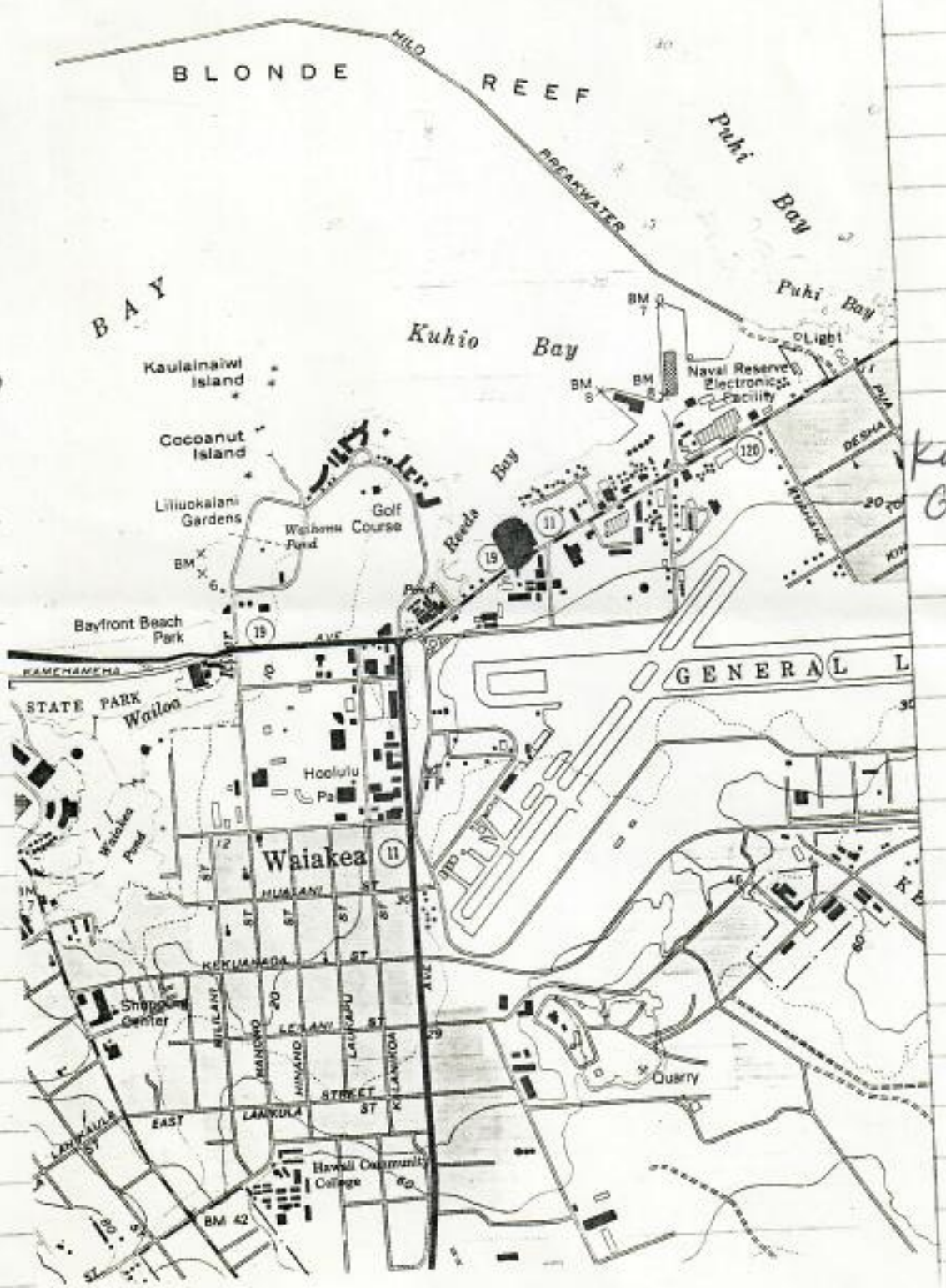
feed [illegible] - very EAT

LIKES w/ CARP + MINNI

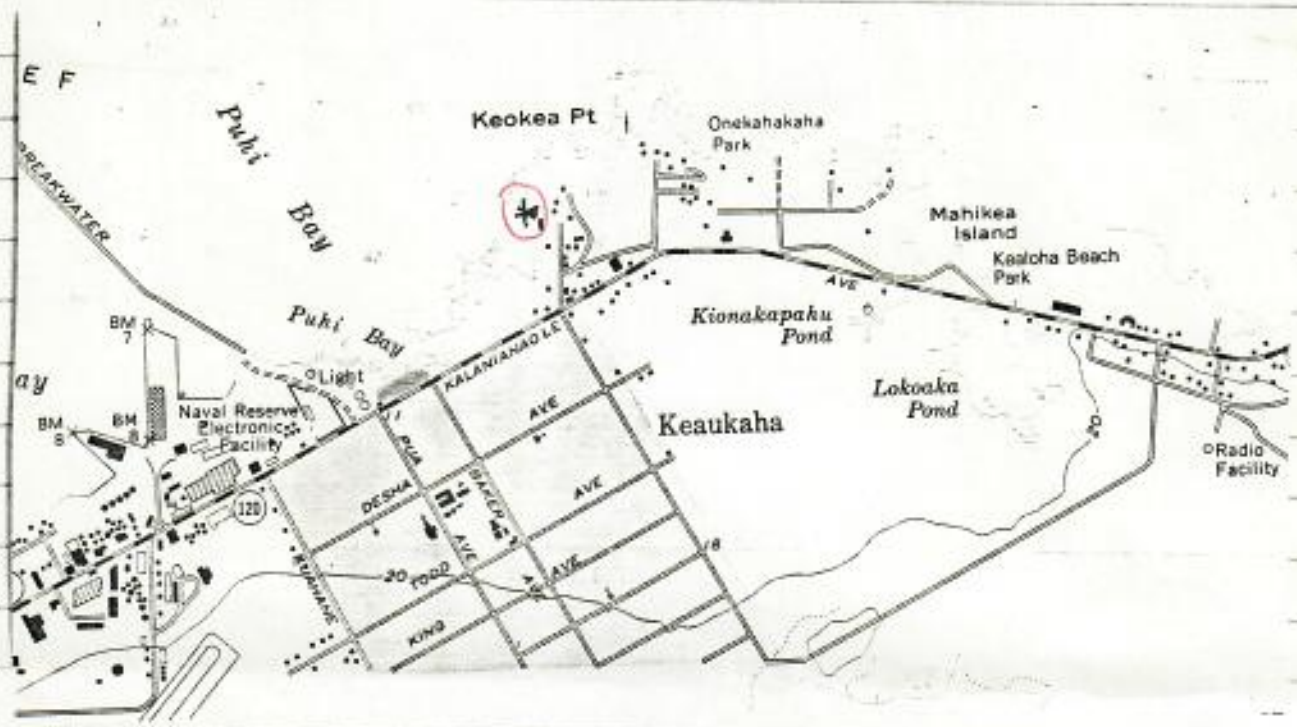
EATS MAHI [illegible]

RICE [illegible]

ALL FISH GETS PUT INTO P.W.


BLONDE REEF
HILO
BREAKWATER
Puhi Bay
BAY
Kuhio Bay
Puhi Bay
Light
Naval Reserve Electronics Facility
Kaulainaiwi Island
Cocoanut Island
Liliuokalani Gardens
Waiakea Pond
Golf Course
Reeds Bay
Kuhio Garden
Bayfront Beach Park
KAMEHAMEHA AVE
STATE PARK
Wailoa
Hoolulu Pa
Waiakea
Waiakea Pond
HUKILANI ST
KEKUANAOA ST
Shopping Center
LEILANI ST
STREET
EAST
LANIKAULA ST
Hawaii Community College
BM 42
GENERAL L
Quarry

* The Turtle Bob Laube found dead w/ tumors



FRONT STREET

Dec 12 - 1g. 3½ Foot turtle caught in nets

HUNDS ATE IT

TAKEN DOWN TO FLIPPERS

BARBECUED THE NIGHT

Nov 27. 2:30 PM - SCUBA - @ 55'

3 TURTLES INSIDE 2½ ft, 2½ ft. - ?

forgot one - RETURNED IN hole

FRONT STREET ON [illegible]

MARCH - MAN SETS NET → GOES TO PICK IT UP + IT'S GONE (ONE COVE OVER THE NEXT DAY) ; ANOTHER MAN FINDS THE NET W/A DEAD TURTLE ENTANGLED. A VERY LG. TURTLE WHOSE BODY ALMOST EXCEED A PLYMOUTH TRUNK

APRIL HEARD OF APPX 3 different accidental turtle captures in nets ; ALL HAWKS.

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MAY - HAWK MAN CATCHES TURTLE IN NET → TAKES IT OUT ALIVE → THROWS IT IN HIS TRUNK → STOPS AT A PAVILION TO USE REST ROOM → RUNS INTO A FRIEND + TALK STORY → TIL THE TURTLE BEGINS BANGING HIS IN THE TRUNK TO WHICH HIS FRIEND ASSUMES THE POACHER HAS HIS WIFE IN THE TRUNK.