F84-238-F-582-B-323

McKeon
Art
Consulting

Mr. George Balazs
IUCN Marine Turtle Specialist
National Marine Fisheries Service
Southwest Fisheries Science Center
Honolulu Laboratory
2570 Dole Street
Honolulu, Hawaii 96822-2396

August 14, 1991

Dear George,

Thank you very much for the information that you sent on marine turtles. I learned a lot from it and am more fascinated with these wonderful creatures than ever before.

We returned to Punaluu several times on our vacation and were able to "play" with a large male turtle at very close range. I cannot help but wonder if it was the turtle that the Hawaiian children have "tamed" because he allowed us to pet his head, scratch his chin and touch his shell with no resistance whatsoever. We never held on to him at all and he did not try to swim away.

A few days later I swam with a small (less than two foot) turtle in Ho'okena. It was very shy and untagged. I didn't see any others in that bay.

I would be very interested in working with you on tagging at Punaluu should you need more help. I try to get to the island to work on our land in Naalehu several times per year....working with the turtles would be a wonderful excuse to make a trip. (If nothing else, please put my name in your volunteer file). I am a certified diver.

One last thing, could you possible send an information packet to friends of mine in Kona? They are most interested and, I believe, would prove to be very supportive of your work. Please mail to:

sent

Mr. & Mrs. Hal Smith
Kona Palikaiko
75648 Huai'i
Kailua-Kona 96740

Thank you again. It was a pleasure meeting you and I hope to see you again at Punaluu.

Best Regards,

Laurie McKeon

1404 FOOTHILL ROAD • OJAI, CALIFORNIA 93023 • (805) 646-7917

University of Hawaii at Hilo

MARINE OPTION PROGRAM

November 19, 1991

Dear George,

Mahalo nui loa... Turtle tagging was a huge success with our MOP students. Due largely to you're enthusiasm, I think we may have some "converts" into the marine sciences, or at least people more aware of our precious marine community. Thanks again George, I look forward to the spring semester. When the new semester starts, we will send you the usual list of dates and go from there.

Enclosed you will find the tape sent to Leon. I spoke with Leon and we will make the video as an optional part of our intro meeting on turtle tagging. What we would prefer is a shorter tape of the people of Hawaii and footage of actual hands on work turtle tagging, what to do, and what not to do in terms of safety and working as a team.

Kevin has contacted me about cutting the cages, and we will try and find a new student for the spring semester for the Punalu'u project. Until then, please keep in touch, and let me know if MOP can be of any assistance.

Sincerely yours,

John P. Coney, Coordinator
Marine Option Program

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

Summary of green turtles, *Chelonia mydas*, tagged and resighted at Punaluu Bay, Kau, Island of Hawaii, during the National Marine Fisheries Service and Marine Options Program Sea turtle research project.

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

study dates	Total no. captured	No. newly tagged	No. tag resightings	Total no. tagged to date	Peterson population index estimate*
5/77	3	3	0	3	-
1/78	8	8	0	11	-
8/78	10	10	0	21	-
7/81	7	7	0	28	-
11/83	3	3	0	31	-
12/83	12	10	2	41	186
1/84	13	9	4	50	133
2/84	12	10	2	60	300
3/84	30	20	10	80	180
4/84	3	2	1	82	240
5/84	11	7	4	89	225
6/84	13	8	5	97	231
3/87	7	5	2	102	340
3/88	3	3	0	105	-
4/89	14	11	3	116	490
4/90	12	8	4	124	348
7/90	12	5	7	129	213
11/90	17	5	12	134	183
4/91	20	4	16	138	168

*$\frac{\text{No. tagged turtles resighted}}{\text{Total No. turtles captured}} = \frac{\text{Total No. turtles tagged}}{\text{Total No. turtles in resident population (X)}}$

Note: Tagged turtle 7723-24 found dead with throat cut at Punaluu 11/4/84. Originally tagged 5/15/84 at Punaluu. Another turtle, tag numbers unknown, documented as being killed at Punaluu on 7/16/84.

PUNA-8T.GHB

SUMGRT.GHB

Summary of green turtles tagged and resighted at Punaluu Bay, Kau, Hawaii

by
George H. Balazs
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
2570 Dole Street
Honolulu, Hawaii 96822-2396

Study dates	Method of capture	Total no. captured	No. newly tagged	No. tag Resightings	Total no. tagged to date	Original tag dates for turtles resighted at Punaluu
6/76-9/76	SC	42	37	5	37[a]	
5/7/77	N	3	3[b]	0	3	
1/20-1/26/78	N, SC, SK	8	8	(1)	11	(8/76)
8/31-9/3/78	SK	10	10	0	21	
7/26-7/29/81	N, SK	7	7	0	28	
11/26/83	SC	3	3[c]	0	31	
12/15-12/19/83	N, SC, SK	12	10	2[c]	41	8/78; 11/83
1/8-1/10/84	N, SC, SK	13	9	4	50	1/78; 7/81; 12/83; 12/83
2/17-2/19/84	N, SK	12	10[d]	2	60	8/78;1/78
3/23-3/28/84	N, SC, SK	30	20	10	80	1/84; 1/84; 1/84; 2/84; 9/78; 11/83; 1/78 and 2/84; 8/78; 12/83; 8/78 and 12/83
4/13-4/14/84	N, SK	3	2	1	82	12/83-1/84-4/84
5/14-5/17/84	N, SK	11	7	4[e]	89	2/84; 1/84; 3/84; 2/84

Continued.--SUMGRT.GHB

Study dates	Method of capture	Total no. captured	No. newly tagged	No. tag Resightings	Total no. tagged to date	Original tag dates for turtles resighted at Punaluu
6/26-6/29/84	N, SK	13	8	5[d]	97	2/84; 2/84; 1/84; 1/78-2/84-3/84; 12/83-1/84-4/84
3/23-3/25/87	N	7	5	2	102	3/87; 3/87
3/21-3/23/88	N	3	3	0	105	
4/10-4/12/89	SK	14	11	3[f]	116	12/83; 1/84; 9/78
4/9-4/11/90	SK	12	8	4[g]	124	12/83; 1/84; 3/88; 9/78 and 4/89
7/18/90	SK	12	5[h]	7	129	4/90; 4/90; 4/89; 2/84; 3/88 and 4/90; 11/83 and and 3/84; 1/84 and 4/90
11/27-11/28/90	N, SK	17	5	12[g,h]	134	4/90 and 7/90; 7/90; 4/90 and 7/90; 4/89; 12/83 and 4/89; 4/90; 4/89; 4/89; 1/84 and 4/90; 4/89; 12/83 and 4/90.

N = net; SC = hand capture while scuba diving; SK = hand capture while skin diving

[a]Monel alloy tags. All other tags used are made from Inconel 625 alloy. "Total no. tagged to date" was computed separately for Monel and Inconel.

[b]Tagged turtle 5008(8165) resighted 6/19/84 nesting at East Island, French Frigate Shoals.

[c]Tagged turtle 6711-13 resighted 7/9/86 nesting at East Island, French Frigate Shoals.

[d]Includes tagged turtle 7634-37 with four leeches, leech eggs, and likely small tumor in corner of right eye.

[e]Also includes tagged turtle (6182, 6242, 6260) originally tagged nesting at East Island, French Frigate Shoals, 6/82 and 8/82.

[f]Also includes tagged male (3041, 6164, Y205-06) originally tagged basking ashore at Whale-Skate Island, French Frigate Shoals, 5/4/79. Resighted at same location 6/79, 6/80, and 6/82.

[g]Also includes tagged male (6360-61, Y650) originally tagged basking at Tern Island, French Frigate Shoals, 11/28/82.

[h]Includes tagged turtle N388-89 with small tumor in corner of left eye.

Summary of green turtles tagged at Punaluu Bay, Kau Hawaii during the 27-28 November 1990 during the cooperative NMFS/MOP-UH Hilo Marine Turtle Research Project, Compiled by George Balazs.

National Marine Fisheries Service
2570 Dole Street
Honolulu Hawaii 96822-22396

Tag No.	Straight (cm) Length	Notch	Width	Curved (cm) Length	Width	Tumor Ranking	Comments
Expedition date 11/27/90							
*3041, 6164, Y205, Y206	88.5	88.5	68.1	93.0	90.0	0	
*7540, 7541, (Z253)	70.6	70.4	56.0	76.5	71.5	0	Possible tag loss 3-4
*N388, N389, N537	69.8	69.3	52.7	75.0	69.5	1	Tumor left eye #1 Photo - close-up Same turtle that was captured 7/90 Punaluu #13
*N539, Y181, Y182, Z228	59.1	58.8	46.6	63.0	58.0	0	"Horseshoe" - hand capture
*Y198, Y199, Y200, (Z252)	70.5	70.0	57.7	75.0	71.0	0	Raised injury, posterior carapace.
*Y643, Y644, Y645, (Z251)	69.9	69.9	56.3	75.5	71.0	0	Recaptured by seine net 11/28. The next day - at same site by same method.

Tag No.	Straight (cm) Length	Notch	Width	Curved (cm) Length	Width	Tumor Ranking	Comments
Expedition date 11/27/90							
*Y646, Y647, Y648, (Z254)	66.3	66.1	52.8	71.0	65.5	0	R2S entirely missing and completely healed.
*N538, Y653, Z2	66.4	66.3	53.0	71.0	68.0	0	Tag mark on Z2. Another turtle bit it? or turtle bit its own tag? or pufferfish.
Expedition date 11/28/90							
*7550, 7570, 7571, Y649	78.8	78.6	59.8	83.0	77.0	0	3rd lateral right - likely spear hole wound, partly healed.
*7604, 7605, Y654, (Z258)	72.8	72.5	58.0	78.0	72.0	0	
N540, N541, N542, (Z255)	65.8	65.8	52.2	72.0	66.5	0	Numerous burrowing barnacles
N543, N544, N545, (Z256)	67.8	67.8	54.8	73.0	68.0	0	L3-4 Z256 upside down
N547, N548, N549, (Z260)	66.8	66.8	52.6	73.0	65.0	0	R1S 3/4 missing
N550, N551, N552, Z229	67.9	67.7	53.8	72.5	65.0	0	Tag site on LH missing
N553, N554, N555, Z230	70.8	70.5	57.5	76.0	71.0	0	Lots of burrowing barnacles

Tag No.	Straight (cm) Length	Notch	Width	Curved (cm) Length	Width	Tumor Ranking	Comments
Expedition date 11/28/90							
*N546, Y193, Y194, (Z257)	58.3	58.2	46.2	63.0	56.0	0	
*Y195, Y196, Y197, (Z259)	70.0	69.4	54.0	75.0	71.5	0	

( ) Tag newly applied along with existing tags.
* Recapture of previously tagged turtle.

January 19, 1996

Dear George Balazs,

My apologies for this *very* tardy thank-you note!! I hope your Christmas and New Year's celebrations were happy and cozy... and some true wishes--although belated--to you for a peaceful, calm, and happy year in 1996.

First of all, my thanks for the photograph you sent of me, along with the two reports on the turtles which you helped research and write. I hope, and will strive to this end, that in my future, I will research and find a great many important things as you do. You have done, by far, the largest amount of work on and for the sea turtles all around the world. I applaud you. =)

I am writing you also my gratitude for your hand in supplying me with information on my *Pterocladia* field research project. You are always friendly and so personable to all, and you can answer most questions asked of you. Well, here is the first draft of my report, which has been sent to the Marine Affairs Symposium for presentation this year, and which you asked for earlier. Will you be there? I am hoping I will make it to the symposium, scheduled for April 27-28.

Thank you very much, for being my friend and mentor. Have a great day!! (And you spelled my right!)

Truly Yours,

Joy Yoshina

Joy Yoshina

Joy S. Yoshina
P.O. Box 638
Pahala, Hawaii 96777
(808) 928-6141
Ka'u High School
Renwick Bibilone

ANALYSIS OF THE GROWTH RATE OF *PTEROCLADIA* ALGAE AT PUNALU'U BAY

ABSTRACT

This experiment endeavored to study the growth rate of *Pterocladia*, a kind of red benthic algae, in an isolated environment in Punalu'u Bay. The green sea turtle (*Chelonia* mydas), the primary consumer of *Pterocladia* algae, was limited from grazing on certain algae specimens in four rectangular, wire-mesh cages which were placed at various locations throughout the bay. The experimental enclosures also restricted other consumers, to an extent, from feeding on the algae. Through observations made about every third week since the beginning of the field research to its completion (Sep. 19 - December 3, 1995), a rough estimation of the growth rate of *Pterocladia*, under unpressured conditions. has been established.

Data on the experiment was gathered and recorded at an interval of every third week. After snorkeling to observe and collect algae and water samples and temperature readings from both within and the exterior of the cages, the samples were brought to the surface.

Next, the algae was scraped for weight comparisons in the sugar factory laboratory, standardized to a one-inch template. Also in the lab, the various water samples were tested for salinity and pH, and the algae scrapings were oven-dried and weighed.

Additionally, the research sought to improve on Yuko Okano's cage design, which were ravaged by waves and gave entry to fish. However, three of this experiment's cages were destroyed, probably, by the forceful wave action at Punalu'u. Thus, placement of the enclosures is about as important as the structure and modeling of the enclosure itself.

Results of this experiment show that the *C. mydas* does have a significant impact on the *Pterocladia*. The enclosure algae was found to grow remarkably in comparison with the control algae: very abundant and "wavy" underwater. Also, it was found that algae establishes itself very rapidly on a surface. Yet the effects of temperature, salinity, and pH of the surrounding ocean water on the algae were undetermined in this experiment.

ENCLOSURE SITES

SEE CHARTS 4 & 8

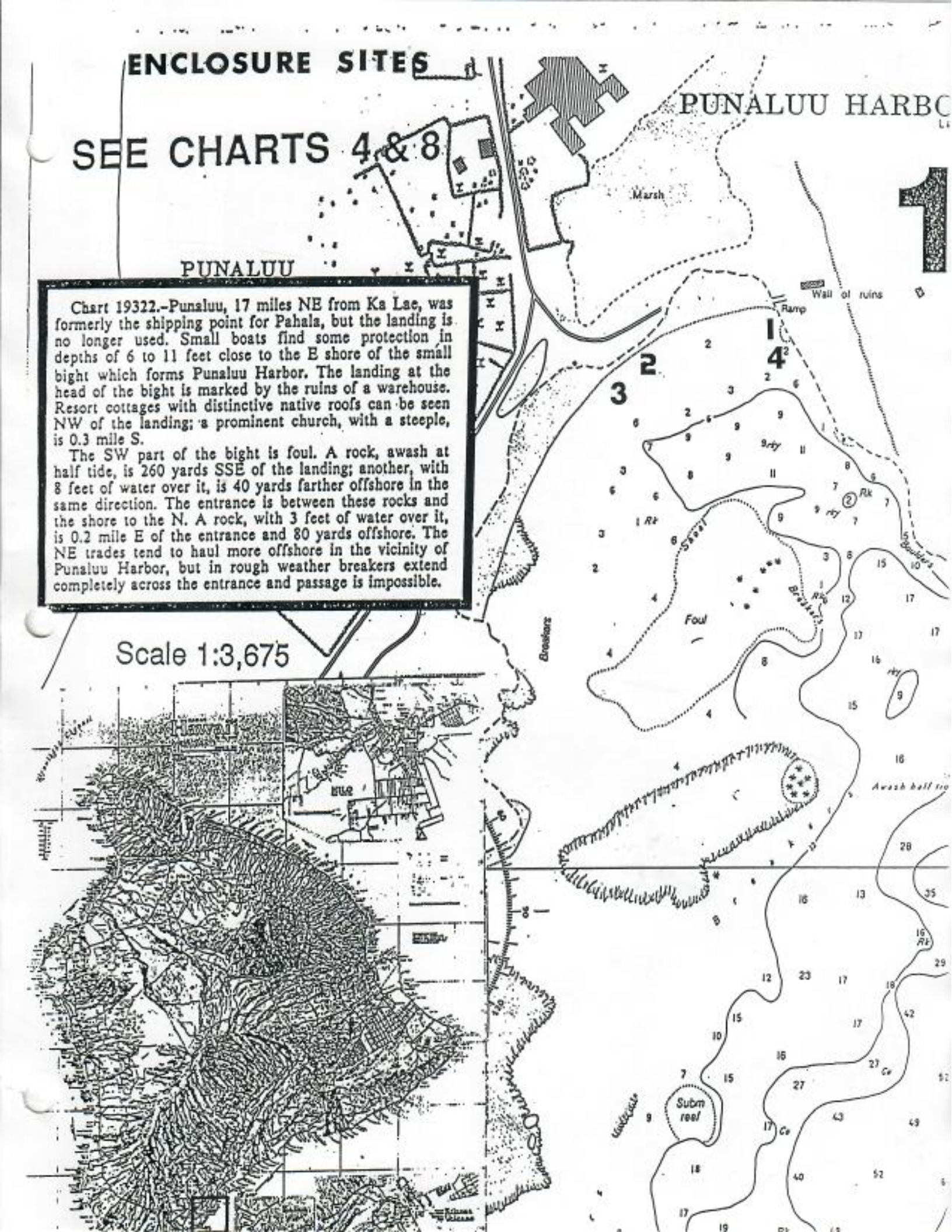
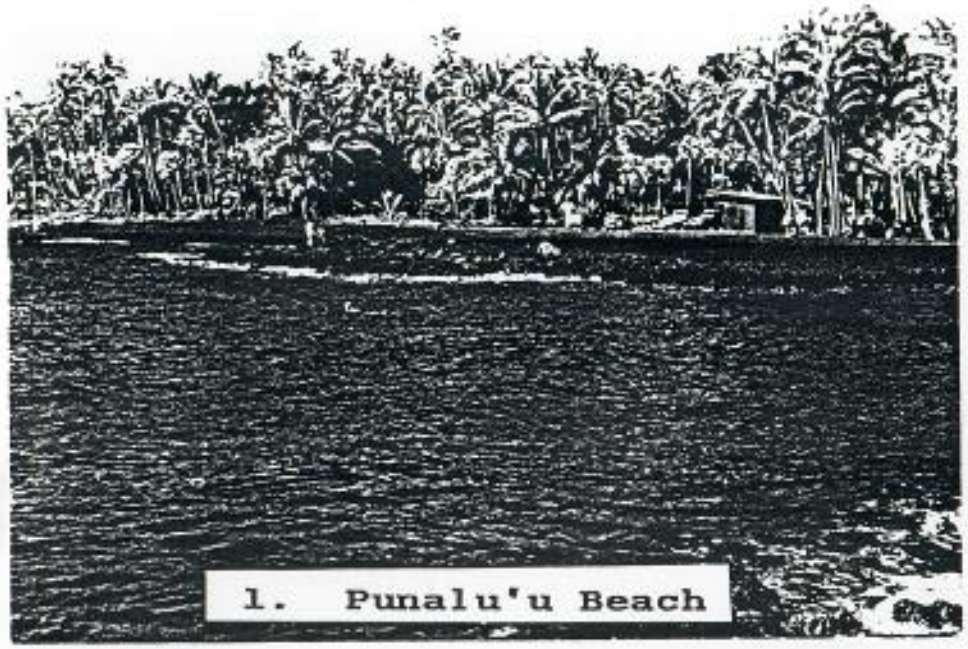
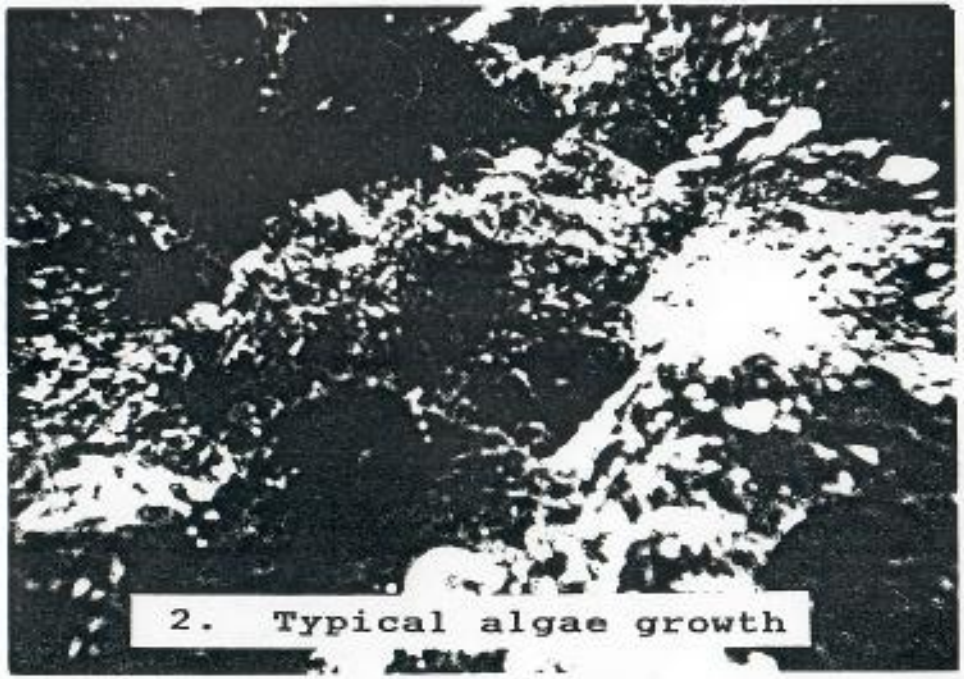


Chart 19322.–Punaluu, 17 miles NE from Ka Lae, was formerly the shipping point for Pahala, but the landing is no longer used. Small boats find some protection in depths of 6 to 11 feet close to the E shore of the small bight which forms Punaluu Harbor. The landing at the head of the bight is marked by the ruins of a warehouse. Resort cottages with distinctive native roofs can be seen NW of the landing; a prominent church, with a steeple, is 0.3 mile S.

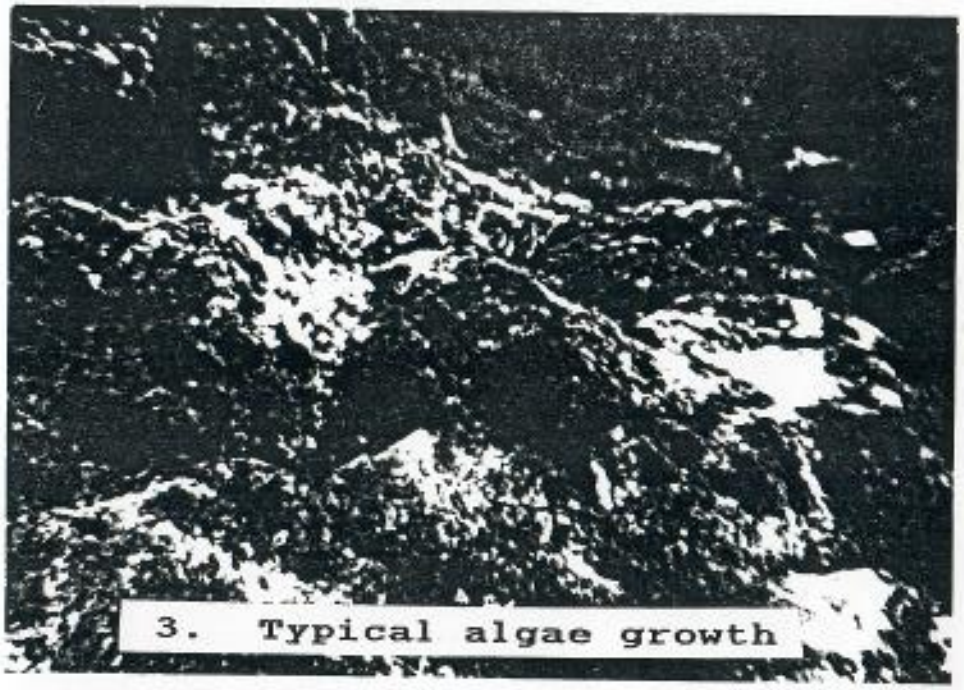
The SW part of the bight is foul. A rock, awash at half tide, is 260 yards SSE of the landing; another, with 8 feet of water over it, is 40 yards farther offshore in the same direction. The entrance is between these rocks and the shore to the N. A rock, with 3 feet of water over it, is 0.2 mile E of the entrance and 80 yards offshore. The NE trades tend to haul more offshore in the vicinity of Punaluu Harbor, but in rough weather breakers extend completely across the entrance and passage is impossible.



1. Punalu'u Beach



2. Typical algae growth



3. Typical algae growth

PROBLEM STATEMENT

In her conclusion on her study of "The Effect of Turtle Grazing on Pterocladia biomass in Punalu'u Bay. Hawai'i", Yuko Okano stated that, "However, what still remains to be tested is how much grazing pressure is attributable to *Chelonia mydas* and how much to other herbivores such as fish." This field experiment attempted to study the growth of *Pterocladia* under unpressured conditions, based on periodic algae sampling data from Punalu'u Bay, which may aid to establish those figures.

Additionally, the previous structure for the experimental cage to contain the subject algae in the wild was inaccurate in keeping the seaweed growth from the Pterocladia's consumers. Therefore, this project further worked to design a better algae enclosure.

LITERATURE REVIEW

Because this research attempted to determine the growth rate of *Pterocladia* biomass in isolated environments, it was first needed to show what consumed the algae. On several occassions throughout the UH's Marine Options Program's periodic "Turtle Tags" at Punalu'u, George Balazs has stated the *C. mydas* to be a major consumer of the *Pterocladia*. Furthermore, in Yuko Okano's research, she concludes that, "...*Pterocladia* is subject to intense grazing pressure..." from the green sea turtles that "...feed almost exclusively on *Pterocladia*."(Okano: 1993)

However, although the amount consumed was not discussed, the algae is not ingested solely by the green sea turtles, as stated by Marie C. Neal. "Fish are enemies that use seaweed for food," and "Fish, especially young ones, eat seaweeds and hence limit them." (Neal: 1930)

Yet there are other factors which affect the algae. Included are some described by V.J. Chapman, such as

"extreme variations in salinity," which can be fatal to a few certain algal species: an area of the ocean or bay which varies in the contents of its suspension (murkiness); and wave action, essentially a "modifying factor." This statement was mentioned also in Okano's study, with a citation to "Fralick & Andrade. 1981": "The most probable explanation for biomass decline on experimental rocks was hydrodynamic fragmentation by strong wave action in the bay." And while there were a few declarations made by Neal (1930:30) and Chapman (1962:394) of temperature as having a part in algal color and possibly its sucess in flourishing, there was nothing definite or exact on such components. Certainly no evidence of temperature either enhancing or causing a decrease in the Pterocladia biomass in this experiment was found, although underwater temperatures were recorded.

PROCEDURE

Part 1: Design & Construction of Algae Enclosure

A modification of Yuko Okano's algae enclosure design was necessary not only to exclude the green sea turtle. but also smaller fish from the algae. Mesh size was reduced from 1"x2" to 1/2" square. Algae enclosures were constructed to isolate the algae in the investigation. Employing a light meter, the intensity of sunlight under the 1/2" wire mesh and without the mesh was tested to ensure it was of an identical degree.

Part 2: Field Procedures

A. Enclosures

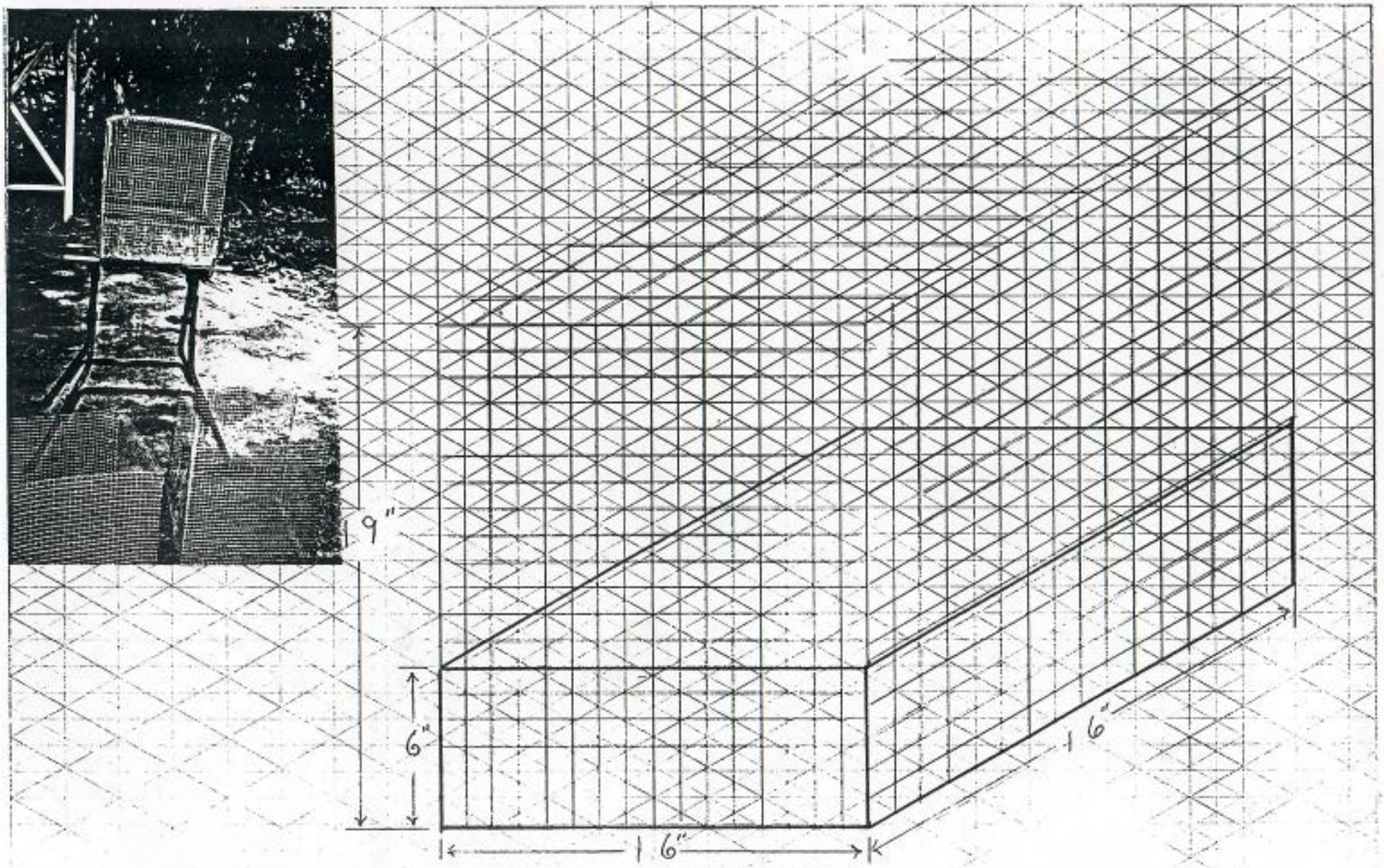
1. Construction

   a. Base - four 16x16x6 in. concrete slabs (55 lbs. each)

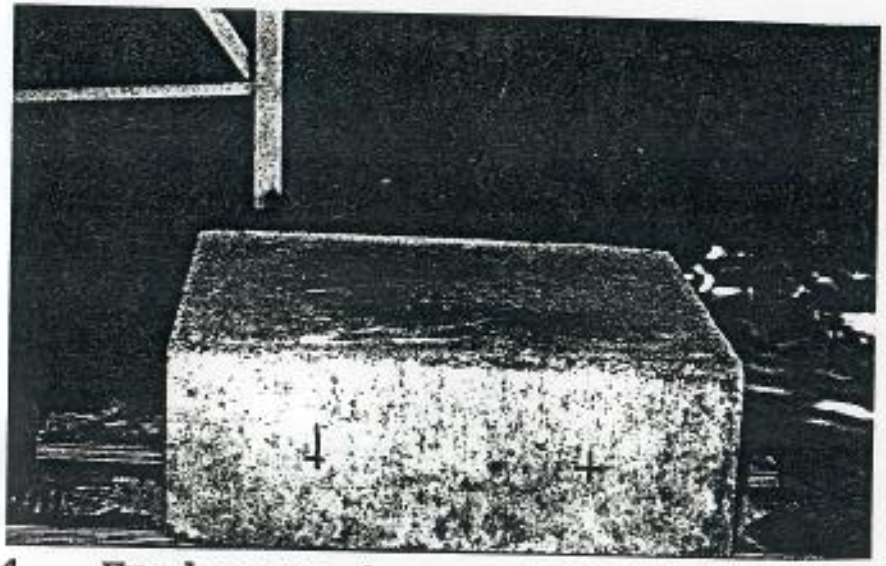
   b. Wire enclosure - 1/2 inch wire mesh

   c. Shape - 16x16x14 in. rectangle

   d. Lid - 8x8 in. wire mesh on the top of each cage



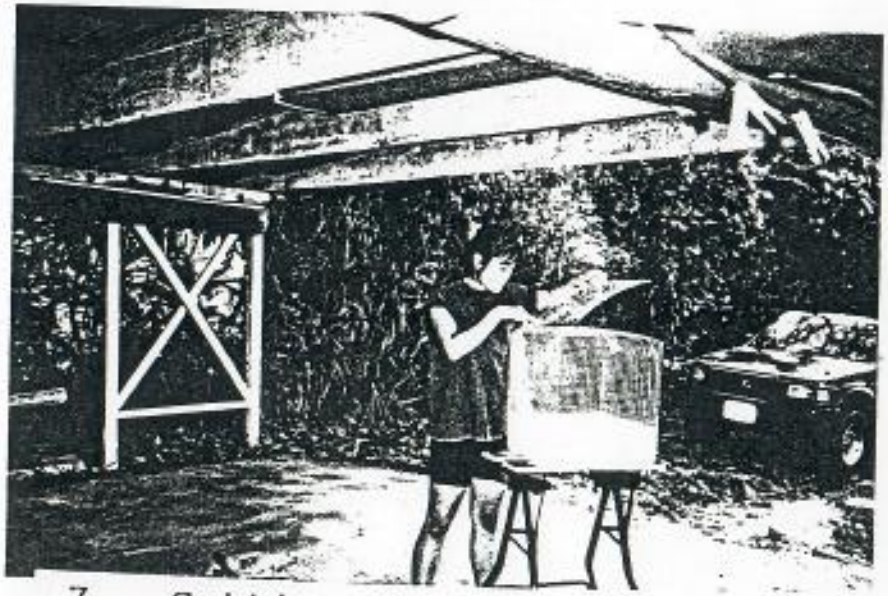
ALGAE ENCLOSURE



4. Enclosure base: 16" x 16" x 6" cement slab

6. Cutting wire mesh (1/2" x 1/2")

5. Drilling base for hardware



7. Setting door on enclosure

2. Placement

   a. Using an old bodyboard to keep it afloat. two enclosures were placed to the south side of the ramp, two around the rock-outcropping.

   b. Depth - approximately 2-4 feet below surface.

3. Content

   a. Bottom of each cage filled with algae-covered rocks gathered from within a few yards of that exclosure.

B. Algae sampling

1. Samples taken periodically (once every third-fourth week)

   a. From each enclosure, a representative sample was removed (one rock).

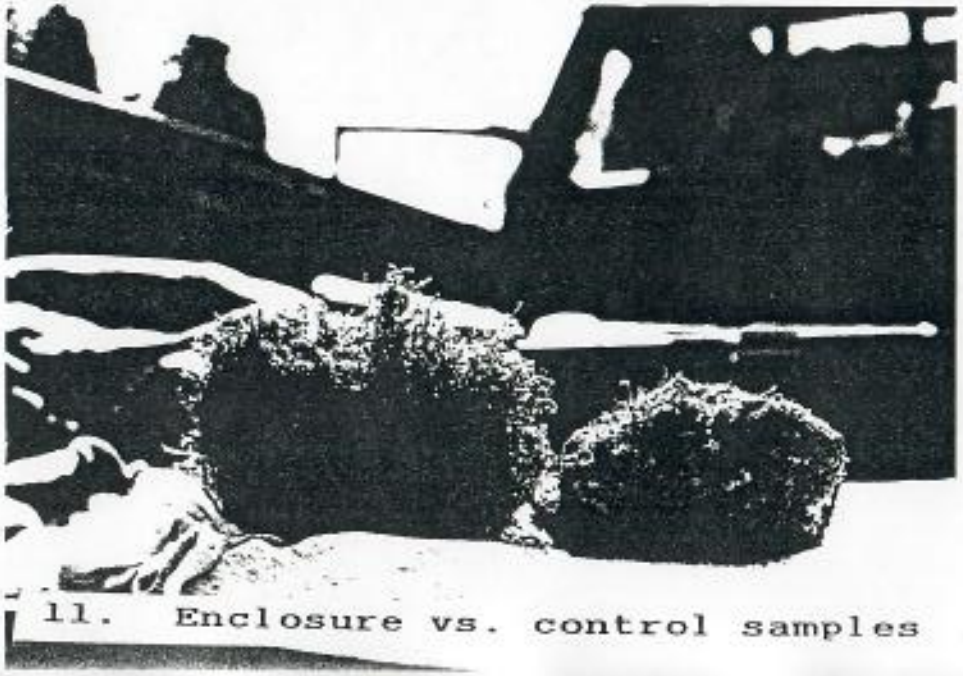
   b. From each control location (within two meters of a cage), a representative sample was removed (one rock).

   c. Algae samples, standardized by a metal template to one inch square. were first cut off with kitchen scissors. then

8. Clipping *Pterocladia* sample using 1" x 1" template

10. Clipping sample

9. Clipping sample



11. Enclosure vs. control samples

scraped off rocks at base with a chisel.

d. Scrapings placed into labeled plastic Ziploc bags and taken to the lab for drying and weighing.

C. Water sampling

1. Temperature

a. Placed probed thermometer through an enclosure mesh.

b. After about one-two minutes. wrote the thermometer reading on underwater writing pad.

2. Submerged a plastic bottle in ocean water next to a cage until filled for salinity testing in lab.

Part 3: Lab Procedure

A. Water testing

1. Salinity

a. Poured half of a water sample into refractometer.

b. Pressed button for salinity analysis and

recorded datum.

2. pH

   a. Poured remaining half of water into the pH testing meter.

   b. Recorded datum.

B. Algae

1. Drying

   a. Samples removed from bags and placed unto respective petri dishes.

   b. Dishes then placed into the oven for about three hours (per bagasse sampling HSPA-60% moisture).

   c. After three hours, samples were completely dried and removed from the oven to be weighed and compared.

2. Weighing

   a. First, weighed each petri dish for each algae sample.

   b. Second, algae scrapings were weighed after drying on the petri dishes using the same scale.

12. Placing sample on petri dish

15. Using brix refractomet (salinity)

13. Oven drying sample

14. Weighing sample

c. Third, the various weights were calculated. and the actual sample weight determined through simple subtraction.

3. Pressing

a. Filled a pan halfway with tap water from a sink.

b. Dampened in it two small, index-sized cards of Herbarium paper.

c. Placed on each sheet the *Pterocladia* samples; used a pointer from a science kit to set the algae.

d. After setting the algae on the paper, placed it into a homemade press; covered the algae with a cloth and newspaper.

e. Tightened the press with the belts and left it for about 24 hours.

f. Checked the algae after about a day of pressing; added water to the parts that hadn't yet adhered to the paper; also changed the cloth.

g. Three days since first began pressing, looked again at the algae; again some

parts were yet loose so applied Crayola glue.

4. Identification
   a. Scraped the algae which looked the most obvious as being separate species from one rock (from ex.#3).
   b. Using a microscope and two references, cross-indexed the sample (occassionally added acid to it for further identification).
   d. Distinguished five types of algae apart from *Pterocladia*.

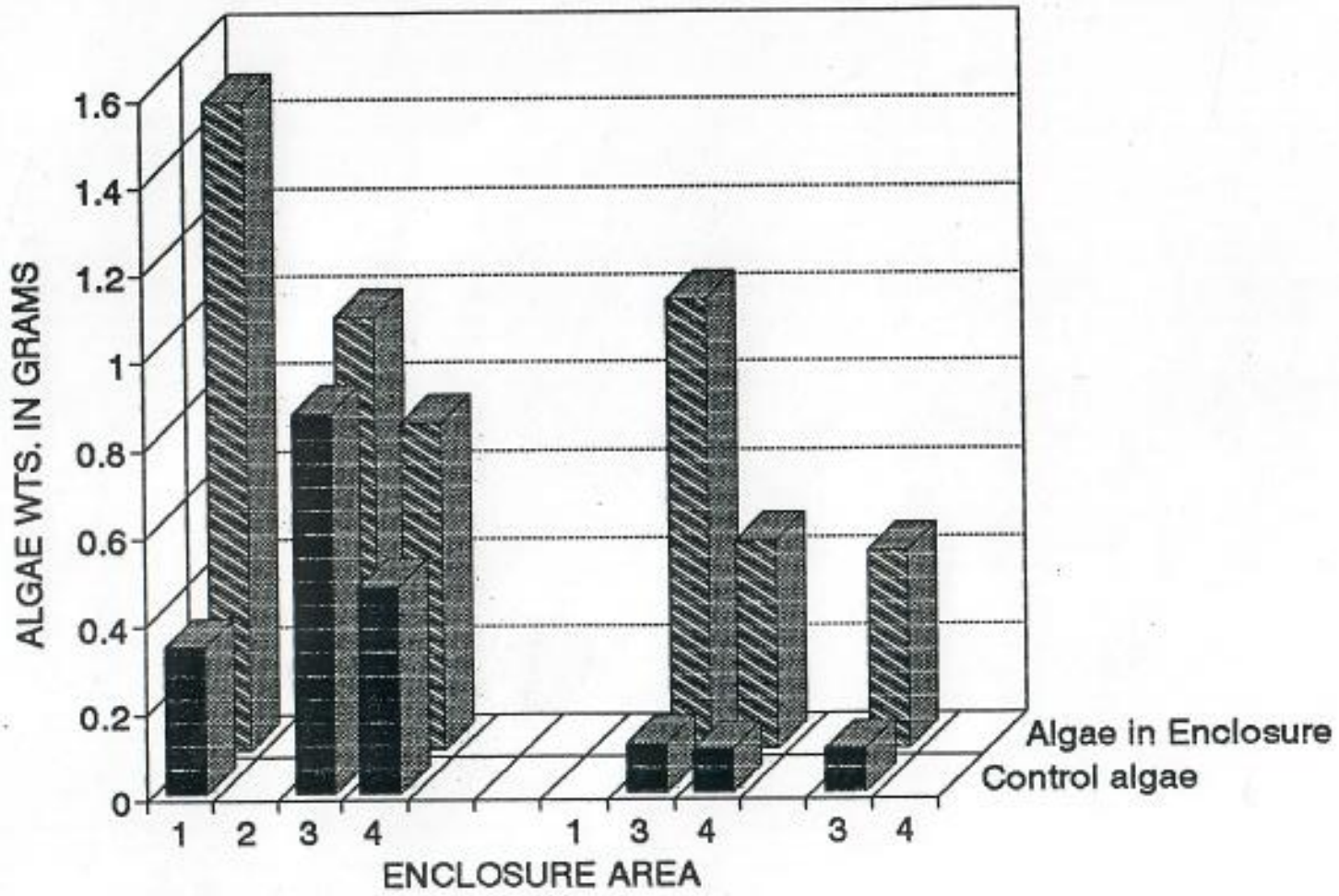
RESULTS

In contrast with the control algae, which had been exposed to consumer grazing, the experimental algae was greater in mass, both in appearance and scaled weight. There was more experimental algae than control algae.

Pterocladia Algae Study

DATE	ENCLSR.	TEMP.	REFRACS	SALINITY	ENCLOSURE DISH WT. in gms	ENCLOSURE DRY WT. in gms	ENCLOSURE ALGAE WT.	OUTSIDE DISH WT. in gms	OUTSIDE DRY WT. in gms	OUTSIDE ALGAE
*9/20/95	1	24	3.94	3.3684						
	2	24	3.82	3.2652						
	3	24	3.74	3.2164						
	4	23	3.86	3.3196						
*10/14/9	1	23	3.84	3.3024	29.477	30.959	1.482	29.589	29.928	0.339
	2	Destroyed by waves								
	3	22	3.98	3.4228	29.967	30.955	0.988	19.229	20.098	0.869
	4	23	3.94	3.3884	19.505	20.05	0.745	19.435	19.91	0.475
*11/05/9	1	Destroyed by waves								
	3	23	3.82	3.2652	29.96	30.987	1.027	19.231	19.342	0.111
	4	22	3.84	3.3024	19.504	19.978	0.474	19.437	19.534	0.097
*12/03/9	3	22	3.84	3.3024	29.968	30.419	0.451	19.229	19.327	0.098
	4	Destroyed by waves								

PTEROCLADIA ALGAE WEIGHTS



The least weighing control algae scraping was .111 grams. while the isolated algae was .451. The heaviest control algae sample was .869; in the caged algae, it was 1.482 grams. In mean weight, the control algae was 0.3315 grams; whereas the experimental algae, as an average, was much higher: 0.85783 grams. Thus, the isolated algae was more than twice the weight of the control algae; roughly 2.6 times greater.

DISCUSSION

Yuko Okano, in her 1993 study, found the *C. mydas* to be a significant contributer to *Pterocladia* grazing pressures; meaning the turtles consume extensive amounts of algae at Punalu'u Bay (though they were not the grazers of *Pterocladia*). This knowledge most plausibly explains the control algae's continual dwarfish height and weight in contrast with the experimental algae in this research, which followed Okano's procedures. Both groups of algae, at each testing site, were subjected to

identical environmental conditions, such as water salinity and temperature. The only differing factor between the experimental and control algae was the exposure to such consumers as *C. mydas* and fishes.

However, although the experimental algae was an averaged 2.5 times more massive than the control algae. it is unknown whether its observed growth was its maximum amount. Tiny crustaceous organisms were noticed amongst the algae growths, both within the enclosure specimens and the control group. Although they were seen moving about the algae when brought up for sampling, none were seen to be feeding on the *Pterocladia* at that time. Nonetheless, it is likely some amount of experimental algae was consumed by those organisms while underwater. Additionally, there were two incidents of a small fish sighted within enclosure #3, which was the last remaining cage in the experiment. The species were unidentified. so whether their kind grazes on algae is obscure.

The cage design, though planned to replace Okano's previous construction, was insufficient in isolating the algae specimens and withstanding the force of the waves/currents in Punalu'u Bay. Of the four total concrete-based enclosures, just cage #3 endured to the

conclusion of this project. It is surmised that this was due to cage placement in a particularly wave-swept area. Despite the cages' construction of concrete, iron, and steel, the ocean strength, presumably at low tide when the three cages were exposed, tore the enclosures apart. Also, a local fisherman had commented he had netted an enclosure, then "put it back." This accidental capture of an enclosure may have damaged it, either initially or supplementary to prior destruction; it may also represent other such captures that have led or furthered cage disablement.

CONCLUSION

While the levels of water salinity, pH, and temperature were tested and recorded, they were not intensively studied. However, all remained fairly constant throughout the four months of the research. Their influence over algae growth needs to be studied further. Whether the effect of light, or the varying

turbidity of the oceanwater, significantly contributes to the increase or decrease in *Pterocladia* growth also needs to be researched further. Additionally, the *C. mydas* herd at Punalu'u Bay is growing in individual size and population number, according to reviews on herd number by George Balazs. It needs to be determined what the maximum carrying capacity of turtles in Punalu'u is. as Okano stated: "...they [*C. mydas*] feed almost exclusively on *Pterocladia*... the turtle population at Punalu'u is large... [and] turtles are large animals that eat large amounts of food." So, a study must be done to establish how many more turtles Punalu'u can accommodate. and what can be done once the algae food source in the bay is being overgrazed.

Cage design was inadequate, in that three of the four total cages did not survive past the sixth week. One sole cage remained to the completion of this research. Therefore, a better cage is yet to be conceived. Recommendations for future cages are (1) If possible, place the cage about two to three yards from any exposed surface, and/or at a depth which leaves at least a one and one-half foot space from the surface: for it may be that the location of the cage will either leave

Tide

it unaffected or destroy it. Such placement, thereby, will likely save the researcher(s) from wasted time and attempting to mend an unsalvageable cage; (2) Plan for a securer lid which will resist opening except by humans; (3) Alter the dimensions of the design for less drag; and (4) Reduce the cage's base weight. Fifty-five pounds, even fifty pounds, is too bulky and dangerous for dropping off and retrieving at a site.

Lastly, *Pterocladia* was not the sole algae scraped. Although efforts were made to obtain just the *Pterocladia* from each site, there was undoubtedly some bits of other algae species in each sampling. In identifying the differing algas, five others were named.

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

February 8, 1991 F/SWC2:GHB:JEG
PENI-7L.GHB

Mr. John Penisten
General Education Division
Hawaii Community College
University of Hawaii at Hilo
Hilo, Hawaii 96720-4091

Dear Mr. Penisten:

I want to take this opportunity to say "thank you" for the excellent and timely work you have been doing in promoting a greater awareness of our cooperative Punaluu sea turtle research project. I know that both Drs. Walt Dudley and Leon Hallacher share my appreciation for your fine contributions to the project's educational components. The students, as well as the general public, have substantially benefitted as the result of your involvement.

If I can ever be of assistance to any of your other professional or community service activities, please do not hesitate to contact me.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research

UHH Marine Option Program

Changing Tides

Vol. VI, No. 3 December 14, 1990

Return Requested, Please Forward
University of Hawaii-Hilo
Marine Option Program
523 W. Lanikaula
Hilo, HI 96720

January
TGIF
Snorkel
Sailing

Febuary
TGIF
Fishing

A Special Thanks

Last summer while turtle tagging at Punaluu, a special couple approached the MOP staff and inquired what all the activity was about. Debbie and Rick Soehren from Sacramento, California were on the Big Island doing research for a guide on viewing Hawaiian birds. After hearing about the Marine Option Program, they expressed a desire to make a donation to help offset the cost of feeding hungry student volunteers. An unusually generous contribution from the Soehrens' arrived shortly thereafter. Their generosity helped provide the food for the November turtle tagging expedition. Debbie and Rick, thank you for your kokua. Mahalo, nui loa, from the staff and students of the UH-Hilo Marine Option Program.

***

A Synopsis of Some MOP Fall 1990 Activities

This semester has again been a busy one for UH-Hilo MOP. Although the weather often failed to cooperate, we were still out there doing what we do best; Doing It. The raindrops, called torrential by those uninitiated to East Hawaii and drizzle by those of us who have been here for a while, slackened long enough to get in a couple of great sailing and fishing sessions. You know it seems the MOPpers who sign up and come the first time always sign up again. Might we have something going here? Allright, so we had to cancel a couple of times due to atrocious weather. We've just picked some dates and we're working on agreeable conditions. Come on in and sign up.

Speaking of atrocious weather, turtle tagging on September 18 and 19 was canceled due to Hurricane Marie. Schedules were juggled and a replacement date was set for November 27 and 28. A tenacious crew of William Dana, Ronald Gabonia, Doug Poteet, Terry Reissen, Jim Synder, John Coney and myself left campus in a (torrential downpour-drizzle) reaching Punaluu about 11:00am. George Balazs, of the National Marine Fisheries Service, the authority on Hawaiian Green sea turtles arrived right after us inquiring, " What's for lunch! " After a round of " Dolphin Safe " tuna sandwiches it was time to hit the water. A new technique for capturing turtles, utilizing a seine net, was employed and by 13:30 seven turtles were patiently waiting on the beach to have their overall health checked, bellies measured and new license plates (tags) attached. A growing crowd of inquisitive tourists surveyed the action and kept up a steady stream of questions. As one woman remarked to her husband with drops of rain streaming off her chin " I've never had the opportunity to see anything like this in my life, and probably never will again. If you want to go back to the car, fine! I'm staying. " (he stayed too)

The second crew of turtle taggers, Lani Brewer, Clint Elliot, Jill Lippert, Sherri Miller, and Christi Wilcox, led by Doctors Dudley and Hallacher arrived around 17:00. After a quick review of our day's activities the decision was made to

In This Issue

Changing Tides is a monthly news publication of the University of Hawaii at Hilo Marine Option Program (MOP). The opinions expressed herein are not necessarily those of MOP, or of UH-Hilo but those of the *Changing Tides* staff and contributors. *Changing Tides* welcomes any editorial contributions or comments. All articles received are edited for grammar and spelling only.

Editor: Michael Childers

Changing Tides, UHH-MOP
523 W. Lanikaula St.
Hilo, HI 96720
Ph. (808) 933-3544
Fax (808) 933-3355

recon a nearby cove for turtles that might have decided to bed down early. Although three were caught napping, two of them were still awake enough to escape the turtle researchers' grasp.

The next morning, although dawning gray, was interspersed with patches of blue. After a hearty breakfast of eggs, toast, fresh fruit, orange juice and coffee, impeccably prepared by Chef John Coney, the crew hit the beach. George Balazs gave the pre-mission briefing with valuable input from turtle catcher extraordinare " Willy " Dana. The seine net technique was employed again with good success, Several turtles were also captured by hand. By now you know the results, ten turtles on the beach patiently waiting to have their..... (please see related article by Lani Brewer)

Other aspects of marine research continued on through the semester unabated by the weather. Nothing short of small craft warnings kept the *Kaimi* and her fearless crew from the scheduled weekly sampling of water quality in Hilo Bay. Research also progressed on various organisms observed under high magnification provided by the SEM (Scanning Electron Microscope). (See related article by J.C.)

When I said earlier," we're doing what we do best." *Doing It*, I meant it! Stop by the MOP office and see what's going on. Quite possibly it's something you've always wanted to do. If you wait to read my synopsis at the end of next semester, you will have missed out on so much, so don't wait!

***

Summer Skill Projects Abound

by Leon E. Hallacher

In summing up this past summer's productivity vis-a-vie MOP Skill Projects, I can't help but think back to a line from the movie classic, *Butch Casidy and the Sundance Kid.* The Sundance Kid (Robert Redford) looks over at Butch Casidy (Paul Newman) and says," Who are those guys?", in reference to the juggernaught of lawmen doggedly tracking them down.

This summer, the lawmen were students from all over the mainland, their quarry was the MOP Skill Project, and they were relentless in pursuit of their quest. Fourteen students from five university campuses (University of California at Santa Cruz, Fairleigh Dickenson University, Colby College, Sierra College, and the University of Maine at Orono) enrolled in a special directed studies course entitled MOP Certificate Skill Project Investigations.

Sally Haggerty, Stephanie West, and Summer Ferrell were regularly seen kayaking and walking along the Hilo coastline as they worked on their project, *"Visual censusing of green sea turtles in the Hilo Bight."* Andee Morozowsky and Denise Ramick spent hours and hours bobbing in the waters of the Kapoho tidepools while they evaluated the *"Habitat utilization and territorial behavior of two species of damselfish."*

The largest project team consisted of five students; Beth Brandreth, Chris Burger, Terry Jones, Carl Lawrence, and Gina Rygle. They spent many days in the field working on their multidisciplinary study entitled, *"Biological and physical characterization of the reef flats at Kapoho."* Their efforts, as well as those of Andee and Denise, were effectively encapsulated in a fifteen minute video production by our own Michael Childers. The video, entitled *"Kapoho reef survey, Summer 1990"*, was yet another skill project completed by Mike.

In addition to field-oriented projects, a number of students took advantage of the UHH's transmission electron and scanning electron microscope facilities and the expert guidance of Dr. Don Hemmes to look at cellular structure in various mollusc species. Joe Rininger and Vicky Baldwin did separate but related projects respectively entitled, *"Microphotography of living dove shells (Collumbellidae)"* and *"Microphotography of living marine gastropods (Triphoridae)."* Shannon Erickson, utilizing SEM facilities, looked at cowrie mantle ultrastructure in her project entitled, *"Scanning electron microscopy of the outer surface of the cowrie mantle."*

The hard work put into these skill projects culminated in public presentations by each student at the First Annual UHH Summer Marine Science Skill Project Symposium. Faculty and students attending the Symposium were rewarded with excellent presentations and an entertaining video. All in all, it was a banner summer in regard to skill projects, and a pretty good start to UH Hilo's blossoming Summer Program in Marine Science.

***

The Perspective of a New Convert to Turtle Tagging

by Lani Brewer

Whitewater tumbling over my head, I made a quick grab for the dark, leathery turtle flipper beating beside me. Before the next wave set hit me I surfaced for a bit of air and rolled with the surprisingly powerful little creature. Gaining my footing somewhat on the slippery red limu covered reef, which the accosted turtle had previously been feasting upon, I managed to get the turtle under control enough to flag someone down for assistance. In no time, there was a group of about five other MOPpers who helped turn the turtle over and hoist him into the innertube raft. The excitement over, I noticed my elevated pulse and breathing rate as I watched the raft being dragged to the beach. Although the whole process took no longer than five minutes, the excitement of the experience was imprinted upon my mind forever.

Emerging onto the beach, I was overwhelmed by the beauty of Punaluu and the amount of onlookers which had accumulated while we were in the ocean. The tourists hung over George Balazs as he carefully and efficiently tagged, measured, weighed, and cared for the turtles. The only thing keeping the onlookers at bay was the occasional blast of black sand thrown up by the turtle's front flippers.

Originally, the onlookers were attracted to Punaluus' sandy expanse of beach with its natural springs shaded by coconut trees and Mauna Loa rising up in the background. However, seeing the turtles lying on the beach was a much more thrilling sight for the tourists and also for me and the other MOPpers.

After having a lunch and packing up our gear, we Turtle Taggers got together for a group photograph. As I reflect back, I fell that the experience was definitely well worth the time and energy that I invested. The next time that I see posters about Turtle Tagging, Lani Brewer will be the first name on the sign-up sheet.

***

Maui Weekend

by Leilehua Yuen

Cecil B. DeMille they're not, but the MOP students selected for the video workshop on Maui were creative, had fun and learned plenty.

After landing in Kahalui, the students piled themselves and their gear into vans and headed for the nearest drive-in for some Maui-style plates. Maui-style means RICE with the laulau--yuck! To get off on the right fin, several orders were changed to mixed seafood platters.

Next stop was Maui Community College. Those guys have one rad media center, and MOP got to play with it all weekend. Lectures started Friday night, with basic video photography theory and demonstrations of video techniques. Students finally hit the pillows at the Maui Seaside Hotel sometime after midnight.

At 7am Saturday, the gang was preparing for the next phase: actually getting under water with the video cameras. The Kihei dive spot was beautiful, but visibility could have been better. Clouds of very fine sand drifted through the water. After lunch, the MOPpers convoyed back to MCC for editing.

What a disappointment for those with no previous video experience. Several minutes of the photographers' own fins and tumbling coral with the tails of fish disappearing into the distance flashed by on the monitors. Fortunately, part of the workshop was figuring out how to correct the mistakes.

Lectures followed the hands-on work, and included viewing some very professionally shot footage. Steve Holly and Steve Russell showed the video they made of the bird refuge on Kaua'i. Beautifully done, it was part of the legislative testimony to preserve the area. It was an effective demonstration of the positive impact possible through video photography.

Sunday was a repeat of Saturday, but with improved visibility and experience to draw from. Editing and lectures went on late into the night, broken only by excursions for food.

Monday dawned overcast and drizzly, which gladdened the hearts of all involved--everyone was stuck inside all day editing. The weather had been perfect for diving all weekend, right up until the MOPpers had to stay inside.

Editing became more and more frantic, with at least one group using stock footage to cover what could not be shot. The three pm Aloha flight home took off, leaving harried MOPpers frantically working editing boards. Finally at four pm, the last editing was complete.

Viewed with pizza and beer, the videos looked great. Then the MOPpers piled themselves and their gear back into vans for the trip to the airport and home.

To see the results of the intrepid gang's weekend, come by the MOP office and schedule a viewing.

***

Computers and the Sea

By John Coney

At this time of the year most students are trying very hard to complete those term papers that they should have started a couple of months ago! At MOP, the majority of students use Wordperfect for their writing needs. With Wordperfect, there are a few tricks to make your writing easier.

An important trick is to frequently utilize the spelling checker and thesaurus. The spelling checker is used by pressing the control key and the F2 key, and choosing option 3. This allows the entire document to be checked. A word count is displayed after the document is checked. To spell check just a section of your document, you block the area (Alt F4) move the cursor to highlight the area, and then press control F2 key. For students writing in a language other than English, other language dictionaries are available.

The Thesaurus can make your vocabulary much more powerful. To utilize the Thesaurus place the cursor over the word you would like referenced, and press Alt F1.

While writing is never easy, learning a few tricks can make your job easier. Good luck on your papers and Happy Holidays!

***

Spring 1991 Schedule for UHH-MOP

January:

14	Semester Starts
18	TGIF
19	Snorkel at Kapoho
27	Sailing on Hilo Bay!

February:

22	TGIF
23	Fishing on Hilo Bay!

March:

2-3	Maui Symposium
9-10	Camping Honomolino
17	Sailing on Hilo Bay!
22	TGIF
25-29	Spring Break (MOP Archeology Symposium)

April:

16-17	Turtle Tagging
19	TGIF
20	Fishing on Hilo Bay!

May:

5	Sailing on Hilo Bay!
8	Last Day of class, & graduation party

***

High Mag!

by John Coney

The SEM (scanning electron microscope) is a powerful tool used to view images with magnifications as high as 100,000 times. This would be equivalent to your foot being magnified to appear to be about 19 miles in length. A model WB-6 SEM, manufactured by International Scientific Instruments Corporation was purchased with a grant from the National Science Foundation and matching funds from UHH, it is currently available for faculty and student research and teaching applications.

Ever since the invention of the first light microscope man has strived to view specimens at increased resolution and magnification. By 1938, the first SEM was constructed by M. von Ardenne. This was possible as a result of the work of H. Stintzing in 1929, who is honored with the first theoretical description of the SEM. It wasn't until the early 60's that Cambridge Instrument Company produced the first commercial SEM. This SEM was primitive, and required the operator to manipulate many hand cranked valves in a specific order. Since the proliferation of digital electronics, today's SEM is fully automated in operation.

People frequently confuse scanning electron microscopy and transmission electron microscopy. I like to use the analogy that SEM work scans the image obtaining a "topographic view" of the specimen and is more akin to a dissecting microscope. On the flip side, TEM work gives the operator a cross sectional view of the specimen. Both the SEM and TEM are important tools and have complementary uses.

The mechanics of the SEM are generally like that of a camera. Instead of photons (light) the SEM uses a controlled beam of electrons, and the lenses are magnets instead of glass. The electron beam travels down a column at voltages ranging from 3KV (thousand volts) to 30KV. Once the beam reaches the specimen, a secondary electron image is formed by both secondary electrons and backscattered electrons emitted when the electron beam strikes the specimen. These electrons are then picked up by a detector which converts the electrons to light photons, and then into a digital signal. At this point the signal enters the station console and is enhanced digitally. The signal is then converted back into an analog image and displayed on a persistent phosphor screen, or the image is displayed on a smaller screen used for photography. The operation of the SEM requires the column to remain under high vacuum of no less then $4x10^{-6}$ torr. The magnitude of this vacuum would be a million times less then the atmospheric pressure found at sea level. This is necessary to keep the filament from oxidizing, and the removal of air prevents the electron beam from colliding with air particles in the column. To create the needed vacuum, three pumps are used in the following sequence; 1) Roughing pump, 2) Diffusion pump and 3) Ion pump. In past times, operators needed to manually watch vacuum gauges, and turn the appropriate valve at the correct time to evacuate the specimen chamber. Today this is done completely automatically.

University of Hawaii at Hilo

HAWAII COMMUNITY COLLEGE
GENERAL EDUCATION & PUBLIC SERVICES DIVISION

December 4, 1990

Mr. George H. Balazs
National Marine Fisheries Service
Southwest Fisheries Center
Honolulu Laboratory
2570 Dole Street
Honolulu, Hawaii 96822-2396

Dear George:

Thanks for allowing me to take part last week in the turtle tagging project down at Punalu'u.

I got some great photos for my story on turtle tagging for Hawaii Magazine. I am waiting for them to come back from the lab.

I'd like to ask you for some additional help in the form of some literature and related information on turtle tagging, work that's been done on studying the turtles, etc.

You had indicated that you had some more information that may be useful to me as I put my article together.

After I receive your information I will then contact you by phone for some follow-up.

Thanks again. It was a really neat experience.

Yours truly,

John Penisten

John Penisten

933-3529

HILO, HAWAII 96720-4091 • TEL: (808)933-3421

Summary of green turtles tagged and resighted at Kaalualu Bay, Hawaii.

By George H. Balazs
Southwest Fisheries Science Center Honoluu Laboratory
2570 Dole Street, Honolulu, HI 96822-2396

Study dates	Method of capture	Total No. captured	No. newly tagged	No. tag resightings	Total No. tagged to date	Original tag dates for turtles resighted
5/5-5/6/77	Net	9	9	2	9	Turtle tagged 5/5 was recaptured 5/6; turtle tagged on 5/6 reported taken by fisherman on 5/14/77
5/8/77	Net	4	4[a]	0	13	
1/21/78	Net	4	3	1	16	5/6/77
9/2/78	Net	2	1	1	17	1/21/78
9/5/78	Net	4	3	1	20	5/6/77 and 1/21/78
7/23/81	Net	2	1[b]	1	21	1/21/78 and 9/2/78

[a]Includes adult female 5016-19 resighted on 6/28/79 nesting at East Island, French Frigate Shoals.
[b]Adult female 5485-88 found dead during July 1983 washed ashore at South Point with bullet holes in the head and neck.

KAALU.GHB-5

Summary of green turtles tagged and resighted
at Punaluu Bay, Kau, Hawaii

by
George H. Balazs
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
2570 Dole Street
Honolulu, Hawaii 96822-2396

Study dates	Method of capture	Total no. captured	No. newly tagged	No. tag Resightings	Total no. tagged to date	Original tag dates for turtles resighted at Punaluu
6/76-9/76	SC	42	37	5	37[a]	
5/7/77	N	3	3[b]	0	3	
1/20-1/26/78	N, SC, SK	8	8	(1)	11	(8/76)
8/31-9/3/78	SK	10	10	0	21	
7/26-7/29/81	N, SK	7	7	0	28	
11/26/83	SC	3	3[c]	0	31	
12/15-12/19/83	N, SC, SK	12	10	2[c]	41	8/78; 11/83
1/8-1/10/84	N, SC, SK	13	9	4	50	1/78; 7/81; 12/83; 12/83
2/17-2/19/84	N, SK	12	10[d]	2	60	8/78;1/78
3/23-3/28/84	N, SC, SK	30	20	10	80	1/84; 1/84; 1/84; 2/84; 9/78; 11/83; 1/78 and 2/84; 8/78; 12/83; 8/78 and 12/83
4/13-4/14/84	N, SK	3	2	1	82	12/83-1/84-4/84
5/14-5/17/84	N, SK	11	7	4[e]	89	2/84; 1/84; 3/84; 2/84
6/26-6/29/84	N, SK	13	8	5[d]	97	2/84; 2/84; 1/84; 1/78-2/84-3/84; 12/83-1/84-4/84

Study dates	Method of capture	Total no. captured	No. newly tagged	No. tag Resightings	Total no. tagged to date	Original tag dates for turtles resighted at Punaluu
3/23-3/25/87	N	7	5	2	102	3/87; 3/87
3/21-3/23/88	N	3	3	0	105	
4/10-4/12/89	SK	14	11	3[f]	116	12/83; 1/84; 9/78
4/9-4/11/90	SK	12	8	4[g]	124	12/83; 1/84; 3/88; 9/78 and 4/89
7/18/90	SK	12	5[h]	7	129	4/90; 4/90; 4/89; 2/84; 3/88 and 4/90; 11/83 and and 3/84; 1/84 and 4/90

N - net; SC - hand capture while scuba diving; SK - hand capture while skin diving

[a]Monel alloy tags. All other tags used are made from Inconel 625 alloy. "Total no. tagged to date" was computed separately for Monel and Inconel.

[b]Tagged turtle 5008(8165) resighted 6/19/84 nesting at East Island, French Frigate Shoals.

[c]Tagged turtle 6711-13 resighted 7/9/86 nesting at East Island, French Frigate Shoals.

[d]Includes tagged turtle 7634-37 with four leeches, leech eggs, and likely small tumor in corner of right eye.

[e]Also includes tagged turtle (6182, 6242, 6260) originally tagged nesting at East Island, French Frigate Shoals, 6/82 and 8/82.

[f]Also includes tagged male (3041, 6164, Y205-06) originally tagged basking ashore at Whale-Skate Island, French Frigate Shoals, 5/4/79. Resighted at same location 6/79, 6/80, and 6/82.

[g]Also includes tagged male (6360-61, Y650) originally tagged basking at Tern Island, French Frigate Shoals, 11/28/82.

[h]Includes tagged turtle N388-89 with small tumor in corner of left eye.

SUMGRT.GHB

Letters

Punaluu

You got some nerve, Mufi "Tokio Joe" Hanneman, for telling my niece Keola Hanoa that she is out of step in Ka'u! What business does a malihini newcomer like you have writing that way about someone born and raised in Ka'u? You even accused her of abusing someone when all she wrote was the facts. You must think you are still in Honolulu, playing dirty politician!

"Don't you ever tell us we are out of step when we are trying to protect our own land at Punaluu that was in our family for 150 years. We are the last Hawaiian kuleana land owners left at Punaluu! So why don't you write and tell everyone how C. Brewer cheated all the other Punaluu kuleana owners out of their land.

You sure have been quiet since State Rep. Mike O'Kiefe told you where to get off! Why don't you Brewer big shots answer him straight, instead of sneaking around getting seniors to put their names on your shibai letters? If you are such a special friend of Ka'u why didn't you give up your job to one of the plantation people you laid off after they worked for C. Brewer for 20 or 30 years?

You just started working for Brewer a few years ago! And don't try to say we are against tourists and jobs for Ka'u people. We have said right from the beginning to put the resort across the highway where there is plenty of room for it to grow without crowding and polluting the beach area. You make that resort by the shore, and the next thing the fish will have is the cigatera disease like in Kona. Just remember, Mufi Hanneman, Punaluu is a sacred place for me and my family, and we are not going to let you and your Japan buddies turn this place into another Kona. Do you understand?

Chris Bangay
Naalehu

UHH Marine Option Program

Changing Tides

Vol. IV, No. 3 *November 17, 1988*

Student Projects

This column is designed to give readers an idea of the types and content of students projects that are integral to the essence of MOP but rarely get reported upon. The following is the abstract from an on-going project by Sherri Miller and Stephen Skipper both undergraduates. Sponsors include U.H.Hilo-M.O.P., U.H. Sea Grant College Program, U.S.D.A. Soil Conservation Service, Minority Biomedical Research Support N.I.H., and County of Hawaii Dept. of Public Works. Advisors are Dr. Walter C. Dudley, Dr. Leon Hallacher, Dr. Tom Hammond, Dr. John Chan, and Dr. John Scott all from U.H.Hilo.

SEWAGE POLLUTION IN HILO BAY

Hilo Bay, located on the eastern side of the Island of Hawaii, is highly used for aquatic recreation, marine transport, commercial and recreational fishing. Hawaii's clear blue tropical waters also help to attract tourists, on which the state's economy heavily depends. However, on occasion, catastrophic sewage spills have occurred. Swimmers and canoe paddlers in Hilo waters complain of infections. These infections may be related to sewage pollution. Because of the serious health risk posed by sewage pollution, we are systematically monitoring the shoreline along Hilo's coastline from Pepeekeo Point to Leleiwi Point. Sewage pollution sources and distribution patterns are being determined by studying levels of bacterial indicators and measuring pertinent physical parameters.

Samples are taken both off and onshore, from marine, estuarine, and transitional sites. Water temperature, salinity, pH, and dissolved oxygen are measured. A current meter and a series of drogues are used to measure currents and determine sewage dispersal patterns. Wind, rainfall, and tidal cycle are recorded, and human activity at the site is also noted. The major bacterial indicator, fecal coliforms, are monitored using the Millipore Filtration Method according to techniques recommended by the EPA.

Sites with consistently high bacterial counts fit into one or more of the following categories: high fresh water input, low circulation, high boat activity. Generally, offshore counts have been low, even when the counts onshore were high. This appearsto indicate that the pollution source is onshore and that pollution is quickly diluted and dispersed.

Coliform counts from samples taken near Hilo's sewage treatment plant were negligible, and no spills from the plant were reported during the study. Sewage pollution is reaching the ocean another way, and seems to be a chronic problem. We hypothesize that rainwater is flushing cesspools through the porous lava substrate and ultimately into the ocean. Our data is consistent with this hypothesis. Perhaps lava tubes bypass normal groundwater filtration and funnel cesspool waste directly into the nearshore region. If the data are confirmed and cesspools prove to be the source of the pollution, homes and businesses may need to be connected to a sewage treatment system, thereby eliminating this serious risk to public health. The work may also serve as a model for sewage pollution studies in tropical island environments.

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In This Issue

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EDITORIAL

Apathy is Aggravating

Sat. Oct. 29th was the date of the Big Island portion of a national beach clean-up project. *Changing Tides* publicized the event, *Vulcan News* ran a short announcement, and posters were placed all over campus.

A grand total of three MOP members showed up. It's possible other members went to other sites. It's possible members had plans they could not break. But still with a member count of 93 and a mailing list of almost 150, more people should have shown up.

I'm disappointed, mainly because I recently read and entered the student files into a new database and almost without fail each member mentioned the need to protect Hawaii's marine environment or expressed anger about pollution of the ocean.

Most readers at this point would expect me, using the vernacular, to "lay a guilt trip on them". I might start the harangue if I felt guilt worked as a long term motivator, but I don't. However when people express a desire to correct a situation and then don't act when given the chance something within the minds of these people should be questioned.

When guilt doesn't work and fear of impending ecological doom doesn't work, I ask, What will?

The motivation for action may be a very simple rational thought. I have a rare chance to affect history. I have a chance to change my world for the better. I can use my will power and improve the future. One of the most fascinating things about the 60's were the civil rights and anti-war movements when people felt that they had the power to change society. We are dealing with a completely different issue, the life of our planet.

This is not a sermon and I don't want to confuse my point. It's simple; you have a will, you know the facts and when history labels the 90's as the era of concern for our planet can you happily tell your grandchildren you were a small part of it.

Jan E. Heckman

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To The Old and New

ALL MEMBERS: If your address has changed or any other pertinent data is different please come by the office, phone, or leave a note.

Changing Tides would like to welcome all the following new members along with the hope that each and every one achieves their goals and finds MOP a significant part of their undergraduate experience.

Stephen Ackerman
Rayland Aina
Wall Alys
Kevin Anderson
Jenny Arnold
Julie Beardsley
Dana Black
Richard Dodd
Thomas Garcia
Jan Heckman
Leo Hefner
Kathleen Hughes
Victoria Husen
Zoe Jacobi
Dennis Jones
Kevin Klein
Daniel Kraus
Kin Man Li
Barbara Martinez
Georgia Merrill
William Moores
John Mosely
Erik Pearthree
David Rose
Ty Sanders
Teddy Sazzmann
Kerry Stewart
Kevin Sullivan
Gail Takaaze
Vicki Talbot-Jones
Zerlina Young
David Vaughn

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Of Squid and Adventure

photo by David Rose

Sure you can. Think about it. Simply check with your instructors about future assignments, make sure to arrange for any test make-ups, and set aside some time to study while sailing around the windward coast of Oahu catching squid. As we reported in our last issue that's exactly what Jill Lippert and Jenny Arnold did the week of Oct. 4th through the 11th. David Rose came onboard for the second week of the 11th - 18th. We didn't ask if they got much studying done but found out they did have some free time despite their 6 to midnight shift and helping out during the day.

The first week's cruise served two purposes. One was to catch squid for their photophores in order to study bioluminescence. Since the squid become active at night they jigged until midnight. A second shift handled the duties until 6 a.m. Another objective was to count the number of planktonic squid caught by what was described as a "huge" plankton net, which was deployed during the day. There seems to be a correlation between the presence of squid and tuna. Since tuna do not feed heavily on large squid the correlation is known but not fully understood.

The second week included only two more days of jigging for squid and then the crew switched to trawling. A graduate student onboard was studying mesopelagic fish and was surprised to find them relatively close to shore. David reported the ship went as far as 100 miles off the windward coast in their search. This aspect of the cruise was part of an on-going research project to understand Hawaiian fishing waters. Last year our Big Island waters were checked and produced much larger numbers of squid.

All of our MOPpers had to learn how to tell the sex of the squid, whether they had been mated, and if they were mature. They also helped hand stitch the plankton net and sat lab watch, plus got a chance to steer the ship. They said the food was great; steak, shrimp, ribs and snacks available at any time since the ship is active 24hrs a day. The cabins were very comfortable, and a nice lounge with VCR and movies was available. Sounds rough and if it appears this report is intended to make you jealous, it is. Sure, there was a good deal of work but when I asked if they would go again there was no hesitation. My impression was that the cruise may prove to be the highlight of the semester for three of our members.

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Turtle Tagging

Two members of MOP got the honor of tagging, not bagging the first turtles of the 88-89 school year. Victoria Husen and Richard Dodd along with approximately 25 students from Hawaii Preparatory Academy, and two scientists from NOAA went to Kiholo Oct 26-28th in search of turtles. This is part of an ongoing project designed to check the growth, migratory, and population patterns of green sea turtles in Hawaiian waters.

Timid members of the group slept in tents but since the weather was good, most slept under the stars. The main group was split into four smaller groups who then divided a 4:00pm - midnight time period into 2 hour shifts. The nets were checked every 15 minutes for the turtles, who come into shallow water to feed. On two nights the group was divided in half and a "free-swim hand-catching" expedition was launched which resulted in a tally of 6 turtles. A grand total of 21 turtles were caught of which about half had been previously tagged. Each turtle involved 1/2 to 3/4's of an hours work. First was the obvious check to see if the animal had been tagged before. Next the following measurements were taken: length of the plastron or belly and tail, right flipper width, head width, and both straight and curved length and width of carapace or shell. Stomach and fecal samples were then taken to check on what the turtle had been eating and whether parasite eggs were present. A general description was then logged and if necessary some first aid administered.

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Attention: T-Shirt Aficionados

We have a design and while still trying to be humble, it's a beauty! It is called *Turtle Rapture* by Annenberg, a professional artist. <u>You will want to own this shirt whether you're a MOP member or not.</u> We are going to need 100 individual commitments for them to start printing; so we are taking orders, $10.00 per shirt (money to be collected later) in the MOP office. Don't be shocked at the price, look at the shirt first. We will have a shirt available so you can see the finished

product. Also a sample shirt will be placed in the MOP cabinets in the Natural Sciences area. If there is enough interest (100 shirts pre-ordered), we can collect the monies and you can collectively congratulate yourselves on your artistic taste and wise expenditure.

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Message in a Bottle

1. The Second International Conference on Marine Debris will be held in Honolulu April 2-7, 1989. The registration fee is $25.00. Come by the MOP office for more information.
2. MOP members and others should consider using our files of completed student projects and other marine related information for their research.
3. We didn't go sailing Nov. 5th due to nasty weather conditions, but we do have a couple of new hulls coming in, which should conjure visions of MOP REGATTA. The first "Hilo Cup"?

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Turtle Tally and Hawksbills

The following are some projects that could use MOP student participation:

1. Observational monitoring of foraging sea turtles at Honolii and the seaward side of the Hilo breakwater. (i.e. foraging patterns and censuses)
2. Assistance to personnel at Volcano National Park in monitoring, protecting, and managing hawksbill turtles nesting in and immediately outside park boundaries.
3. Search-out and identify a suitable netting site to capture and tag turtles in the immediate vicinity of Hilo.
4. Collect, compile, and write-up historical information on the impacts of tsunamis on sea turtles (for example, turtles were tossed far inland at Punaluu during the 1975 event).
5. Students interested in doing one of these projects should contact Leon Hallacher (933-3364) or Walt Dudley (933-3411) or the MOP office (933-3544).

Return Address:
Please Forward, Return Requested
University Of Hawaii-Hilo
Marine Option Program
523 W. Lanikaula St.
Hilo, Hi. 96720

HILO DEC22'88 HAWAII U.S. POSTAGE .25 3306380

George Balaz
2570 Dole St.
Honolulu, Hi. 96822

November 2, 1988 F/SWC2

Dr. Leon Hallacher
Division of Natural Sciences
University of Hawaii at Hilo
523 W. Lanikaula Street
Hilo, HI 96720-4091

Dear Leon,

This letter follows up on our telephone conversation where I promised to provide you with some suggestions for MOP student projects relevant to sea turtles. Please telephone me when it is convenient to do so and we can discuss these ideas in greater detail.

1) Effects of sewage and/or heavy metal pollution in Hilo Bay on sea turtles and their algal forage.

2) Observational monitoring of foraging sea turtles at Honolii and the seaward side of Hilo breakwater (i.e. foraging patterns and censuses).

3) Assistance to personnel at Volcano National Park in monitoring, protecting, and managing hawksbill nesting in and immediately outside park boundaries.

4) Search-out and identify a suitable netting site to capture and tag turtles in the immediate vicinity of Hilo (a site near Coconut Island was suggested by a resident spiny lobster fisherman). Use such a site for Hilo-MOP study visits, under my guidance.

5) Undertake snorkel surveys and hand capture of turtles at Punaluu <u>without</u> incorporating labor-intensive netting. Do observational monitoring for foraging, including behavior and habitat use patterns to the north of the bay.

6) Undertake a policy of a single night of intensive netting at Punaluu to tag and recapture turtles. The logic here would be to put "all our eggs into one basket" and leave before the "fruitcakes" realize we are there. Problems in the past have occurred on the <u>second</u> night of netting when "problem-creating" people get the word that we are camped out. My earlier letter concerning non-holiday, non-weekend field trips would nevertheless still be strongly recommended.

7) Collect, compile, and write-up historical information on the impacts of tsunamis on sea turtles (for example, turtles were tossed far inland at Punaluu during the 1976 event).

I hope these suggestions are helpful. Naturally I'm open to your ideas for sea turtle oriented projects suitable for cooperative assistance on my part.

Best regards to Walter.

Sincerely,

George H. Balazs
Zoologist

GHB:gr

bcc: GHB
HL

Listen carefully and you will hear..
Seawords
MARINE OPTION PROGRAM UNIVERSITY OF HAWAII
News of the Marine Option Program University of Hawaii at Manoa
Seawords May 20, 1988 Vol. III No. 6

Turtle Tagging on the Big Island

By Dan Bauer

Tagging sea turtles drew about 25 MOP students from Hilo, Manoa and Maui programs to the black sand beach park of Punaluu on the Big Island for three days during spring break, March 21 through 23. The project was coordinated by UH-Hilo MOP and conducted by researcher Robert Forsyth of the National Marine Fisheries Service (NMFS).

MOP students helped Forsyth capture, study, tag and release Hawaiian green sea turtles (Chelonia mydas), a threatened species that frequents the southeast coastline of the Big Island, a region known as Ka'u.

The cove at Punaluu has been the site for several turtle tagging expeditions in the past, by Hilo MOP and others, under the direction of George Balazs of NMFS. The sea turtles may be attracted to the area by a species of red limu (Pterocladia capillacea) that grows there. By studying the green sea turtles, NMFS scientists hope to learn more about their growth patterns, and feeding and migratory habits.

Being classified as a threatened species means that the Hawaiian green sea turtle is likely to become an endangered species in the near future, according to the federal Endangered Species Act. An endangered species is one that is in immediate danger of extinction.

Turtle tagging Manoa MOP students take time out to visit the UH Hilo MOP campus. L to R: Dan Bauer, Tina Xavier, Lara Asato, Mary Roney, and Raymond Boland.

UH-Hilo MOP Coordinator and project supervisor, Walt Dudley explained the two-fold purpose of the project: NMFS receives data from the turtles, and MOP students learn about the sea turtles by participating in the methods that scientists use to study these reptiles.

Everyone camped out around the main pavillion of the county beach park for the duration of the project, which began Monday afternoon with the setting of the 60-feet long by 10-feet deep tangle nets used to snare the feeding sea turtles.

See page 3

Editor Says Goodbye

This is it. I'm out of here. Not only am I finally graduating (after five years) with my B.A. in journalism, I'm passing on the editorship of Seawords to my able assistant, Lani Teshima.

Working for MOP for the past two and a half years has been a great experience. I've met some of my best and closest friends through MOP, and had some of my best college experiences at MOP activities.

Some of my favorite stories I've written for Seawords include; Hawaii Transect Workshop (HTW) '86, the Lanai Survey, the oil spill on Windward Oahu, and the April Fools' issues. My best interview was on limnology with MOP alumni John Ford, who now works for the U.S. Fish and Wildlife Service.

This summer, I will be interning at the Pacific Business News, and then I will be trekking in Nepal in October.

I would like to thank several people for their help and guidance.

First, Sherwood for his endless resource of information. I hope some of his attention to detail has rubbed off on me.

Administrative officers Marianne Lam, Gail Browne-McDonald, Henrietta Yee and Ann Dorado were all very patient with me, and helpful with Seawords.

Manoa Student Coordinators Greg LeLesch, Liz Kaul and Lorena "Tap" Wada made my job easier by keeping me to date on MOP events and people, and by being good friends.

Manoa Coordinators Annie Orcutt and Phyllis Ha Tamaru were both full of energy and insight to marine events in Hawaii, and encouragement for Seawords.

Thanks also to the MOP office help for putting up with me. I didn't always deserve it -- Melinda Gaza, Susan Shimabukuro, Karen Izumi, Iris Miyamura, and Judy Domingo.

Last but not least, thanks to my assistant editor, Lani Teshima, whom I couldn't have done this job without.

I'll be in contact with MOP in the years to come, and look forward to keeping the friendship that started with MOP.

Aloha,

Dayne

Now that Lani Teshima is the new Managing Editor at Seawords, her previously held position of Assistant Editor is open.

The duties of the Assistant Editor include: covering MOP events, interviewing people involved with MOP, maintaining regular Seawords columns, writing up stories and headlines, pasting up copy, and taking photos of MOP events.

Qualifications include: interest or experience in newsletter production, layout and graphics, and knowledge of Multi-Mate and DBase programs on the computer.

Desirable skills include: Ability to write well, familiarity with basic journalism styles, and knowledge of darkroom photography work. Also, work/study students are preferred.

If you are interested in the position or would like more information, contact Lani at 948-6000, or Sherwood at 948-8433.

With Liz Kaul leaving to go back to school in Arizona, Manoa MOP will be looking for a new Student Coordinator.

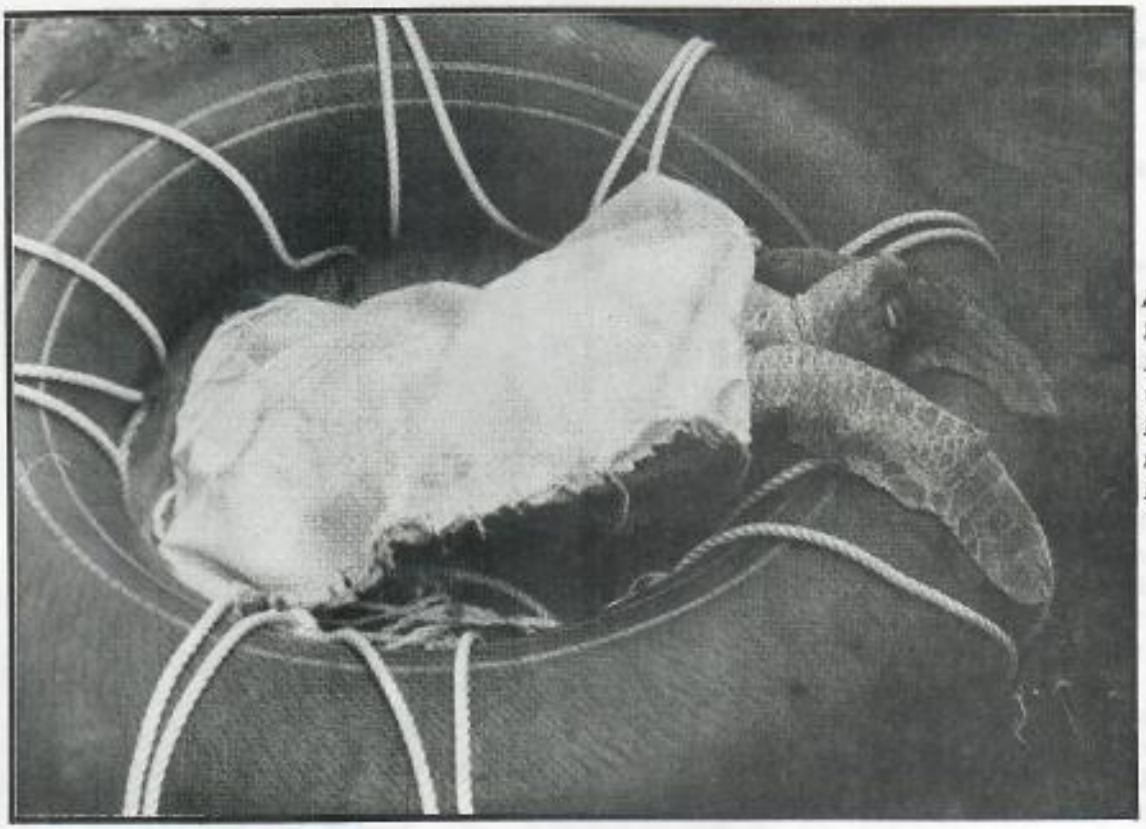
The duties of a MOP Student Coordinator include: assisting Manoa MOP and the MOP Director in conducting MOP activities such as student advising, report writing, maintaining student records, recruiting, workshop presentations, field trips and publicity.

To qualify, you must have extensive experience with MOP as a student, with familiarity of the program as well as marine offerings on campus. You will also need a scuba certification, and have outside experience with other marine programs.

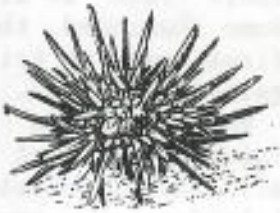
If you would like to be the new Manoa MOP Student Coordinator, contact Sherwood at 948-8433.

Turtle Tagging

From page 1



A turtle caught in Punaluu in the evening rests on an inflated tire tube, and waits to be measured in the morning. -Photo by Raymond Boland.



Wetsuits were worn by practically all the snorkelers. Cool groundwater that seeps in abundance into the cove through the porous lava rock made the water temperature feel to some snorkelers more like that of an alpine lake than a tropical ocean.

It didn't take long to catch the first turtle: one snared itself in the net while the snorkelers were still trying to get it set. The turtle was hauled out and set on its back inside an inner tube to rest out the night. Being placed on its back overnight immobilizes the turtle, while doing it no harm, Forsyth explained. That is the way that all caught turtles are stored overnight; then in the morning all measurements and samples are taken together.

That evening, four-person teams working two-hour watches monitored the net's floats for any sign of snared turtles. Netted turtles could easily become exhausted and drown if not promptly removed from the net. During normal activity, turtles need to come up for air every few minutes.

The net yielded no more turtles that evening, and at 1 a.m. a few hardy MOPers ventured into the water with snorkels and dive lights to pin up the net to the floats, so that the net could remain set in the water. However, no more turtles would get caught while the crew slept.

The following morning students helped as Forsyth took several measurements of the turtle, tagged its two front flippers, and turned it back on its stomach. The newly released turtle wasted no time in finding its waay downhill and back into the water, where it proceeded to make itself scarce.

Tuesday afternoon, a local throw-net fisherman gave the tagging crew a small green sea turtle that he had cuaght in his net. No more turtles were netted that evening, even though it was decided to pull an all-night watch (to the surprise of a few unlucky souls who had gone to bed unaware that they were due for late-night wakeup call).

Wednesday morning, Hilo MOPer William Dana decided that the team hadn't tagged enough turtles, so he snorkeled out into the frigid cove and caught one with his bare hands. That gave Forsyth and the students two small turtles to measure and tag that morning.

See page 4

Turtle Tagging

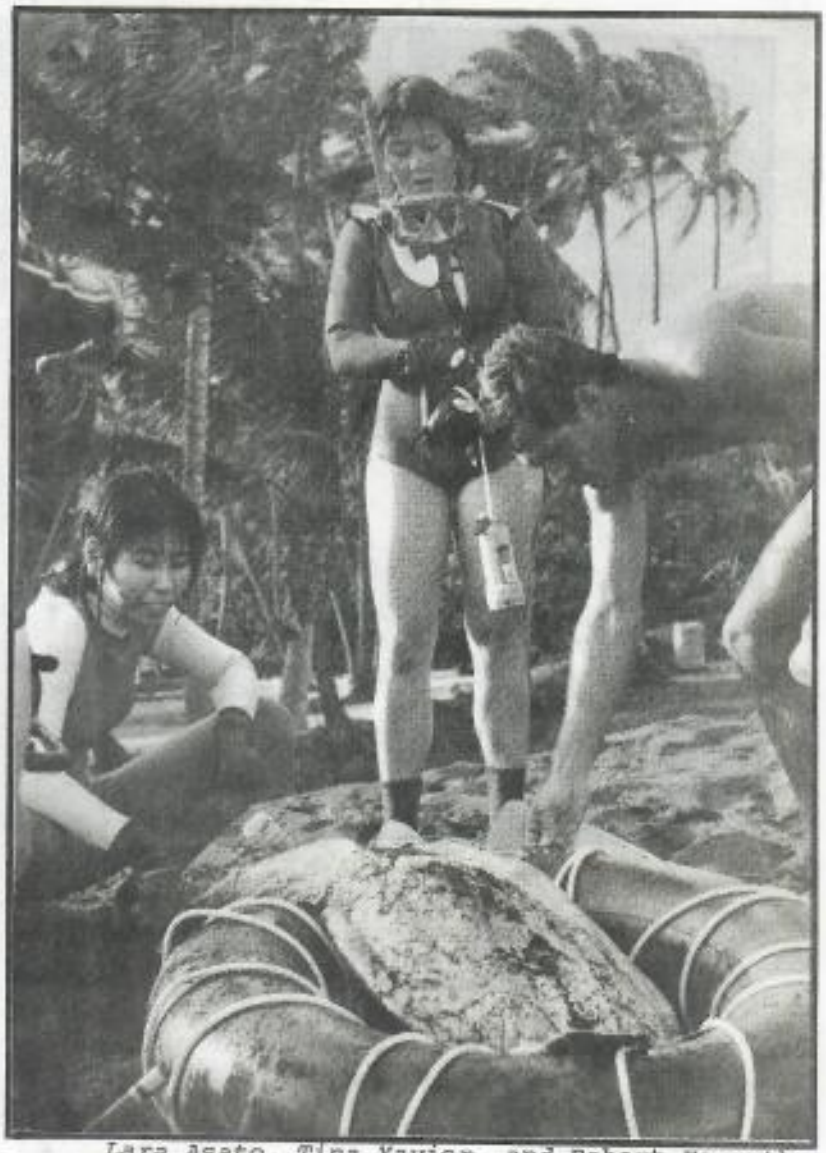
From page 3

Stomach samples were also taken of the two turtles. After some difficulty in getting the turtles to open their mouths, a rubber hose was inserted down their throats. Water was then flushed through the hose. As it washed back out their mouth, small pieces of limu came out with it. The sample was collected in a jar for later laboratory analysis. The newly tagged turtles were each then returned to the beach, where they swiftly splashed off, undoubtedly glad that their terrestrial ordeal was over.

Everyone stayed more than well-fed during the expedition, thanks to Kimber Alspach from Hilo MOP, who organized the whole project. Each of the students had their turn at kitchen duty for one meal. Some bemoaned the fact that this was the first camping trip that they had actually gained weight on.

Many students expressed that the most interesting part of the trip was meeting all the different MOPers from the various islands, who presented a wide assortment of personalities. Some enjoyed a trip to a large heiau located across the cove from the pavillion. Several felt they benefitted most from the hands-on participation in capturing, studying and releasing the sea turtles.

Following the return to Hilo, some visiting Manoa and Maui students stayed on to witness the creation of Big Island real estate when they ventured down the coast to Kalapana, where heavy ocean breakers were assaulting an active Kilauea lava flow.



Lara Asato, Tina Xavier, and Robert Forsyth (NMFS) after they have placed the turtle on its back in the inner tube. -Photo by Raymond Boland.

NMFS researcher and sea turtle specialist George Balazs normally heads such turtle tagging projects, but unfortunatley, circumstances prevented his attendance this year.

About 18 Hilo students participated in this year's turtle tagging project. Manoa MOP students in attendance were: Lara Asato, Dan Bauer, Ray Boland, Mary Roney, and Tina Xavier. The two MCC MOP students participating were: Robert Lohle and Heidi Tobias-Glover. The Manoa students recently held a MOP-in slide show about the expedition.

Left: MOP students detangle and lay out the net to be used to snare turtles. -Photo by Raymond Boland.

1988 MOP Certificates

The following is the list of graduating students who will be receiving their MOP certificates:

UH Manoa

Wayne Jones -- Underwater Baseline Surveys, and Sea Turtle Biology;

Thomas O'Connor -- The Design and Deployment of Remote Sensing Oceanographic Instrumentation and Field Acquiaition of Data;

Victoria O'Connor -- The Design and Deployment of Remote Sensing Oceanographic Instrumentation and Field Acquisition of Data;

Anthony Salvaggio -- Hawaiian Marine and Coastal Environmental Problems.

Windward Community College

LeeAnn Anderson -- Underwater Ecological/Geomorphological Studies, and Coordination of Marine Educational Program;

Linda Vaught -- Biologists' Aid, Hawaiian Monk Seal Headstart Project.

Maui Community College

Heidi Tobias-Glover -- Underwater Archaeology.

UH Hilo

Lisa Jeanne Hall -- Aquaculture, and Marine Education.

The following are receiving MOP Certificates of Appreciation:

UH Manoa

James Gonser -- Marine Journalism;

Madeleine Goodman -- Progressive Administrative Leadership for Marine Education;

Bruce Kennard -- Aquatics Education;

Bill King -- Marine Computing.

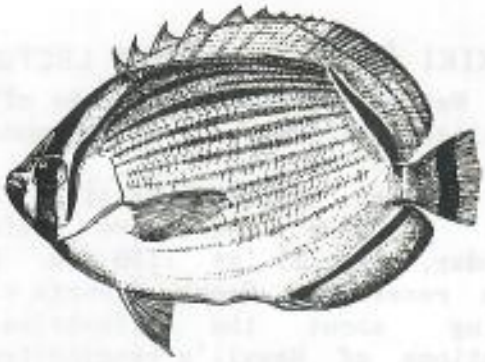
Windward Community College

John Hawkings -- Support for Marine Educational Programs.

UH Hilo

Don E. Hemmes -- Marine Education;

Craig Severance -- Seamanship and Marine Safety.



QUEST Dive Team Leaders

Congratulations to the following students, who have been selected to be dive team leaders during the 1988 MOP QUEST Workshop. They were chosen on the basis of their water skills, initiative and leadership abilities. They are:

Lead Divers

Lara Asato, Manoa
Chris Evans, Manoa
Lee Halverson, WCC
John Leary, WCC
Peter Ravetto, MCC

Safety Divers

LeeAnn Anderson, WCC
Dennis Epperly, Hilo
Dale Gilmartin, Manoa
Rodney Jacques, Manoa
George Stender, WCC.

Seawords

1000 Pope Road Room 203
Honolulu, Hawaii 96822
Ph. 948-6000

James Gonser - Managing Editor
Lani Teshima - Assistant Editor
Sherwood Maynard - Director

Supported by the UH Sea Grant College Program, the State Ocean Resources Branch, the State Aquaculture Development Program and the UH. The opinions expressed herein are not necessarily those of the Marine Option Program or the University of Hawaii.

Of Interest

WAIKIKI AQUARIUM OFFERS LECTURES

The Waikiki Aquarium will be offering two slide lectures during the months of May and June.

The first, called "Hawaii's Hidden World: Caves and Cave Life" on Wednesday, May 25 at 7:30 p.m. Bishop Museum researcher Frank Howarth will be speaking about the lifestyles and adaptations of Hawaii's troglobites, and the habitats themselves.

"In Your Wildest Dreams," is the title of the second slide presentation. UH zoologist Robert Kinzie will give an overview of the special lifestyles and adaptations of Hawaiian wildlife, and discuss the origins and value of the diversity of the island ecosystems. This lecture will be on Wednesday, June 8.

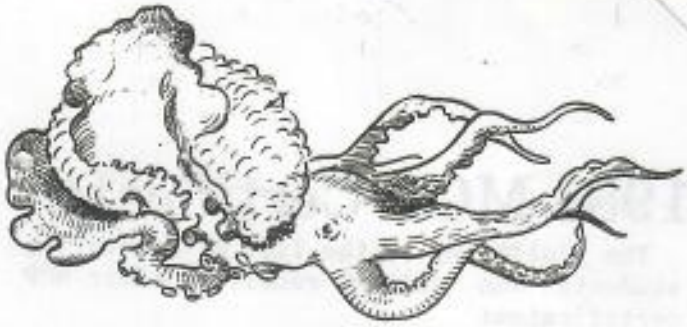
There will be a $2 donation for each presentation. For more information, call the Waikiki Aquarium Education Department at 923-9741.

AQUACULTURE WORKSHOP AT MRTC

An aquaculture workshop will be held on the topic of biological filtration and hatchery circulation on Saturday, May 28, at the UH Mariculture Research and Training Center (MRTC) on the windward side.

The workshop, which is being co-sponsored by Sea Grant, MRTC, the Hawaii Institute of Marine Biology (HIMB) and the Hawaii Aquaculture Development Program, will address such things as: the chemistry and biology of biofilters, the water quality requirements of a successful hatchery run, and the design and construction filters and small hatchiers.

The workshop will run from 8 a.m. to 12:30 p.m., and costs $40. If you are interested in attending, send $40, your name, address, phone number, name of employer and your position to: Recirculating Workshop, Sea Grant Extension Service, University of awaii, 1000 Pope Rd, MSB 205, Honolulu, HI 96822.



LAW OF THE SEA INSTITUTE

This year, the 22nd annual conference of the UH Law of the Sea Institute, and the 11th annual conference for the University of Rhode Island Center for Ocean Management Studies will be held together from June 12 - 16 at the Narragansett Bay campus of the University of Rhode Island.

Titled "New Developments in Marine Science and Technology: Economic, Legal and Political Aspects of Change," the conference will deal primarily in looking into the future of marine science and technology.

The pre-registration fee for the conference is $225. If you are interested in attending, or would like more information, write to: the Center for Ocean Management Studies, The University of Rhode Island, 19 Upper College Road, Kingston, RI 02881-0820.

NEW DOLPHIN BABIES AT SLP

Two dolphins were born (of separate mothers) at Sea Life Park, one on April 21, the other on April 23.

Both are Atlantic bottlenose dolphins, and weighed in at 30 and 35 pounds each.

According to park curator Ingrid Shallenberger, both births were "very normal," and both dolphins are currently doing well.

SCHOLARSHIPS TO JAPAN

Hosei University, located in Tokyo, Japan, is offering an undergraduate scholarship program through their Hosei University International Fund.

The Undergraduate Foreign Students' Scholarship Program is offered every year to two non-Japanese citizens. The scholarship covers the cost of enrollment, tuition, room and board, and students can study for up to a year.

If you are interested in studying in Japan for a year, see Jean at the office of the UHM Department of Oceanography for a brochure and application.

Of Interest

SEAWORDS GOES MONTHLY

Beginning this summer, Seawords will become a monthly publication.

However, to keep on top of such items as job openings, internships, and upcoming deadlines, MOP will be publishing a monthly Sealetters, which will be sent out to all current MOP students. A smaller version of Seawords, Sealetters will be published on the alternate weeks of Seawords, concentrating mostly on the types of items that appear in our "Of Interest" column.

If you are a current MOP student, you can expect to see your first issue of Sealetters around mid-June.

SUMMER NIGHT CLASSES AT UHM

The UH Manoa College of Continuing Education and Community Service is offering classes through their evening credit course program that may be of interest to MOP students.

The courses listed below are for the summer accelerated term, which runs from June 6 through August 13. Tuition for these classes are $45 per credit for Hawaii residents, and $155 for non-residents.

Geog 368: Geography of Hawaii.
Zoo 200: Marine Biology, and
Zoo 200L: Marine Biology Lab.

If you would like to take these courses, or would like more information, call 948-8400.

MOP STUDENT WINS AWARD

Congratulations to Manoa MOP student Carol Yonamine, who received the Agatin Abbott Award from the Department of Geology and Geophysics.

Carol receives a plaque and $400 from the Agatin Abbott Memorial Fund, which was established 10 years ago following the death of long-time chairman Agatin Abbott.

The award is given out once a year to the senior undergraduate student with the highest GPA.

Carol, who refused to divulge her GPA, laughed and said, "My brothers told me I must've gotten the award because I was the only student in the department!"

Congratulations, Carol!

SEA LIFE PARK OFFERS CLASSES

Sea Life Park will be offering a number of classes for children and adults over the summer.

Both the "Keiki and Adult Explorations" and "Sea Creatures and Crafts" classes will feature on arts and crafts, facts about marine mammals, and other marine related activities. There are different classes for whales and dolphins, octopus, fish, sea lions and seals, and sea turtles. Classes are limited to preschoolers, accompanied by adults.

"Tidepool Discovery" will involve learning experiences at the park, plus field trips to nearby beaches and tidepools to study marine invertebrates and fish.

"Sea Creatures and Crafts" and "Tidepool Discovery" are geareed for elementary and intermediate students.

"Facing up to the Fish" and "Tidepool Trek" are open for the whole family. "Facing up to the Fish" includes a lecture with hands-on props, a game in the Hawaiian Reef Tank, bamboo pole fishing, and gyotaku (Japanese fish printing). "Tidepool Trek" is an introduction to tidepool creatures using a variety of props, and includes an exploration to nearby tidepools.

For adults, there is "Marine Animal Photography," which will teach students how to shoot with the "dry land" approach. Students should have some knowledge of 35mm photography and provide own camera and film.

All of these courses require reservations, and registration fees. If you would like to learn more about the events, write to: Sea Life Park, Education Class Registrar, Makapuu Point, Waimanalo, HI 96795.

BML SUMMER PROGRAM DEADLINE

There is still time left to sign up to attend the Blue-Water Marine Lab (BML) Summer Program.

The deadline for the program, which will start on June 20 (with orientations on June 18), will be on June 10.

If you would like more information on how to be register for the BML Summer Program, call Liz Kumabe at 923-9741.

Of Interest

JOBS AT NOSC

The Naval Ocean Systems Center (NOSC) is looking for a number of students to fill part-time positions.

There are two positions available at Hickam Air Force Base.

The first is for a computer science analyst, who will be assisting the on-site system administrator to install, operate, modify and maintain the existing office automation system. The position also involves the maintenance of software and hardware, trouble-shooting problems, designing, developing, testing and documenting computer programs.

To qualify, you must be a computer science or management information systems major, with knowledge in two or more of the following areas: VAX/VMS, computer networking/communication, database/data structures.

Desirable skills include experience with both the IBM PC and Apple Macintosh hardware and software.

The second is for a mechanical or civil engineering analyst, who will assist the facility manager/engineer in preparing, phasing and implementing a large construction project. Duties include reviewing, analyzing and documenting operational procedures pertaining to the building facilities, reviewing and analyzing construction design drawings and specifications, providing necessary engineering to support preliminary construction and facility issues, preparing engineering drawings, project work breakdown structure, and activity networks.

To qualify, you must be a civil or mechanical engineering major in the College of Engineering, and have completed freshman and sophomore level engineering courses.

Desirable skills include experience with drafting and blue-pring reading, and experience in the construction/consulting field.

The work for the following NOSC positions will be conducted at the Kaneohe Marine Corps Air Station.

There are two positions open for electrical engineering analysts, who will assist the work sponsor in designing, breadboarding and testing developmental electric cirvuits, integrating electronic components with mechanical hardware, and documenting designs of electronic circuits.

To qualify, you must be an electrical engineering major, having completed one semester of logic design or equivalent.

Desirable skills include the ability to use small hand tools, soldering and wire-wrapping, and experience in using an IBM PC.

The final position is for a mechanical engineering analyst, who will provide support in the field of mechanical hardware design, analysis, testing and cable winding for the fiber optic system of the NOSC ET Project. You will also be assisting in the design, layout and testing of developmental mechanical hardware for fiber optic cable winding system, integrating mechanical and electronic components to balance form and function, and documenting mechanical design, analysis and testing.

You must be a mechanical engineering major, and have completed one semester of mechanical design.

To qualify to any of these NOSC positions, you must:

1) Be a U.S. citizen;
2) Provide your own transportation;
3) Attend school on a full-time basis;
4) Be a graduate student with a GPA of at least 3.0, or an undergraduate junior or senior with a GPA of at least 2.0;
5) Be able to work at least 10 hours a week, with a maximum of 20 hours a week during school and 40 during vacation.

All positions pay $5.40 an hour. If you are interested and would like to apply, call the Marine Option Program (MOP) at948-8433.

BABY NEWS

Former MOP Administrative Officer Henrietta Yee gave birth to Shayna Noelle Yee on March 11, at 1:59 a.m. Shayna weighed in at 8 lbs, 6 oz., and both mother and daughter are doing fine.

Congratulations, Henrietta!

Of Interest

JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS JOBS

There are job openings for those interested in aquaculture.

The first position is for a full-time employee for the UH Department of Animal Sciences Prawn Aquaculture Research Program. The position is a three-month casual hire appointment, with continuation depending on availability of funds.

The duties include: assistance in broodstock management, larval rearing, facility management, data collection, conduction of tank and aquarium level experimentation.

Qualifications include: the ability to physically perform the duties and responsibilities of the position. You must be willing to work some weekends and holidays, possess a valid Hawaii driver's license, and preferably have some experience in prawn or shrimp aquaculture research, including experience in larval rearing techniques.

The Prawn Aquaculture Program is also looking for two or more student employees who would like to assist in maintaining the prawn research experiments and facilities, feeding animals, taking data, building apparatuses and maintaining grounds.

To qualify, you must qualify for UH or Windward CC student employment, and be able to work 20 to 40 hours a week. Personal transportation to the Anuenue Fisheries Station on Sand Island is necessary.

If you are interested in these positions, call Yara L. Lamadrid-Rose at the Prawn Aquaculture Program at 847-6015 during the day.

There is an internship open for a UH authorized scientific diver to assist in a Damselfish behavior project in Kaneohe Bay. The investigator for the project, which is part of Earthwatch, needs one student dive partner from August 17 to September 23 to assist with tagging and observations.

Room and board will be provided at Coconut Island.

If you are interested, call David Booth (before May 30) or Bill Tyler (after May 30) at the Hawaii Institute of Marine Biology (HIMB), 247-6631.

The Honolulu laboratory of the National Marine Fisheries Service (HIMB) is looking for MOP student interns to help them with a small boat survey project.

The work will involve collecting information on a number of small recreational and commercial fishing vessels operating from small boat piers, harbors and launching ramps around Oahu.

In two 12-hour shifts, students will monitor the number of boats returning from fishing trips over a 24-hour period, at locations to be assigned.

The work period will last between one week to a month.

The students will be supervised by the Fishery Management Program, and a student project leader.

A MOP stipend could be awarded depending on the scope of the project.

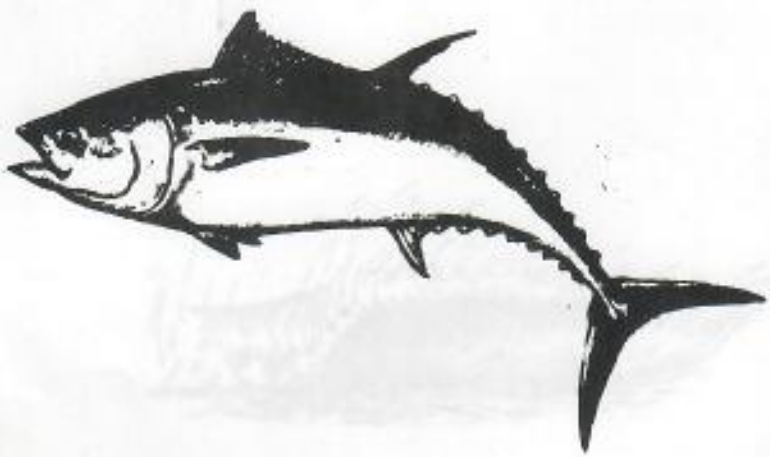
If you are interested, call Russell Ito at NMFS, 943-1210.

There is a part-time position available for a person to assist with field sampling of nearshore oceanographic parameters (one day a week for 10 to 12 hours), and to assist with equipment preparation, errands, data work up and clerical duties (an additional eight to 10 hours a week).

Desired qualifications include previous experience with sampling, and small boat operation.

The starting pay is $5 or $6 an hour, depending on experience.

If you are interested, call Patrick Sullivan at Oceanit Labs, 531-3017.



MOP Calendar

May

20-22: NANEA KAI '88 NBC EXHIBITION HALL, 948-8191.

21-June 1: MOP QUEST WORKSHOP HOSTED BY WCC at Coconut Island.

21 (Sa): SEAWEED PRESSING WORKSHOP Waikiki Aquarium, 9a.m.-noon, $10, w/Karla McDermid, 923-9741.

25 (W): WAIKIKI AQUARIUM, LECTURE. FRANK Howarth, "Hawaii's Hidden World: Caves and Cave Life." 7:30 pm, $2 donation.

29 (Su): KHET TV 11, NATURE, 7 PM "IN THE Shadow of Fujisan: Long Live the Turtle."

30 (M):HOLIDAY: MEMORIAL DAY

31 (Tu): KHET TV 11, 9 PM FRONTLINE "Trouble in Paradise," US military pacts in Palau.

June

1 (W): ADVANCED NAUI DIVING COURSE W/ Geoff Saint. 948-8433.

1 (W): NAUI OPENWATER SCUBA COURSE W/ Alan Hong, 948-8433.

3 (F): MOP ALUMNI ASSOC. DIRECTORY Meeting, 10 am, MSB 229, 948-8433.

4 (Sa):GRE TEST DAY

6 - August 13: SUMMER ACCELERATED TERM for evening classes, UHM. See OI interest for MOP oriented courses.

8 (W): LECTURE, WAIKIKI AQUARIUM, "IN Your Wildest Dreams," by Robert Kinzie, 7:30pm, $2 donation, 923-9741.

10 (M): APPLICATION DEADLINE TO ATTEND BML Summer Program. Call Liz Komabe at 923-9741 for more info.

10 (M): HOLIDAY: KAMEHAMEHA DAY.

14 -25: CLASS, LIFE ON HAWAIIAN REEFS, 6 sessions, thru Waikiki Aquarium, $40, T/Th/Sa, 923-9741.

16 (Th): MANOA MOP ADVISORY COUNCIL Meeting, 3:30 pm.

18 (Sa): ORIENTATION DAY FOR THOSE Attending BML Summer Program.

19 (Su): FATHER'S DAY.

20 (M): FIRST DAY OF CLASS FOR THE BML Summer Program.

29 -July 2: CLASS, HAZARDOUS MARINE LIFE in Hawaii, 6 sessions, thru Waikiki Aquarium, T/Th/Sa, $ 20 923-9741.

July

1 (F): MOP ALUMNI REUNION COMMITTEE Meeting, 7 pm, Annie Orcutt, 948-8191.

4 (M): HOLIDAY: INDEPENDENCE DAY.

5 -16: CLASS, REEF FISH WATCHING, THRU Waikiki Aquarium, 6 sessions, T/Th/Sa, $40, 923-9741.

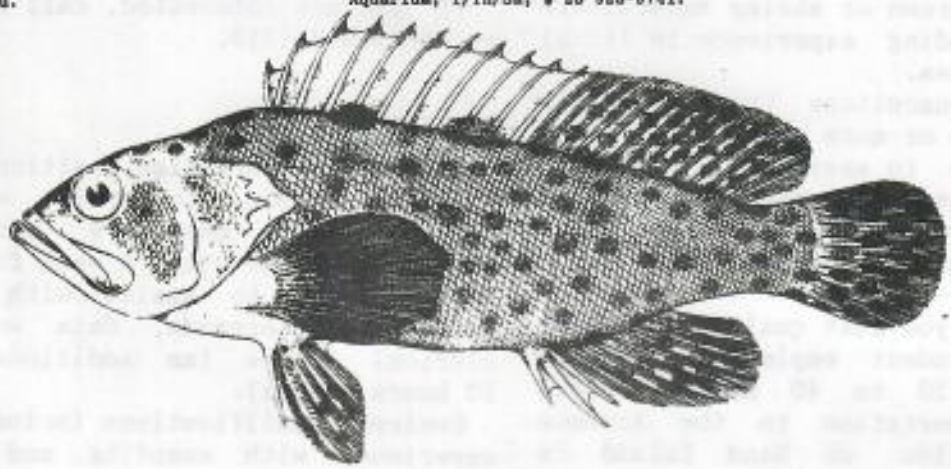
19-23: CLASS, HIGH SPEED NOMADS OF THE Open Seas, thru Waikiki Aquarium, T/Th/Sa, $20, 923-9741.

19, 23, 28: CLASS, MARINE ANIMAL Photography, thru Sea Life Park, 259-7933.

29 (Sa): MOP ALUMNI REUNION, WAIKIKI Aquarium, 948-8433.

30 (Su): MOP ALUMNI BEACH DAY, KUALOA Beach Park, Crafts & classes, 948-8433.

.....Denotes MOP activity.



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University of Hawaii at Hilo

COLLEGE OF ARTS AND SCIENCES
Division of Natural Sciences

September 17, 1987

Dear George,

Enjoyed seeing you in Honolulu. You still owe me a luncheon date.

Sorry that I've taken so long to get a copy of this "turtle proposal" to you. The rush at the beginning of the school year is a killer.

At any rate, I've heard nothing from C. Brewer, so I wish you luck. I must confess that the attached letter proposal was "ghost written" for me by one of my Hawaiian activist friends who is interested in preserving the turtles, but doesn't want to have their name associated with a request to C. Brewer.

Let me know what the boys have to say. At any rate, if they don't come forward with funds, I will find money somewhere and pay for stipends for student leaders, as well as food money.

Please keep me informed about the upcoming turtle tagging with Hawaii Prep. I heard that they were asking Manoa MOPPERs to participate. We've got lots of students here who would like to go.

Looking forward to hearing from you.

Aloha,

523 W. LANIKAULA STREET
HILO, HAWAII 96720-4091 • TEL: (808) 961-9383

Green turtles captured and tagged at Punaluu Bay, Kau, Hawaii on 23-25 March 1987.

	Date	Time	Tag No.	Sex	Straight-line carapace (cm) Length	Width
1.	3/23/87	2050	9826-29	F	80.8	62.1
2.	3/23/87	2230	9830-31	--	59.7	--
3.	3/23/87	2400	7734-36	F	85.7	62.7
	(Originally tagged at Punaluu on 6/28/84, 2 years, 9 months ago, at which time it measured 85.1 cm S-LC. Growth rate was 0.22 cm per year.)					
4.	3/24/87	2230	9832-33	--	60.9	47.8
5.	3/25/87	0530	9834-37	F?	75.1	57.6
6.	3/25/87	0530	7630-33; 9838	M	89.7	68.6
	(Originally tagged at Punaluu on 2/18/84, 3 years, 1 month ago, at which time it measured 88.8 cm S-LC. Growth rate was 0.29 cm per year.)					
7.	3/25/87	0530	9839-40	--	46.3	36.0

Listen carefully and you will hear...

Seawords

News of the Marine Option Program — University of Hawaii at Manoa

Seawords March 16, 1986

ON MARKRICH

by David Stroup

Advertiser columnist Mike Markrich has strong feelings about the ocean; more than just an integral part of Hawaii's past and future, he sees it as something precious, a "family heirloom" that's been passed down from one generation to the next. He sees it as Hawaii's greatest resource, from the economic paths now being developed by big business to the subsistence fishermen whose lives depend on it, as well as an integral part of Hawaii's heritage. Unfortunately, he also believes that this generation may be on the verge of fumbling that heritage-- that we may not be able to pass that heirloom on to the next generation.

Markrich, in his job as columnist for the Honolulu Advertiser, believes that an important part of his work is to warn the public of that impending loss-- to awaken people to the importance of the ocean before it's too late. He didn't set out to be a writer, and it took a few twists of fate to bring him to his present position.

His degree, from the University of Hawaii, is in Agricultural and Resource Economics, and he planned to be an economist, concentrating in fisheries. But the job situation on the island was poor at the time, and after a period of frustration he reevaluated his priorities. He's always liked writing, so he went to the Advertiser and discovered that they didn't have a fishing columnist. The arrangement that resulted fixed both the newspaper's oversight and his jobless status, and he's been writing his column, "From The Sea", ever since.

His favorite stories are the unusual ones; the strange, the out of the ordinary, the stories that entertain and amuse, while stretching people's perceptions of the sea. He cites the story of the man with the pet barracuda, which he found by following an off-hand reference someone made while he was hunting for features ("Man, no interesting stories around here... real boring... like, just the other day I was telling the MAN WITH THE PET BARRACUDA--" "Hold it."). Another amusing piece concerned the little old ladies who go down into the surf to pick limu.

Continued Page 4

Teacher to explore Innerspace

by James Gonser

One lucky pre-college science teacher from Oahu will be selected by a panel of UH oceanographers to take part in a research dive aboard the submersible Makalii in the Teacher in Inner Space project.

The submersible Makalii is 5 feet in diameter and 15 feet long and carries a pilot and one observer in the cozy interior. The submersible has already made over 350 successful dives.

The winning teacher will do the research at the red coral beds in 1200 feet of water about 6 miles off Makapuu. Two video and one 35mm camera will record the once-in-a-lifetime event.

At the ceremony to announce the project on Saturday March 1 at the Makai Pier, everyone got a chance to see the facility and get a close look at the submersible.

Some teachers expressed a fear of claustrophobia while being in such a confined space for the four hours that the dive will last. Makalii's pilot Dave Foster said most people who go down "are so busy looking out the window that they forget all about it."

Foster said there is no motion once you're underwater and the temperature is a comfortable 75 degrees inside.

Interested teachers must be full-time elementry or secondary school teachers in Hawaii, participate in a science project during the dive, be able to function in a confined space and be in good physical health.

Applications are available at the Waikiki Aquarium with a deadline of April 1. The winner will be announced May 17. Two runners-up will go along with the support vessel during the dive.

The Teacher in Inner Space project is a cooperative venture organized by the Hawaii Science Teachers Association, Hawaii Undersea Research Laboratory (HURL), and the University Laboratory School, College of Education. Co-sponsors are the DOE, the Waikiki Aquarium, the Hawaii Maritime Center and the Blue-Water Marine Laboratory

OF INTEREST

Starting out this issue: job offers up the yin-yang. Here's a list culled from "Environmental Opportunities", a sort of a clearing-house of such information.

An Executive Director is needed to manage and direct the activities of the 6000 member environmental organization "Friends of the River" in San Francisco. Applicants should have strong personal and profesional experience, managerial skills, experience with fundraising, public speaking and press contact, and so on. Send a resume, personal and professonal references, and a personal letter expressing your background and interest to Mark A. Hetts, Friends of the River, Building C-Ft. Mason Center, San Francisco, Calif. 94123.

The Boston Harbor Islands State Park has three positions open. The first is for an Island Manager Supervisor to run the whole project. Required skills are knowledge of park management skills and supervisory and training experience and interpretation. Send resume and cover letter to Dept. of Environmental Management, Office of Interpretive Services, Division of Forests and Parks, 100 Cambridge St. Boston, MA 02202.

The same group needs Island Naturalists and Historians. Applicants should be college students or graduates in American History, Natural Sciences, Park Management or a similar field. Same contact as above.

Also needed are Island Managers, to live and work on an island in Boston Harbor. Training will be given, and applicants must be at least 20 years old. Send resume, covor letter and a list of

Continued page 5

MOPers begin survey of Kaneohe Bay

by James Gonser

Greg Lelesch and three other WCC MOP students, Dennis Regan, Dave Haney and Mike Neill have started an underwater survey of Kaneohe Bay as their skill project and hope when they finish other MOP students will pick up and continue on.

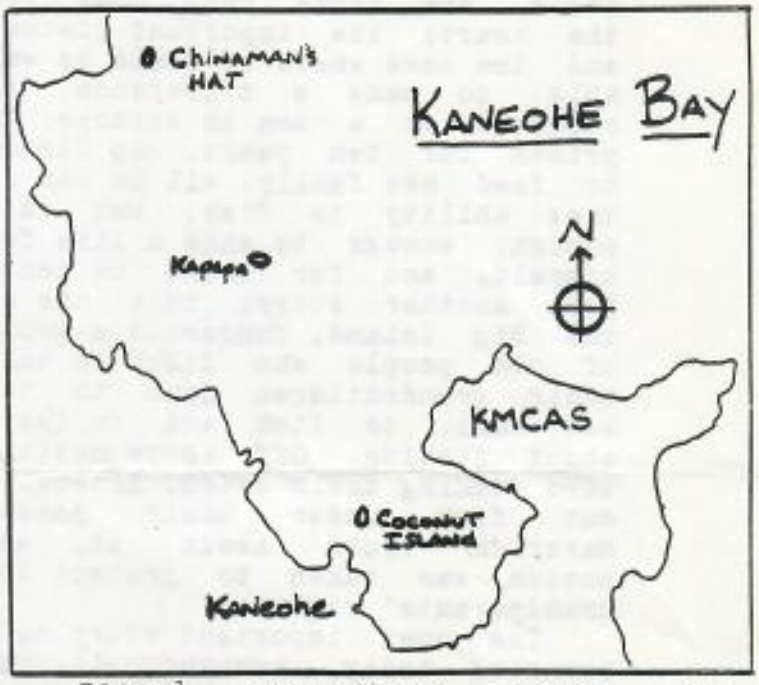
"We're trying to create a working file on Kaneohe Bay," Lelesch said. "A general survey of the bay is the start of that file."

The survey will take about 80 hours to complete and cover a 16th of the bay. The team works mostly on weekends and they are slaves to the weather.

"Swells and rough seas have slowed progress so far," Haney said.

The survey starts at Kapapa Island and heads out to sea and towards shore 1000 meters. From the same starting point they will survey 500 meters towards Chinaman's Hat and towards Kaneohe Marine Corps Air Station. The bay's depth varies from 6 inches to 60 feet in the survey area.

"We take a one-meter square grid of PVC pipe and lay it on the bottom," LeLesch said. "Then we record everything within the grid."



"Shells, limu, sand and coral are what we expect to find mostly," Haney said.

"The last survey of the bay was in 1972. (At that time) they were looking for damage from sewage and rainfall," LeLesch said. "We hope this survey will be used in classes and by other MOP students to base their skill projects on."

CURRENTS

Manoa

Congratulations to Paul Bass who passed MOP's limu test with a 94%.

MOP coordinator Annie Orcutt said the 3rd symposium was the best ever. She was glad students could see the Hilo campus.

After the symposium Annie, Sherwood and some Hawaii Preparatory Academy people visited eight dive sites for the upcoming HTW. Annie said this year the workshop would be improved by the facilities provided by HPA. Students will stay in dorms and have two labs and computers to use, as well as the academy's food service.

A scholarship drive has been started to help send students to HTW. Annie said she hopes $5000 is raised.

The crew of the R/V Hokusei Maru were treated to a local style bar-b-que at Sans Souci beach. One of the Japanese crew was heard to say that in Japan they only cook out once a year and it's not warm and not on the beach.

Maui

Things must be really busy on Maui because I can't get anyone on the telephone.

Continued page 5

MARKRICH from page 1

But the best stories, he feels, are those that come from the heart; the important pieces, and the ones where he feels he was able to make a difference. He reported on a man in Waianae, in prison for ten years, who fishes to feed his family. All he has is that ability to fish, but it's enough; enough to make a life for himself, and for those he cares for. Another story, this one on the Big Island, concerned a group of old people who liked to take their grandchildren down to the sea wall, to fish and to learn about fishing. Off shore netters were taking their catch, literally out from under their noses; Markrich wrote about it, and action was taken to protect the grandparents' rights.

The most important story he's covering today, however, is the decline of Hawaii's ocean resources. Overfishing is the main culprit; fish are taken in vast numbers, and often so young that they never get a chance to reproduce. In the past, the ocean was taken care of by the ancient Hawaiians, whose kapu system prevented overfishing; later, the Japanese immigrants to the islands continued the custodianship. Today fish are being wiped out by huge nets and even chlorine, and nobody seems to care. Markrich is apalled at the lack of respect for wildlife and nature-- he says that Hawaii's people are "squandering an inheritance", and he only hopes that we wake up before it's too late.

Markrich says that presently there's no real enforcement, no game warden system, and that the only real sources of marine education in the islands are MOP and the Blue-water Marine Lab.

Other on going stories include an investigation into what's happening to the coral at West Beach, and a look at the impact of change on subsistence fishermen on Kauai. He said that he usually likes to work about two stories in advance, but that he doesn't like to talk about the stories until they're written.

Presently he's also working as an economist for Sea Grant, completing a study on the impact and potential of ocean recreation and related industries in Hawaii. According to Markrich, for the past 30 years, people have been pouring money into Hawaii's fisheries, mostly without pay-off. Now they're beginning to realize that there's more money to be made showing fish to tourists than further depleting Hawaii's fisheries.

In recent years there's been an upsurge in amount of money-- and attention--devoted to ocean recreation. Now Markrich is going to events, conducting interviews and colating information to build up a comprehensive model of the economic impact of these activities on the state. Already he's uncovering conflicts-- for example, between people who want to show the fish, and the subsistence fishermen who want to eat them.

Other problems include the dumping of sewage from cruise ships, and the confusion at the last Triathelon: it was all set up when, at the last minute, the fire department told them they had a fire hazard and cancelled the proceedings.

According to Markrich, it's vital to Hawaii's economic future that these activities be protected and nurtured, and no one seems to take them seriously. Surfing and canoe races alone bring both money and free exposure to the islands: unless we take care, these new resources could be easily lost in a sea of indifference and burocratic red tape.

Markrich has strong feelings on a number of other issues. He feels that the idea of an Ocean Center is a good one-- a place to increase public interest in and awareness of the sea. But he also said that "I feel strongly that to build a monument to a dead ocean is wrong." He said that the money could be better spent to ennance the reefs or bring back the fish.

He said that interisland ferries are a good idea-- but that ferries are expensive, the channel

Continued page 7

CURRENTS

from page 3

Hilo

Leon Hallacher said he was very pleased with the symposium and called it a big success.

Mike Morrow, from the National Weather Service, gave a lecture to about 25 people, mostly from the community (rather than being students) and was very well received.

They hear from Walt Dudley in France occasionally and he is alive and well with his Coccolithophores.

Windward

They are breathing easy now that the symposium is over. WCC's own Robin Minton placed first for best science paper. Dave Krupp has a video of the event, and he said if it looks good the people who didn't make it to Hilo can at least see the tape.

Guest speaker Stuart Pfeffer will discuss sea bird life on the leeward Hawaiian Islands at the regular MOP meeting Friday, March 7 at 3:30 pm in Iolani 117.

U.H. MOP's
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Sherwood Maynard — Director
Supported by the UH Sea Grant College Program, State Ocean Resources Branch, Aquaculture Development Program, and the U.H.

OF INTEREST

from page 2

relevent coursework to Environmental Intern Program/ Northeast, 25 West St., Boston MA 02111. Call (617) 740-1605.

Other openings: a Colonial Waterbird Specialist for the Seatuck Research Program, contact Patricia Dooley, Seatuck Research Program, Islip, New York 11751. Cetatean research internships with the Maine Whalewatch, contact Beverly Agler, Allied Whale, College of the Atlantic, Bar Harbor, ME 04609. More whale internships at the Center for Coastal Studies, contact (617) 487-3622. Still more at the Cetacean Research Unit, contact them through Gloucester Fisherman's Museum, PO Box 159, Gloucester MA 01930. Many internships-- horticulture, aviculture, fish husbandry and more-- through Sylvia James, Education Departement, National Aquarium in Baltimore, Pier 3/501 E Pratt St. Balt. MD 21202

The Waikiki Aquarium (for those of you who've just toured the east coast with me, that's actually in Hawaii, folks) wants to announce a series of five monthly lectures, "Encounters With Marine Life", on Wednesday evenings at 1930 hours. All lectures will be at the Aquarium, 2777 Kalakaua, and a donation of $1.50 is appreciated.

There's a series of courses being offered by the Gulf Coast Research Lab in Mississippi this summer. Courses include Marine Invertebrate Zoology, Marine Science for Teachers, Coastal Vegetation and more-- contact Registrar, GCRL, Ocean Springs, MS 39562. We have a list of all courses and dates here at the MOP offices.

Continued page 6

Of Interest

from page 5

The Blue-Water Marine Lab is announcing the opening of its 1986 Cruise Leader Program. Students will learn about oceanography and the state of Hawaii while gaining teaching, management and leadership skills-- the CL's will be in charge of 20 high school students, and must train them to be Cruise Instructors for the BML program, '86-'87. Deadline is March 31-- contact the BML office, University of Hawaii, Blue-water Marine Lab. (BML) Waikiki Aquarium, 2777 Kalakaua Ave, Hon HI 96815. Phone 923-9741.

The Teacher's Workshop on the South Pacific will be held March 24-25 in CC Rooms 307-308, UH Manoa. The program includes "French explorations of the Pacific" with Dr. David Hanlon, "The Tahitian Mind with Dr. Jan Newhouse, and a film: La Polynesie Au Coeur. For more information call x7700 or x6393.

The Second International Symposium on Indo-Pacific Marine Biology will be held in Guam, June 22 to July 9, 1986. We now have all the necessary forms here in the MOP offices. For more info please contact Prof. David H. Montgomery, WSN Secretary, Biological Sciences Dept., California Polytechnic State University, San Luis Obispo, CALIF., USA 93407.

Five students are needed for a biological oceanography research cruise over spring break, March 22- 31. Work will be sampling for larval squid on UH R/V Kila off Wainae coast. Contact Dr. Richard Young, UH Dept. of Oceanography, 948-7024.

Join Aquanauts

by James Gonser

"There are three things that keep people from scuba diving once they're certified," said UH Aquanauts Club President Rich Neumann, "equipment, transportation and someone to dive with. The Aquanauts try to solve these problems and get more people into the water."

The Aquanauts first formed with help from MOP in 1972 and today have over 50 members, about 1/3 of whom are women. Members are mostly UH students and faculty but the club isn't restricted to them.

"We accept anyone with marine interests," Neumann said. "People even come along on dives and just enjoy the beach."

In addition to scuba diving, club members snorkel, take underwater pictures, collect shells and some spearfish.

Every Saturday, year around, the Aquanauts meet at 8 am at Sinclair Circle. They form car-pools to the dive spots and are usually back by noon. The more experienced members know the local dive spots and provide leadership while underwater. They help make the dives safe and fun.

The Aquanauts also rent dive gear to members at discount rates.

Every year the club volunteers to clean some ocean area. This summer the project will be Hanauma Bay. Using burlap bags they police the shoreline and the bay itself. Prizes are given in several areas including most unusual trash collected.

The Aquanauts meet at 4pm the 2nd and 4th Tuesday of each month in the Hemenway lounge (second floor). Membership dues are $5 per semester and entitle you to discounts on gear and services, including air refills, from local shops.

Xiangyanghong: Reprise

In which the editor addresses the subject of crow as a dietary supplement.

Some of you may recall the article I ran in these pages a few issues ago telling of my adventures on and around the Chinese research ship Xiangyanghong #14. In it I got a little sarcastic-- well, a lot sarcastic-- about the whole affair: the diplomatic show, the speeches, the ship itself. I was just joking, folks-- I certainly didn't mean to attack China or start any Major International Incidents.

Well, someone out there in newsletter land took it the wrong way. He sent a letter of complaint to the president, who responded with a letter of apology. He's also asked various vice presidents on his staff to investigate, and develop ways to maintain greater "creative control" over UH newsletters.

I'd like to say, first, that I'm sorry that I offended anyone; that certainly wasn't my intention, and the article wasn't intended as an attack, personal, political or scholastic. I apologize for the misunderstanding.

But I do not apologize for the article itself, nor will I retract anything I said there in. As I said, nothing I wrote was intended as an attack, and I won't accept responsibility for the fact that some people took it that way. It was intended as simple reporting on the event, coloured-- as are all of the stories I've been running in this MOPzine for the past year and a half-- by personal impressions, opinions and humor. I reported on what I saw: though I take the research the ship is doing seriously, aspects of the whole shindig struck me as humerous.

Second, let me remind all concerned that Seawords is a free speach organ for MOP; an outlet for news, information, and the creativity of the writers, hopefully presented in a manner which will entertain, inform and incite the readers. If I have to I'll state in every issue that the articles are written by myself, my assistant and the members of the Marine Option Program, and do not necessarily reflect the official views of the University of Hawaii.

The comments in that article-- as in other articles written in the past and future-- were intended in a humerous vein. Someone's takeing all this far too seriously. Before this response grows longer than the original article, I'll end it, reminding you that it was written by

David Stroup,
editor

Markrich

from page 4

is rough and the neighbor island car rental business is founded on people flying from island to island, leaving their own cars behind. And he fears the impact that an Ala Wai ferry would have on the canoers who practice their hobby there.

All in all he's enjoyed writing "From The Sea" for the past three years-- it's given him a chance to see a side of island life he probably would never have touched otherwise. He's optimistic about the future, but believes that Hawaii must make an effort to recognize the value of the sea-- "Maybe that's my job," he added. He sees the "ocean as some family heirloom that's been passed down from one generation to the next, and now maybe people are waking up and noticeing that this is really valuable, and life just wouldn't be the same without it."

MOP Calendar

March

7 (F) WCC MOP Talk-- see Currents this ish.
7 (F) State TORCH Meeting, HIMAG Conference facility in Nuuanu
8 (S) Tour of Aquaculture facilities, Richard Fassler, Aqua Dev. Prog. For MOP and IS 261 Students-- see Sherwood.
11 (T) MOP First Aid Course, part one. 1800-2200 MSB 203.
12 (W) HTW Organizing meeting, 1630 in MSB 203.
13 (Th) MOP First Aid Course, part Two. 1800-2200 MSB 203.
14 (W) MOP fish ID course starts with Alan Tomita. Evenings, MSB 203.
15 (S) MOP Research Dive Checkout, Oahu.
15 (S) BML Hike, Hanauma Bay to Blow Hole, 0730-1230.
18 (T) Happy Birthday to Dr. Davidson
19 (W) MOP CPR Class, MSB 203.
19 (W) Hawaii's Marine Resources and You. Rep. Peter Apo, 1930 at the Waikiki Aquarium.
22 (S) UHM MOP Fieldtrip to Alan Davis Beach-- see Randy Harr
22 (S) MOP Dive Team management Class.
22 (S) TORCH Whalewatch on Maui
25 (T) President Simone's Inauguration
24- 29 SPRING BREAK
24- 28 Pacific Congress on Marine Technology Princess Kaiulani Hotel in Waikiki.
26 (W) Kuhio Day
28 (F) Good Friday
30 (Sun) Easter

April

1 (T) In IS 261: Paddling My Own Canoe, Audrey Sutherland, Explorer and Author.
3- 4 Tester Symposium, held this year at CC 307-8
4 (F) Deadline to qualify for HTW stipend.
5 (S) MOP Fieldtrip to Kawainui Marsh.
7 (M) First Poolside meeting, Alan Hong's Open Water scuba class.
10- 11 State High School Science Fair, Blaisdell.
16 (W) Encounters With a Living Fossil (the Nautilus). Bruce Carlson, Waikiki Aquarium, 1930 hours.
17 (Th) High School Marine Symposium at Hawaii Prepatory Academy.
19 (S) Hui Wa'a Canoe Regatta (Magic Island).

Indicates MOP/ BML Event.

University of Hawaii
Marine Option Program
1000 Pope Road Rm. 229
Honolulu, Hawaii 96822

George Balasz
National Marine Fisheries Serv.
2570 Dole St.
CAMPUS MAIL

SOUTHWEST FISHERIES CNTR
HONOLULU LABORATORY
2570 DOLE STREET
HONOLULU HI 96822-2396

April 2, 1987 F/SWC2:GHB

Ms. Kristen O'Brien
Marine Option Program (MOP)
University of Hawaii at Hilo
Hilo, HI 96720-4091

Dear Kristen,

I am writing to formally express my appreciation for the important role you played in initiating and organizing the recent MOP/NMFS cooperative turtle tagging expedition to Punaluu Bay. The trip was exceedingly well planned and carried out with great success. I was very pleased with the biological data collected, and feel certain that all of the students benefited from this educational experience.

Again, many thanks for your involvement and conscientious work.

Sincerely,

George H. Balazs
Zoologist

GHB:ey
cc: Balazs
HL

January 6, 1985 F/SWC2:GHB

Ms. Diane Hazarakis
Student Coordinator
Marine Option Program
University of Hawaii at Hilo
Hilo, HI 96720-4091

Dear Diane,

I am writing to formally express my appreciation for the important role you played in coordinating and helping to successfully carry out our NMFS/MOP green turtle study at Punaluu Bay. Some exceedingly important biological data have been collected over the past year as the result of this cooperative project. In addition, I am certain that all 16 of the student participants benefited substantially from this educational fieldwork experience.

Again, many thanks for your involvement and conscientious, quality work.

Sincerely,

George H. Balazs
Zoologist

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

March 30, 1987 F/SWC2:GHB

Dr. Walter Dudley
Coordinator
Marine Option Program
Division of Natural Science
University of Hawaii at Hilo
Hilo, HI 96720-4091

Dear Walt,

Just a brief note to tell you how tremendously pleased I am with the outcome of our recent cooperative MOP/NMFS turtle netting expedition to Punaluu Bay. Some excellent data were collected on growth rates extending over a 3-year period (see attached). In addition, it was my impression that all of the students and faculty benefited substantially from this field-work experience. Furthermore, they appeared to have a very enjoyable (although exhausting!) time in the process.

Please pass on my gratitude, compliments, and best regards to everyone who contributed to make the project such a great and safe success.

Sincerely,

George H. Balazs
Zoologist

Attachment

cc: Sherwood Maynard
Director, MOP

Bill
I've told
Him "O.K. - great" by phone

GB + Robt
- Hilo airfare
- van rental
- gear shipment

University of Hawaii at Hilo

COLLEGE OF ARTS AND SCIENCES
DIVISION OF NATURAL SCIENCES

February 3, 1987

Mr. George Balazs
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

Dear George,

I have gotten together with the students and we have set March 23, 24, 25 as the days for the turtle expedition. That avoids the weekends and Kuhio Day (26th). We are requiring the students to go through First Aid and CPR and chip in for food, etc.

We have the pavilion at Punaluu reserved. All we need is a confirmation from your end. Please let us know something as soon as possible. The students are giving up their Spring Vacation for this once in a lifetime experience with Uncle George. Hopefully the bureaucracy won't let them down.

We await your reply.

Aloha,

Walt

HILO, HAWAII 96720-4091 TEL: (808) 961-9383

September 4, 1984 F/SWC2:GHB

Mr. Ian Bowman
Manager and Vice President
Kau Agribusiness Inc.
P. O. Box 130
Pahala, HI 96777

Dear Mr. Bowman:

With the consent of your staff members, Mr. Bud Doty and Mr. James Frazier, on August 22, I was able to conduct a survey of hawksbill sea turtle nesting activity at Kamehame Hill. This work was undertaken as part of our cooperative sea turtle research project with the University of Hawaii Sea Grant Program and the Marine Option Program at the Hilo campus. I am writing to express my appreciation for the permission that was given by your staff.

I would also like to take this opportunity to send you the enclosed articles describing the conservation status and biology of Hawaiian sea turtles, with special emphasis on the Kau District. The coastline of your area, particularly Punaluu Bay, constitute key foraging pastures for the green sea turtle.

Sincerely,

George H. Balazs
Wildlife Biologist

Enclosure

GHB:ey
cc: Balazs
HL

Male and Female Rocks

Tales of Old Hawai'i

By Russ Apple

NINOLE, Ka'u, Hawai'i — Now famous for its C. Brewer golf course, condominiums and homes, when Hawaiians alone ran Ninole it had a living legend; Hilo'e, one of its two fishponds had unusual clientele, and a Ninole beach was famous for its unusual rocks.

At Ninole lived a cannibalistic water lizard, a *mo'o* named Kai-kapu. Her pretty granddaughter lured unwary visitors in ancient times to her grandmother's cave.

Kai-kapu ate them raw.

If Kai-kapu is still around today, she has changed her diet. Perhaps she sends her pretty granddaughter out nights to collect her raw food along the fairways. If so, her new diet may explain all the lost golf balls.

At least, there are no reports of missing golfers.

Unusual and exclusive clientele for Hilo'e fishpond at Ninole were the *kauwa*, the caste of untouchable Hawaiians who lived apart and were drawn upon for human sacrifices.

Ninole's untouchables lived inland and upslope. They were permitted to fish from Hilo'e and to obtain fresh and brackish water for drinking and poi making from one of the nearby springs.

PRIVILEGES SUCH as this were granted to the Ninole kauwa to prevent them from ritually polluting fishing and water areas used by other Hawaiians.

Other Hawaiians had the use of the larger Ninole fishpond and its nearby springs.

Hawaiians also had the use of Ninole's rocks.

Koloa beach, between Ninole and Punalu'u, was the home of multiplying rocks. It was also a place to gather stones for use in sling shots and to gather stones used in the Hawaiian checker-like game of *konane*.

Black konane "men" were pieces of basalt; white "men" were of bleached coral. Both had been rounded and polished by the action of the waves on Koloa beach.

When stones mated, the offspring were powerful indeed.

Naturally rounded and polished beach stones were also collected for use in slings. Some of the beach rocks were also dense and hard enough to be finished into small adzes.

But the best known use of Koloa's rocks involved the priests — priests who could tell a male beach rock from a female beach rock.

Not only must a priest be able to determine sex in rocks, but be able to tell which stones should be deified.

GODS MADE FROM Koloa beach rocks presided at games all over the Island.

Male and female rocks, selected as potentially able to cause their owners to win at games and betting contests, were taken by the selecting priests to the nearby temple Ka'ie'ie for the ceremonies which transformed them into gods.

Just how owners qualified for possession of the gods is not known, but the owners got the new gods-of-the-games and tried them out.

If the owners were successful, the fame of the gods (and of Ninole and the priests) was established. But if there were a series of failures in games and bets, the Ninole rocks were either broken or just thrown away in contempt.

Now sex rears its head.

Ninole priests presented each new owner with two rocks, one male, one female. Owners kept them wrapped between games and bets in the folds of kapa — bark cloth.

Successful stones mated. After due time a small stone would be found in the folds of cloth with the large stones. When this stone grew to be the size of its parents, it was taken to the temple for deification.

Second generation game gods were believed to be more powerful than first generation.

Hawaiians called the multiplying stones of Ninole *'ili'ili hanau*.

Blame coastal subsidences in 1868 and 1975 for destroying Koloa beach at Ninole. It and its rocks are now underwater.

University of Hawaii at Hilo

COLLEGE OF ARTS AND SCIENCES
DIVISION OF NATURAL SCIENCES

December 1, 1986

Mr. Bill Gilmartin
Program Leader, Endangered Species
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

Dear Mr. Gilmartin:

Two years ago many of the Marine Option Program students at the University of Hawaii at Hilo had the opportunity to participate in a study of the Hawaiian Green sea turtle under the direction of Mr. George Balazs. They were given, what is all too often, the rare experience of working with a serious professional scientist on a timely, important project. This study had a profound impact on these students, and several went on to graduate study or careers in scientific research, in no small part as a result of their experiences in the study.

There are now plans for intense development in the Kau District at Punaluu on the Big Island, adjacent to a prime feeding area for the sea turtles. It occurred to us that this might be an ideal opportunity to provide more current information on the sea turtle population and at the same time give a new batch of students the opportunity of working with Mr. Balazs.

We hope that you will consider our proposal and allow Mr. Balazs to work with us once again. Please contact me if you have any questions or if I can provide additional information.

Sincerely,

Walt Dudley

Walter C. Dudley
Coordinator, UHH
Marine Option Program

HILO, HAWAII 96720-4091 TEL: (808) 961-9383

Oct 21, 85

Dear Mike & George

Thanks so much for the help you gave us when we found the Turtles. It was nice to know there was someone to call. I would have been real upset if we did something wrong.

I hope you enjoy the pictures. The babies did great & were real full of energy. I was surprised how their instincts just make them do the right thing. We wanted to stay & watch but we didn't want the flash light to confuse them.

We were going to let them go at Punaluu Beach & Horse shoe but there were to many people around so we took them to the other beach because it was more secluded.

We took video pictures so we could watch them forever. We have a 1 year old Natasha who got a big kick out of real live little turtles

Thanks Again
for the help & Info.
Dick, Linda & Tasha Galiz

HATCHLING HAWKSBILLS

from - Barrere, Pukui & Kelly 1979/80 -85-

BPBM Bull. #30 (Bishop Museum)

Opening Prayer for the Hula Pahu

Ke akua uwalo i ka la'i e,	The god who shouts aloud in the calm,
E hea wale ana iluna o Puaa-hulu-nui,	Is calling from the heights of Puaa-hulu-nui,
Ke akua pee i ka lau kiele,	This is the god that conceals himself amidst the kiele leaves,
O'u makua i kui lei,	Who strung the wreaths (of honor) for our forefathers to wear.
E Kui no oe a e lei no makou a.	String us wreaths that we, too, may wear.

Kalani Kamanomano

Eia o Kalani ka-manomano	Here is our chief, our sacred one,
Ka manomano heke o ke kapu,	He of the strictest kapus.
Ka honu peekua wakawaka,	A turtle with a horny shelled back,
Pipii ka unahi ma ke kua,	With scales up the back,
Hiolo ka unahi ma ke alo,	Scales down the front,
Ma ka maha opi o Kalani,	Close to his wrinkled jowl.
Kalani ka hiapo, kama kapu,	The chiefess is his first-born child, a sacred child,
Hanau mua o Hawaii,	First-born chiefess in Hawaii,
Ka ilio nukea ma ka lani,	A white-fanged dog in the heavens,
Eia la ke o nei.	We sing of her always.

This hula chant was said to have been composed by a god. This is the legend to which it belongs:

A beautiful young, kapu chiefess of Kauai was noticed to be continuously drowsy all day and when night fell, she was eager to retire into her private sleeping house and go to sleep.

Her father questioned her, but finding no satisfactory answer, consulted his kahunas. They told him she was in love with a sea god and that if he wished to see him for himself to set guards at intervals from her house to the shore. These guards were to maintain a perfect silence and when the god left just before the break of dawn, to gesture to the next one farther on when he had passed.

The chief and his kahunas were on the shore to see which form he would take before going out to sea.

Just before the dawn, a hand was seen to move to one side the mat that covered the doorway of the chiefess' sleeping house and a handsome youth emerged. He walked quickly to the beach and there he vanished. As he passed, a guard signaled by gesturing to the next guard that he was going that way.

The watching chief saw the youth vanish among the vines that grew over the sand and soon a huge, scaly and thick shelled turtle was seen to move toward the sea and swim away.

The following night the chiefess waited in vain for her loved. He did not come in person but instead he appeard to her in a dream and said, "You will never see me any more for I was seen by many eyes when I left you last night. When our child is born name her Honu (Turtle) for me. Listen, this is the name chant that you must sing for her and for her descendants, for she is both of divine and royal rank." This is how the chant "Kalani kamanomano" came into being.

The hula pahu was and is a hula of dignity and never danced for the pleasure of a ribald crowd.

Kamakau, in his story of Kamehameha I, tells of Kaahumanu's rank and of her descent from the high chiefs of Hawaii, Maui, Oahu, and Kauai and ends it with this phrase, "He honu peekua wakawaka o Kaahumanu," (a thick shelled turtle was Kaahumanu) or in other words, a descendant of this turtle god.

In the olden days the priests scanned the sky for signs and omens, and if the ever-changing clouds assumed the shape of a dog with bared fangs facing the land with tail on the seaward side, it foretold the coming of invaders that would slaughter and abuse the people, but if the dog-shaped cloud faced the sea with fangs bared, then the inhabitants, under the leadership of their

chiefs, would be able to repel and defeat any invaders that dared to attempt an invasion. "A

MASTER

Report for Scientific Collecting Permit No. SCP 84-18
Submitted to State of Hawaii, Division of Aquatic Resources

Date	Tag No.	Sex	Straight-line carapace (cm) Length	Width	Location
11/5/83	6707-08		55.0	45.3	Leleiwi Pt.
11/5/83	6709-10		47.5	40.0	Leleiwi Pt.
9/24/83	7209-12	M	84.1	62.7	Leleiwi Pt.
9/24/83	7213-16		69.8	53.3	Leleiwi Pt.
11/26/83	6711-13	M	80.3	--	Punaluu
11/26/83	6714-17		71.1	56.3	Punaluu
11/26/83	6718-21		69.3	54.3	Punaluu
11/27/83	6722-25		73.3	57.5	Puhi Bay
12/03/83	7528-30		45.4	34.8	Puhi Bay
12/15/83	3519-20		62.3	58.9	Punaluu (hawksbill released from the Waikiki Aquarium)
12/15/83	7529-32		61.0	50.4	Punaluu
12/17/83	2877, 2879, 7533		60.2	48.7	Punaluu
12/17/83	7534-36		68.2	52.8	Punaluu
12/17/83	6711-13	M	80.3	--	Punaluu (recapture from 11/26/83)
12/17/83	7537-39		56.1	42.7	Punaluu
12/17/83	7540-42		56.3	45.2	Punaluu
12/17/83	7543-46		73.7	58.5	Punaluu
12/18/83	7547-49		63.9	53.1	Punaluu
12/18/83	7550, 7570-71		66.4	52.0	Punaluu
12/18/83	7573-74	M	--	--	Punaluu
12/19/83	7572, 7575-77	M	85.2	66.8	Punaluu
12/19/83	7578-80	F	85.8	66.0	Punaluu
1/08/84	2514-15, 7593-94		78.0	61.8	Punaluu
1/08/84	7595-96		46.7	38.6	Punaluu
1/08/84	7597-98		58.8	56.5	Punaluu
1/08/84	4966-69		69.0	56.5	Punaluu
1/09/84	7589-92	M	79.1	63.6	Punaluu
1/09/84	7585-88	F	89.3	73.0	Punaluu
1/09/84	7581-84	M	81.2	63.3	Punaluu
1/09/84	7537-39		--	--	Punaluu (recapture from 12/17/83)
1/09/84	7599, 7600		51.6	42.0	Punaluu
1/09/84	5501-04		75.3	61.8	Punaluu
1/09/84	7534-36		--	--	Punaluu (recapture from 12/17/83)
1/10/84	7601-03		62.8	49.0	Punaluu
1/09/84	7604-05		48.4	39.6	Punaluu
2/17/84	7624-25		41.3	33.0	Punaluu
2/17/84	7622-23		47.7	37.2	Punaluu
2/17/84	7620-21		45.2	38.0	Punaluu
2/18/84	7613-16		73.5	58.5	Punaluu

Date	Tag No.	Sex	Straight-line carapace (cm) Length	Width	Location
2/17/84	7617-19		62.0	51.8	Punaluu
2/17/84	7606-09		68.0	56.2	Punaluu
2/18/84	7630-33	M	88.8	68.1	Punaluu
2/18/84	2875-76, 7638		61.5	50.0	Punaluu
2/18/84	7639-40		44.1	36.5	Punaluu
2/18/84	7641-43		63.5	48.0	Punaluu
2/19/84	7634-37	M	84.5	66.3	Punaluu
2/19/84	2523-24, 7644		65.5	53.0	Punaluu
3/17/84	7645-47		53.3	41.5	Honolii
3/24/84	2877, 2879, 7533		61.1	49.3	Punaluu (recovery from 12/17/83)
3/24/84	7601-03		63.3	48.9	Punaluu (recovery from 1/10/84)
3/24/84	7648-50		73.2	59.2	Punaluu
3/24/84	7652-53		61.9	50.5	Punaluu
3/25/84	7654-56		71.6	57.8	Punaluu
3/25/84	7657-59		63.8	49.2	Punaluu
3/25/84	4966-69		69.3	57.5	Punaluu (recapture from 1/8/84)
3/25/84	7660-62		74.5	60.7	Punaluu
3/25/84	7663-64		55.0	43.1	Punaluu
3/25/84	7665-67		77.6	63.8	Punaluu
3/25/84	7672-73		44.5	37.0	Punaluu
3/25/84	7668-71		78.9	64.5	Punaluu
3/25/84	7674-77	M	84.0	62.5	Punaluu
3/25/84	7604-05		48.7	39.8	Punaluu (recapture from 1/10/84)
3/26/84	7681-83		58.0	25.2	Punaluu
3/26/84	7678-80		61.9	51.2	Punaluu
3/26/84	7622-23		47.9	36.9	Punaluu (recapture from 2/17/84)
3/26/84	7684-85		52.4	42.0	Punaluu
3/26/84	2896-97		69.5	--	Punaluu
3/26/84	6714-17		71.8	56.2	Punaluu (recapture from 11/26/83)
3/26/84	2523-24, 7644		66.2	52.7	Punaluu (recapture from 2/19/84)
3/26/84	2885, 7686-88		75.7	60.0	Punaluu
3/26/84	7689-91		68.1	54.0	Punaluu
3/26/84	7692		38.1	30.1	Punaluu
3/27/84	7693-96		77.6	63.9	
3/27/84	7697-7700	F	89.5	66.0	Punaluu
3/27/84	7701-02		59.0	47.5	Punaluu
3/27/84	7572, 7575-77	M	--	--	Punaluu (recapture from 12/19/83)

Date	Tag No.	Sex	Straight-line carapace (cm) Length	Width	Location
3/28/84	7703-06	F	81.5	62.5	Punaluu
3/27/84	7707-10		75.7	60.9	Punaluu
3/31/84	7711-12		52.1	41.9	Honolii
3/31/84	7713-14		41.2	33.5	Honolii
4/13/84	7749-50		55.8	--	Punaluu
4/13/84	7639-40		44.5	--	Punaluu (recapture from 2/18/84)
5/14/84	7715-16		39.8	30.9	Punaluu
5/14/84	7715-18		41.0	32.5	Punaluu
5/14/84	7721-22		57.4	46.0	Punaluu
5/14/84	7719-20		51.2	41.4	Punaluu
5/14/84	7634-37	M	--	--	Punaluu (recapture from 2/19/84)
5/15/84	7723-24		51.9	41.2	Punaluu
5/16/84	4966-69		69.8	57.0	Punaluu (recapture from 1/8/84 and 3/25/84)
5/17/84	7678-80		62.2	52.6	Punaluu (recapture from 3/26/84)
5/17/84	7620-21		46.1	38.2	Punaluu (recapture from 2/17/84)
5/17/84	7725-27		63.2	51.8	Punaluu
5/17/84	7728-29		37.8	32.0	Punaluu
6/26/84	7630-33	M	--	--	Punaluu (recapture from 2/18/84)
6/26/84	7581-84	M	--	--	Punaluu (recapture from 1/9/84)
6/26/84	7730-31		C47.0	C44.5	Punaluu
6/16/84	7732-33		C50.5	C43.6	Punaluu
6/27/84	2523-24, 7644		66.5	53.4	Punaluu (recapture from 2/19/84 and 3/26/84)
6/27/84	6182, 6242, 6260	F	91.1	--	Punaluu (recapture from French Frigate Shoals)
6/27/84	7537-39		57.4	43.7	Punaluu (recapture from 12/17/83 and 1/9/84)
6/27/84	7738-39		35.2	30.5	Punaluu
6/27/84	7740-41		58.5	47.2	Punaluu
6/28/84	7734-37	F	85.1	--	Punaluu
6/28/84	7578-80	F	84.9	--	Punaluu (recapture from 2/19/84)
6/28/84	7742-44		68.2	52.8	Punaluu
6/28/84	7745-47		66.7	53.6	Punaluu

Date	Tag No.	Sex	Straight-line carapace (cm) Length	Width	Location
8/08/84	3313-14		53.4	43.0	Kiholo
8/08/84	7751-52		38.3	31.2	Kiholo
8/08/84	7753-54		38.4	30.9	Kiholo
8/08/84	7755-56		42.7	35.7	Kiholo
8/08/84	7757-58		50.6	39.2	Kiholo
8/08/84	7759-60		53.6	42.2	Kiholo
8/08/84	3496-97, 7761		62.3	49.5	Kiholo
8/08/84	3478-80		69.6	53.3	Kiholo
8/08/84	7762-63		56.0	43.1	Kiholo
8/08/84	7764-65		62.6	50.0	Kiholo
8/08/84	3487-88		68.0	52.2	Kiholo
8/08/84	7766-67		48.3	36.2	Kiholo
8/09/84	7768-69		42.1	34.3	Kiholo
8/09/84	7770-71		38.0	31.9	Kiholo
8/09/84	7772-73		53.0	44.2	Kiholo
8/09/84	7774-75		53.0	41.3	Kiholo
8/09/84	7776-77		52.8	41.1	Kiholo
8/09/84	7778-79		57.8	47.0	Kiholo
8/09/84	7780-81		65.7	52.9	Kiholo
8/09/84	3317-18, 7782		63.5	48.3	Kiholo
8/09/84	3313-14		--	--	Kiholo (recapture from 8/8/84)
8/09/84	3478-80		--	--	Kiholo recapture from 8/8/84)
8/30/84	3496-97, 7761		62.1	--	Kiholo (recapture from 8/8/84)
8/30/84	7768-69		42.1	--	Kiholo (recapture from 8/9/84)
8/30/84	7766-67		48.2	--	Kiholo (recapture from 8/8/84)
8/30/84	7751-52		38.5	--	Kiholo (recapture from 8/8/84)
8/30/84	7783-84		40.0	--	Kiholo
8/30/84	7785-86		51.2	39.8	Kiholo
8/30/84	7787-88		51.2	41.0	Kiholo
8/30/84	7789-90		59.8	46.7	Kiholo
8/30/84	3499-3501		66.3	53.0	Kiholo

October 1, 1984

Dr. Jack Davidson, Director
Sea Grant College Program
University of Hawaii

Dear Dr. Davidson:

Enclosed is the final fiscal report for project MR/R-26. A deficit of $642, or 4%, occurred in the project. While this is not as great as initially computed two weeks ago, it is nevertheless very disturbing to me, as I am sure it is to you. I accept full responsibility.

While there are no excuses to justify this deficit, aside from the fact that I should have paid closed attention to the last month's spending, I want to mention several unforeseen and contributing factors experienced during the project.

1) the need to pay for 5 students to be certified by the University of Hawaii for scuba diving ($410 to the UH Medical School and $300 in air fare to fly students between Hilo and Manoa).
2) the need to rent vehicles more often than anticipated, rather than use State-owned ones from the UH-Hilo campus.
3) the higher than anticipated cost of supermarket food to feed groups of students adequately during field trips.
4) the last-minute unexpected need to carry out field work at an alternate study site, following the discovery of illegal turtle catching of our tagged turtles at the prime study site (Punaluu).

I should also mention that my travel-claim form for the last field trip (Aug. 29-31) was not filed due to the suspected deficit. On that trip, I spent approx. $60 in personal funds, which I am now willingly donating to the project.

I hope that it will somehow be possible for Sea Grant to cover the deficit of this project. Thank you for your consideration of this request.

Sincerely,

George H. Balazs

UH HILO MARINE OPTION PROGRAM NEWSLETTER

March 6, 1984

Hi George,
Quick note.
miles said → We only have 5 TURTLE TAGS LEFT.

THE BOAT SHED AFFAIR

Friday, March 16, we'll all meet down the boat shed @ 3:30 pm; Party a little, Have a good time, and Move a few boats. Fun, Fun, Fun for all.

TURTLE PROJECT

There is a Turtle tagging expedition scheduled over Spring Break, March 23 - March 28. There is a sign up sheet in the MOP office, and it is a must to sign up as soon as possible. It's not necessary to be there every night but you'll need to be there for the nights you signed up for.

If you are interested in tagging Turtles, come in and talk to someone in the office. We'll try to get you on. There will also be a new position that doesn't involve getting wet, it is to record sightings at Turtle Bay.

CORAL I.D.

There will be a Coral Presentation by Dave Clements, Coral Identifier Extraordinaire on March 13 at 7:00 in L.S.16. Scheduled especially for Maui Transect people and Richardson's Ocean Center people but the public is invited. Come on, Get edjucated.

YOU DO HAVE A VOICE IN MOP

We're ordering T-shirts. Let your preferences be known. French cut, w/pockets, w/o pockets, screen front, screen back, screen front and back. This is for MOP T-shirts and Turtle shirts.

DO YOU LIKE PEOPLE

Did you always want to be more involved in MOP- know what's happening, when it's happening. We've got a job for you.

The MOP office has a position for someone who can help with office work and program coordination. Contact Diane 961-9544.

PROFOUND THOUGHTS

Does E still equal MC^2 20,000 leagues under the sea?

Summer Opportunity

The Hawaii Department of Aquatic Resources will continue it's investigation of fisheries resources in the Northwest Hawaiian Islands. There are 4 positions available to MOP students.

The Project will be from mid-June to near the beginning of the fall 1984 semester, with the possibility of a $100.00 a week stipend. An important part of this project is 30 days at sea aboard the R/V Kila, hauling and tagging Ulua. To apply submit a letter reviewing qualifications and interest with your resume and names, addresses, and phone no. of three reference people to Sherwood Maynard, MOP Director. Deadline is April 9.

SINCE JANUARY :

We've accepted 13 new students and a skill project proposal from a second semester MOP student entitled Ahi Stomach Analysis.

Our Green Sea Turtle Project tagged 26 turtles leaving Principal Investigator George Balazs delighted.

Our Richardson's Ocean Center Self-Guided Underwater Trail team's effort has been outstanding and exceptionally productive. Much of the field data has been generated; the next step being correlation and computation of the in situ survey.

The Tsunami Video Project is nearing completion and will be viewed in Honolulu during March by U.N.E.S.C.O and in June, also in Honolulu, at the Civil Defense Preparedness Seminar.

The Puna Canyon Project's 3-D bathymetric map is being cut and formed to specifications by Stephanie Salazar, while Jackie Johnson Debus of the Performing Arts Department and Walter, our MOP coordinator, are finishing up the script.

We've acquired a new 16' boat, bringing our total boat resources, not counting the zodiac, to three. The boat shed is now something to be proud of and so is the maintenance of the equipment.

The Small Scale Commercial Fishing Feasibility Study is in a holding pattern due to the seasonal migration of Ahi to South Point and out of range of the Patti-Jo.

Two skill projects have come to an end since January. Our disc jockey featuring Public Radio Broadcasts of Marine Topics has retired her radio position and is currently developing the Puna Canyon 3-D map and preparing the Tsunami radio spots for use at the Civil Derense Seminar.

The Nearshore Marine Sediment Identification Project has been completed and the data is being compiled into a report for the State.

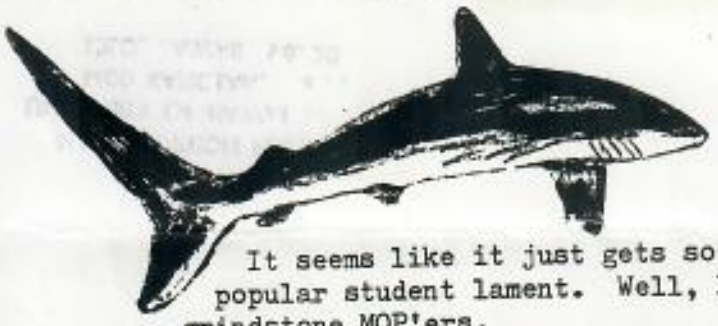
All in all we've gotten a great deal done but still have a great deal to do.

MARINE OPTION PROGRAM
UNIVERSITY OF HAWAII AT HILO
1400 KAPIOLANI STREET
HILO, HAWAII 96720

HILO MAR 14 '68 HAWAII U.S. POSTAGE .20

George Balazs
N.M.F.S.
Honolulu Laboratory
Box 3830
Honolulu HI 96812

UH HILO MARINE OPTION PROGRAM NEWSLETTER



NOVEMBER 28, 1983

It seems like it just gets so busy towards the end of the semester. Aye!! A popular student lament. Well, here's some fun facts for all you nose-to-the-grindstone MOP'ers.

MOP WANTS YOU

Stay tuned to KIPA radio for our 1 minute Public Service broadcasts. Listen to your own voice - write a 1 minute spot about humpback whales, turtles, big surf, anything timely and marine oriented and we'll let you record it.
What a chance - Your big break.

MORE SCUBA INSTRUCTION

Swim with the fish. A scuba class has been scheduled to begin December 17 and will run through January 8. Sign up immediatly! Space is limited - for more information drop by the MOP office or call 961-9544.

SKILL PROJECTS

An encouraging word to Mike Slattery and Leslie Kaholoaa who are diligently working on the Economic Aspects of Small Scale Commercial Fishing in Hawaii.

Bon Courage! Ijeva Bambridge with your work on an aquaculture feasibility plan for raising prawns.

And all you folks, if you need ideas or incentive for skill projects ... We've got it all.

TURTLE PROJECT

Members, please contact Willy at the MOP office concerning your participation in the December netting and camping activity at Punaluu. You'll need to give the date and time of your last exam. Leave messages in Willy's box in the MOP office. Your expedience is necessary to facilitate the camping logistics.

HELP

On another note, if you have not already read the turtle literature from Georg
Your time is coming...

Stipends are available for people especially interested in Hawaiian cultural relationships with sea turtles. The main goal as an interviewer is to properly record for history Hawaiian interactions with the Green Sea Turtle. This could be a skill project too, See Diane or call 961-9544.

LUCKY YOU

The new MOP T-shirts are in. We're talking browns, greens, blues, turquoises', burgundys', champagnes'... Fantastic. Men's $6.00 / Women's $7.00

MARINE OPTION PROGRAM
UNIVERSITY OF HAWAII AT HILO
1400 KAPIOLANI
HILO, HAWAII 96720

George Balazs
Box 3830
Honolulu, HI. 96812

UH HILO MARINE OPTION PROGRAM NEWSLETTER

OCTOBER 11, 1983

NEWS, NEWS, NEWS, NEWS, NEWS, NEWS, NEWS...

TURTLE PROJECT

All students planning on participating on the Turtle Project are required to have completed CPR training within the last year. An eight hour course was offered this past Saturday, Oct. 8. Two more classes will be offered by the American Red Cross this month. The American Red Cross is located at 55 Ululani St. their number is 935-8305, the cost of the one-year certification is $10.00. Be sure to get the class.

On October 21 we will be having a night snorkel at Richardson's for turtle project members. Meet at the MOP office at 7:00pm. Bring your snorkeling gear.

A schedule of Turtle Project dates is in the works and should be out soon.

PROJECTS

Training and stipends will be available for two student positions during the Fall semester to assist Dr.Dudley in lab experiments studying sediment from around the Big Island. The lab assistance can be applied towards a skill project, see Dr. Dudley in W-19.

A Tuna and Squid study will be undertaken by Dr. L. Hallacher during the Fall semester. Interested students, in need of a skill project are encouraged to contact Dr. Hallacher.

SCUBA INSTRUCTION

The SCUBA class has been scheduled to begin on Wed. Nov. 23 at 6:00p.m. The first class will meet at the Y.W.C.A. swimming pool. You must bring your own mask, fins, and snorkel, all other equipment and books will be provided. Sign up immediately.

PARTY!! MEET THE DIRECTOR

Saturday, October 22, Dr. Sherwood Maynard the Director of the Marine Option Program will visit Hilo. We'll meet at ~~Bayfront~~ to barbecue and do some sailing. Potluck pulehu. Write this one on the calender!! Last minute change-to meet at Reed's Bay.

MAHALOS

A very large Mahalo to everyone who assisted [illegible] Thanks Dr. Dudley for your footage of the Islands during your sailing adventures and [illegible] Hallacher for thoughtfully showing the Humpback Whale movies.

Listen carefully and you will hear...

Seawords

News of the Marine Option Program — University of Hawaii

March 15, 1984 Issue 4

Turtles on the Big Island

BY NANCY BERNARD

MOP GOES TURTLING ON THE BIG ISLAND

The Turtle Project contingent of Hilo MOP has just returned from a long week-end of tagging turtles at Punaluu, on the south side of the Big Island. Luckily for us (once again), we had beautiful weather. We keep hearing rumors about the cold, strong winds that come tearing down the slopes of Mauna Loa, but all we've seen so far are sunny, clear days and calm, moonlit nights. It's almost worth getting up to watch the turtle nets at 2:00 a.m. when you know there is a big, beautiful full moon, swaying palm trees and a gently lapping sea. Of course there is always the ever present reality that at any minute you might be forced to climb into soggy swim suits just to wrestle a 250 lb. turtle that is caught in the net.

It's all good and fun, however, and very much worth it, even after you look through the binoculars and spot the flippers flashing about in the moonlight. OH! OH! Another turtle bites the net. You put down the binocs and turn to your buddy; "Should I wake up George or Chris this time?" knowing that George hasn't slept more than an hour all night and Chris just got off watch at 3:00 a.m. Guiltily I run back to the pavilion and shake Chris awake; it's 3:30 a.m. "Hey Chris, wake up, there's a BIG one in the net!" Chris looks at me in shock and disbelief. "YOU weren't supposed to check for another ten minutes". Poor Chris, up again just so he can plunge into the icy cold water.

Meanwhile, back on the beach, the others are suiting up: two people to pull the turtle out of the net and one to hold the light. Chris comes back half asleep and the three of us swim out to the net. To our surprise, we discover another turtle stuck in the net! WOW! that makes six turtles caught tonight. After forty-five minutes both turtles are on the beach lying on their backs next to the other previously caught turtles. There they will rest for the duration of the night, all in a line like beach chairs on the French Riviera, waiting to be tagged, measured, and weighed.

CONTINUED ON PAGE 2

We don't know why the cat is smiling, but if you do, send us your ideas. Most creative and humorous reply WINS a MOP T-shirt. Send your offbeat thoughts to the address on page 4.

DEADLINE: APRIL 16, 1984

MOP, Money & the Legislature

There are currently several bills at the Legislature which have some marine related significance. If you would like to check on their status, call Sherwood at 948-8433.

The bills are: [P.E.D. 109] (Executive Budget Request for DPED) -- General support for Marine Programs. $30,000 designated for MOP and $25,000 for BML ship charter. [H.R. 154 & H.C.R. 63] -- Request for UH, DOE, DPED to prepare a status report on Marine Education needs to 1990. A long-term approach to examine MOP's needs. [H.R. 5] -- Requesting the designation of an official state fish. This would require MOP and the Waikiki Aquarium to investigate past fish with significance to the state and do public opinion surveys. [H.B. 2265]-- $86,266 for BML. This is an appropriation bill which would get BML back on its feet. Without this money BML could be shut down in May.

[H.C.R. No. 35] Requesting a status report on the Big Island ocean recreation and tourism project. This bill relates to the development of the Big Island as a recreation designation.

MTW Update

By Scott Levesque

This will be the last SEAWORDS before MTW III, so read carefully if information herein is applicable.

If you have personal equipment that you wish to be shipped with the MOP equipment, you must bring it in by March 19. If you fail to do so, you will be responsible for the possible extra costs associated with shipping it yourself.

If you have not completed the required organism classes by now, I strongly suggest you at least make an effort to do so...not knowing the organisms puts you at a great disadvantage and the workshop will be nearly valueless to you in terms of gaining valuable transecting experience.

This is an official plea for boxes: big boxes, little boxes, medium sized boxes, ANY boxes that you can donate to our cause. We also need your help with packing. We can accommodate any schedule; just call 948-6000 and ask for Scott, Keith, or Mark. If we are not around, leave a message and we will gladly return your call. I am personally dissappointed in student involvement with regards to preparation for MTW and would be delighted to see the situation turn around.

Annie Orcutt is still in need of payments from many of the potential participants and would appreciate prompt rectification of that situation.

For those of you who are not entirely sure of what the MTW involves, below are listed some of the highlights of the schedule:

3/25---Coral Reef Biology and Dive Safety Lectures
3/26---Two SCUBA dives and Organism Review as well as a Small Boat and Outboard Troubleshooting lecture
3/27---Two SCUBA dives, Transecting Lectures and a Night Diving Lecture
3/28---Two SCUBA dives, Underwater Photography and a Tow dive
3/29---Two SCUBA dives, Fish Survey, Geomorphology Lecture and Search and Recovery
3/30---Two SCUBA dives, Data and Photo Analysis
3/31---Underwater Trail Work and "Remote dives"
4/1---Home again, jiggety-jig!

SEAWORDS

Published biweekly by the University of Hawaii-Manoa Marine Option Program. Supported by the UH Sea Grant College Program, the UH, and the State Ocean Resources Office.

Sherwood Maynard	Director	948-8433
Patty Bibby	Editor	948-6000
Scott Levesque	Assistant Editor	948-6000

1000 Pope Road, Room 203,
Honolulu, Hawaii 96822

TURTLING, con't.

Morning arrives. The breakfast crew prepares pancakes, fruit, cereal, coffee and hot chocolate. Ono grinds! Hilo MOP is really getting the gourmet food preparation down to a science; no one starves at the Punaluu Pavilion Diner. Head Chef Leon Hallacher really outdid himself this time: tacos for dinner, saimin and sandwiches for lunch, and french toast for breakfast.

After breakfast, the motly, half-awake group gathers on the beach to (as George puts it) "process" the turtles who are calmly sun bathing on their backs. The sun is already up and the turtles are looking quite hot. Diane pours water on their

CONTINUED ON PAGE 3

SKILLS IN THE SPOTLIGHT

By Patty Bibby

What will Leslee Yasukochi remember about Ke Kula Kai ten years from now? "Waking up early to go out on field trips!" she says. But the program that gives elementary to high school level students a greater knowledge of the ocean has also shown Leslee many other things.

A year ago Leslee, a junior in Zoology, came on board with MOP. She had expressed interest in Ke Kula Kai and when a Coastal Field Leader (CFL) dropped out, she filled that position.

As a CFL, she helped coordinate field trips with school age children; teaching them while on the outings and overseeing the logistics of an outer islands' field trip schedule.

Some of the skills she has acquired through her work with Ke Kula Kai have been a better ability to organize and "taking charge and learning to speak publicly," she says. Working with so many children gives her a "sense of responsibility."

"Teaching kids can really tire you out--one kid asks one thing and the other asks you something else. It's a lot of hard work," Leslee says. Yet, she continued, "There are a lot of rewards, seeing that they learned something you taught them is great."

UHM Equipment Charges:

Due to increased use and abuse of MOP equipment, deposits will be collected for borrowing MOP equipment commencing March 1, 1984.

The following categories are:

A. item worth under $10.00
deposit will be $5.00
charge per day: none
examples: goody bags, bait boxes

B. item worth $10.00 to $50.00
deposit will be $10.00
charge per day: $2.00
examples: dive lights, calculator, tape recorder

C. item worth $50.00 and up
deposit will be $15.00
charge per day: $3.00
examples: projector, BCs, tanks, regulators, cameras

1) CHARGES: are for maintenance costs.
2) DEPOSITS: will be refunded once equipment is returned. It is an incentive for returning equipment in good or better condition than borrowed. If equipment borrowed has repair and/or replacement charges greater than the deposit collected, the borrower will be liable for these costs.
3) REMEMBER -- MOP equipment is University property; if you do not return equipment or fail to fulfill financial obligations, the University will withhold graduation privileges, transcripts, and registration packets.

NOTE: Charges will be waived for equipment used during a MOP function--e.g. workshops and MOP-INs. Subsidy can be applied for in Skill Project budgets.

Skill Project Symposium

BY Scott Levesque

On Saturday, March 3, The First Annual (hopefully) Skill Project Symposium was held in MSB 114 from 8:00 a.m. to noon. Students from several campuses presented 15 minute slide shows and/or talks about their skill projects. This "meeting of the MOP minds" revealed the diversity of MOP students and their respective talents. All the presentations revealed a considerable amount of preparation time and effort. The following students are hereby officially commended by SEAWORDS for their presentations:

Molokai Coastal Resources Inventory, by Dave Gulko and Randy Harr (UHM)

Salinity: Its Relation to Baitfish, by David Wojcik (MCC)

Ka Moemoeā Kai (Ocean Fantasy), by Irene Kaho'okele, Kala Lindsey and Christine Spencer (WCC)

Application of Thyroid Hormone (T_3) and Anabolic Steroid Testosterone as Growth Promoters in the Aquaculture of Tilapia (Oreochromis mossambicus), by Robert Howerton (UHM)

Ke Kula Kai Coastal Field Leader Program, by David Gerken and Leslee Yasukochi (UHM)

Education and Curriculum Development in Marine Biology, Volunteer Docent Program: Sea Life Park. By Jane Van Hamnik (MCC)

Underwater Nature Trail at Olowalu, Maui, by Victoria Guarriello (MCC)

Lake Tegano- an Enclosed, Isolated Ecosystem, and the Environmental Impact of Tilapia Introduction, by Elisabeth Sedlak-Weinstein (UHM)

After the completion of the presentations, the judges (Sherwood Maynard, MOP Director), Ric Martini (MCC-MOP Coordinator), Annie Orcutt (UHM-MOP Coordinator), Lori Buckley (WCC-MOP Coordinator), and Jim Bell (UHM-MOPer) chose Ocean Fantasy as the best presentation. Irene, Kala and Christine received a $25 gift certificate to the UH Bookstore. The entire event was a success and perhaps, if you're lucky, you could become involved in the Second Annual Skill Project Symposium.

It's Ocean DAY Now

By Annie Orcutt, UHM Coordinator

The "Week of the Ocean" celebration has metamorphosed into a one day event to be held on Wednesday, April 18, from 10 a.m. to 2 p.m. in the Campus Center Mall.

Due to poor response from students and potential exhibitors, we have had to curtail the activities originally set for April 16-19. Furthermore, the ASUH Spring Fling made space logistics very difficult. Therefore, the need to modify our original plans arose.

The objectives of MOP's previous Ocean Fairs will continue. In addition, we will provide opportunities for public participation in ocean issues through petitions and informational booths.

MOP's Ocean Day will be kept at a scale that coincides with availability of manpower, space, and exhibitor interest. If you are interested in helping, please stop by my office, MSB 233, or call 948-8433.

UHH PEOPLE

Dave Clements will be attending UHM grad school, studying Biochemistry. Good job, Dave.

* * *

Leon Hallacher will tie the knot with Barbara Getas, in San Fransisco on March 24. Congratulations!

* * *

Diane Nazarakis, a UHH MOPer, will be the new student coordinator. Give her a call at 961-9544 if you have any MOP needs that should be addressed.

MTS Conference & STUDENT JOBS

The Hawaii section of the Marine Technology Society is cosponsoring The Pacific Conference on Marine Technology from Monday, April 23 to Friday, April 27 at the Kaiulani Hotel in Waikiki.

Speakers from throughout the U.S. and Pacific Basin will make presentations on: remote sensing and oceanographic satellites, ocean energy, GPS positioning and navigation, marine technology for fisheries and aquaculture, mineral resources, undersea vehicles and ocean robotics, offshore engineering, Pacific hydrography and bathymetry, artificial reefs, tsunami detection systems, marine economics and planning, marine education, D.U.M.A.-N.D., buoy technology and oceanographic instrumentation and marine transportation. (WHEW!) Dr. John Byrne, administrator of NOAA, will be the Keynote Speaker.

Special student registration rates are $10/day, $30 for the whole conference, but an exhibitor's area will be open to the public. For more information, contact the UH Center for Engineering Research at 948-8301

Now about the JOBS: Students are needed to work at the registration desk and to run the carousel projectors. Remuneration will be equivalent to about $5/hour. Times needed are: Registration Desk---4-6p.m. on 4/23, 7:30 a.m.-6:00 p.m. from 4/24 to 4/26 and 7:30 a.m. on 4/27. Projectionist--9 a.m. to noon and 1 p.m. to 6 p.m. on 4/23, 8 a.m. to noon and 1 p.m. to 6 p.m. on 4/25 and 4/26 and 8 a.m. to 9:45 a.m. on 4/27. If you can work any or all of these times, contact Sherwood @ 948-8433 (MSB 229). First preference will be given to MOP students who can put in the most time, have experience, and apply by April 6. Remuneration will be directly from the conference. These are not student help positions.

TURTLING, con't.

bellies to cool them off, and picks off parasitic turtle barnacles. Every inch of their turtle bodies are measured, then they're tagged and weighed and finally blood samples are taken so that their sex can be determined. Then the moment we've all been waiting for: freedom! The turtles are turned over on their stomachs and pointed towards the sparkling sea. On little flippers they charge to the water and fly through the surf, freedom at last!

Turtlers work at night so the daylight hours are mostly spent sunning on lounge chairs and picnic tables or sleeping in steaming hot vans. We all rest in anticipation of the two-hour night shifts. Two days of turtling can really be exhausting but it's always challenging and it's always fun. As the end of the week-end approaches we all prepare to leave. The nets are taken out of the water and then the long process of untangling the knots begins. Six turtles trapped in a net can really twist things up. After three hours of untangling and mending, the gear is packed up in various vans and cars and we're off! Another exciting weekend of turtling has come to an end.

[Ed. Note. "The Turtle Project" is headed by Dr. George Balazs, currently a wildlife biologist at NMFS Honolulu, and co-pricipal investigator with UHH MOP Coordinator Walt Dudley on this Sea Grant-funded study. Watch for future articles on the project by Rick Klemm in Makai and Mid- Pac's in-flight magazine.]

MOP CALENDAR

SPECIAL UHM-MOP EVENTS

MARCH

MARCH 26-APRIL 1--MAUI TRANSECTING WORKSHOP!! (SPRING BREAK, TOO)

APRIL

APRIL 18- MOP'S OCEAN DAY AT THE UHM CAMPUS CENTER MALL. CALL ANNIE AT 948-8433 FOR DETAILS.

MAY

MAY 10--MOP GRADUATION

March

21	Wednesday: Origin of the Hawaiian Islands--Hawaii's Place in the Pacific, Dr. Frank Peterson, Waikiki Aquarium Natural History Lecture Series, 7:30 p.m., Waikiki Aquarium foyer.
21	Wednesday: "The Late Great El Nino" Signa Xi Lecture by Dr. Klaus Wyrtki, 7:30 p.m. in St. John Rm 11.
23	Friday: Electron Microscope open house at UHM MSB 108, 9:30-1:00 p.m.
22,23	Thursday, Friday: Sea Grant Directors Council meets at the East West Center.
25-4/1	Sunday...Sunday: MAUI TRANSECT WORKSHOP (See MTW Update in this issue for details)
26	Monday: Kuhio Day--HOLIDAY!
27	Tuesday: HaSTA Board Meeting; 4:15 p.m. University High School Building 2 Rm. 207. Open to all members.
27	Tuesday: Sagafjord port call in Honolulu Harbor.
31	Saturday: "Fish and Seafood Cookery I" non-credit course offered at UHM. Call 948-8400 for details.

April

2	Monday: Last day to change "I" grades from Fall semester.
4	Wednesday: Earth Among the Planets, Dr. David Morrison, Earth Among the Planets Series. UHM Campus Center Ballroom, call 948-8263 for details.
5-8	Tues.-Sun.: National Science Teachers Association National Convention, Boston. Mass. NSTA Headquarters, 1742 Connecticut Ave., NW Washington DC 20009.
10	Tuesday: The Earth Among the Planets Series, "Earth, The Water World" by Dr. Donald Hussong. UHM Campus Center Ballroom, call 948-8263 for details.
10-14	Tues.- Sat.: State Science and Engineering Fair at the Neal Blaisdell Center.
12,13	Thursday, Friday: Tester Symposium (Sponsored by the UHM Department of Zoology). Call 948-8617 for more details.
16	Monday: The Earth Among the Planets Series, "Observing the Planets From Mauna Kea" by Dr. Dale Cruikshank. UHM Campus Center Ballroom, call 948-8263 for details.
18	Wednesday: MOP's Ocean Day at the UHM Campus Center Mall. Come and participate in all the fun and aquatic adventure, call Annie at 948-8433 for details.
20	Friday: Good Friday--HOLIDAY!
23-27	Mon.-Fri.: The Pacific Conference on Marine Technology sponsored by the Hawaii section of the Marine Technology Society, at the Kaiulani Hotel. Call 948-8301 for more details, or see page 3.
24	Tuesday: The Earth Among the Planets Series, "Volcanoes in the Sea" by Dr. Edward Wolfe. UHM Campus Center Ballroom, call 948-8263 for details.

University of Hawaii
Marine Option Program
1000 Pope Road Rm. 229
Honolulu, Hawaii 96822

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George Balasz
National Marine Fisheries Serv.
2570 Dole St.
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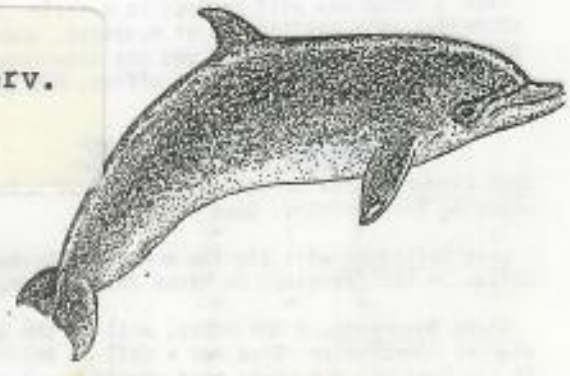

UH HILO MARINE OPTION PROGRAM NEWSLETTER

Jan. 11, 1983

Aloha MOP members,

We've got another semester brewing here's what we've put in the pot.

THE FIRST WEEK

The first week of school is set aside to help students review thie MOP progress. If you are not sure you are on the right track and would like to update your file, now is a good time.

DEDICATION

We will be ~~christening~~ dedicating our new MOP lounge, Friday the 20th around 4:00 Pm. We'll barbecue and toss a few. There will also be a croquet tourney in the LS quadrangle, so bring your cleats. Kidding, only kidding. We, UHH MOP, also have two honorary certificates to be awarded during the celebration. Come and see what transformations have transpired this semester break, we've been busy.

CHANCE OF A LIFETIME LECTURE OR CORAL AND STUFFS

There is a lecture to be offered Jan. 13th by Dr. George Miller from the Univ. of Calif. at Berkeley entitled Marine Invertebrates From Mangrove and Reef Communities Worldwide. The talk will be in L.S. 22 at 4pm. Dr. Miller is visiting in Hilo only briefly and his talk will certainly be fascinating. Sponsored by MOP and the UHH Sigma Xi club.

SPECIAL INTEREST NOTE

You should all be aware that our MOP office will now be distinguished and described not as the small bldg. by L.S. with an anchor in front, but as the bldg. with the BLUE WAVE. Check it out.

WANTED TO GO HIKING

Your MOP Director, in response to many inquiries has been planning a hike down to Halape, sometime in March. This will be a #4 hike on the 1 (easy) - 5 (difficult) scale. So if you're in good shape, sign up, and if you're not in good shape, Wise up.

READY: ANOTHER SCUBA CLASS

We'll be sponsoring another SCUBA course this Spring semester. The dates are not yet definite. Stop by if you have a desire to become certified and would like more information. The classes are limited to ten students each and the entire course plus books is offered to MOP students for $120.00. A good deal.

TURTLES AND THEN SOME

George Balazs, a primary investigator from the National Marine and Fisheries Service, is again recruiting MOP students to participate in the catching and tagging of Green Sea Turtles along the Big Island's coast. The procedure thus far has been to take a core of 15 or so MOP students, with provisions provided by N.M.F.S. and spend anywhere from 3 - 6 days camping. There are two aspects of tagging Sea Turtles in which one can be involved: SCUBA: UH certified divers only

Netting: teams of 2 - 3 people keep 2 hour watches throughout the night - to be sure no turtles drown if entangled in the net. In the morning the turtles, around 6/night, are measured, weighed, and tagged. Or if previously tagged, the new measurements are recorded and compared to past measurements.

George Balazs has been tagging Green Sea Turtles for 11 years, throughout the leeward Hwn. Islands. The turtles, when recovered here are particularly interesting as George hopes to document and understand their life cycle and migratory habits so as to perpetuate and instigate the best protective measures. If indeed his research suggests a renewed healthy upsurgence of Green Sea Turtles, then perhaps sea turtles can be removed from the National Endangered Species List, but he can't do it alone. Help an endangered species.

MARINE OPTION PROGRAM
UNIVERSITY OF HAWAII AT HILO
1400 KAPIOLANI STREET
HILO, HAWAII 96720

HILO JAN 13'84 HAWAII U.S.POSTAGE .20

George Balazs
Box 3830
Honolulu, HI. 96812

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

September 9, 1983 F/SWC2:GHB

Mr. Alika Cooper
163 Kaiulani Street
Hilo, HI 96720

Dear Mr. Cooper:

During the coming months a small research project will be undertaken on the Big Island to tag and study green turtles in their marine habitat. This work will be a cooperative effort involving mainly the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, the University of Hawaii at Hilo Marine Option Program, and the Sea Grant College Program. I would like to ask for your cooperation with any information you may be able to provide on the following points.

1. At which specific coastal sites on the Big Island should we direct our efforts in order to catch the greatest number of turtles?

2. At which specific coastal sites would we be most likely to catch large turtles, 200 pounds and greater?

3. What capture techniques would you recommend for the above locations?

4. Which beach sites on the Big Island were previously used (or are now used) by turtles to nest and lay eggs?

Any help that you can offer on these important subjects will be greatly appreciated. We will be requesting similar assistance from a number of individuals on the Big Island as listed below. If you know of others who might be of assistance, please send us their name and address.

Sincerely,

George H. Balazs
Wildlife Biologist

Big Island People Contacted

1. Douglas Blake
2. Dexter Cate
3. Alika Cooper
4. Ken Ellingwood
5. Dave Harrington
6. Ken Hupp
7. Moses Kahumoku
8. Bill Kalei
9. Gerald Kang
10. Robert Kim
11. Alfred Long
12. Ruby McDonald
13. Tom Nahiwa
14. Robert Nishimoto
15. Howard Takata

Identical letters, September 9, 1983, by George H. Balazs

Big Island People Contacted

1. Mr. Alika Cooper
   163 Kaiulani Street
   Hilo, HI 96720

2. Mr. Douglas Blake
   P. O. Box 307
   Kailua, HI 96740

3. Mr. Dexter Cate
   167 Lahaina Street
   Hilo, HI 96720

4. Mr. Ken Ellingwood
   110 Huaalani Drive
   Hilo, HI 96720

5. Mr. Dave Harrington
   P. O. Box 4840
   Kailua, HI 96740

6. Mr. Ken Hupp
   913 Kaneolehua
   Hilo, HI 96720

7. Mr. Moses Kahumoku
   358 Eulani Street, #104A
   Hilo, HI 96720

8. Mr. Bill Kalei
   688 Kinoole Street
   Hilo, HI 96720

9. Mr. Gerald Kang
   2848 Pulima Drive
   Hilo, HI 96720

10. Mr. Robert Kim
    236 Kanoelani Street
    Hilo, HI 96720

11. Mr. Alfred Long
    104 Alae Street
    Hilo, HI 96720

12. Mrs. Ruby McDonald
    75-5744 Alii Drive, #281
    Kailua, HI 96740

13. Mr. Tom Nahiwa
    2476-A Kinoole Street
    Hilo, HI 96720

14. Mr. Robert Nishimoto
    P. O. Box 936
    Hilo, HI 96720

15. Mr. Howard Takata
    2349 Kalanianaole Street
    Hilo, HI 96720

SEA TURTLE SIGHTING REPORT

Marine Option Program
University of Hawaii at Hilo
1400 Kapiolani Street
Hilo, Hawaii 96720

Observation made by:_____

Address & Tel. No. (optional):_____

Date:_____ Time:_____Location (indicate on chart):_____

Observation made from: ____shore;

____boat; or while ____skin ____SCUBA diving.

Estimated size (shell length):_____

Turtle seen on: ____surface; or at depth of approx. ____ft. Distinguishing characteristics (species I.D. if known, long tail, shell color, tags, injuries, etc.):

_____

_____

Other comments: ie. Historical or Cultural

_____

_____

THANK YOU FOR YOUR COOPERATION

Diane Mazarakis
Marine Option Program
University of Hawaii/Hilo
1400 Kapiolani Street
Hilo, Hawaii 96720

October 11, 1983

Hi George,

Hope your travelling was agreeable; more agreeable than Hilo's weather has been. Rain... Rain... Rain.

I'm writing to get some feed-back from you on an interview guideline sheet for our interviewers. Many students (5) are participating as interviewers and I wanted to be sure we get the kind of info. that would be the most valuable to compile. I'm also real interested in the idea of compiling historical and cultural information about green sea turtles relative to Hawaii and it's people.

Please delete and add to this list as you wish.

It was brought to my attention that perhaps we should"legitimize" these interviews by using a scan sheet, to increase probability of connecting with people who work on the ocean. (ie. Registered boat owners...Captain's licenses). It was thought to at least establish initial contact in a systemized manner.

I threw the idea "out the window". I don't think phone calls or searching particular people out would prove fruitful -- due to the nature of the laws regarding sea turtles.

What do you think? Realizing your busy schedule a short, quick note would be perfect.

Diligently in Hilo,
Your friend,

Diane

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

April 3, 1984 F/SWC2:GHB

Mr. Rodney Y. Inaba
President
Kamuela Leisure Corporation
2170 Kuhio Ave., Penthouse
Honolulu, HI 96815

Dear Mr. Inaba:

On March 30, 1984, I was able to carry out approximately 100 minutes of diving surveys with scuba to census the green sea turtle population off the Mauna Lani Hotel. This work was part of a small research project I am conducting on the Big Island in cooperation with the University of Hawaii at Hilo, Marine Option Program. Our surveys off the Mauna Lani were made possible by the excellent assistance and cooperation of staff members of your Kamuela Leisure Corporation. I, therefore, want to take this opportunity to express my appreciation for their professional and courteous help.

We found that the turtles off the Mauna Lani are mainly small individuals ranging from only 15 to 20 inches in shell length. We saw no more than eight animals during each of two dives. Nevertheless, the turtles are of considerable interest to hotel guests who see them during recreational water activities. They are a distinct asset to the environment of this beautiful coastal area.

I have enclosed some literature on sea turtles that I thought you might find interesting. Again, thank you very much.

Sincerely,

George H. Balazs
Wildlife Biologist

Enclosure

cc: Mr. Francis Ruddle
P. O. Box 4000
Kawaihae, HI 96743

Dear George,

Thank you very much for allowing me to borrow some of your slides for my talk on mark and recapture. Your unique slides enabled me to illustrate vividy the subjects I was given to talk about. In my conclusion I asked my audience (M.O.P.) to keep their eyes and ears open for turtle happenings in their respective areas. They know where to look for tags on a turtle and also how to contact you (N.M.F.S.) in case of a sighting ect. When I wasn't talking turtles with other mopers, I burned 18 tanks and attended classes on limu, sharks, Boat towing with snorkle, underwater photography, coral, transecting methods, geomorphology (Jim Maragos), and fish I.D. . I also received my advanced divers card. All in all it was a good week although the mop shore patrol did invade Lahina saturday nights. Once again thank you very much, and I'm looking forward to seeing you after exams.

Sincerly William Gratt

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

October 25, 1983 F/SWC2:GHB

TO: William G. Gilmartin, Leader, MMESI

FROM: George H. Balazs

SUBJECT: Recovery of a tagged adult green turtle found dead with gunshot wounds at South Point, Island of Hawaii

A letter received this week reported the finding of an adult green turtle washed ashore at South Point with a "bullet shot" in the head and another in the neck. The letter stated that the turtle was found in July and that two metal tags were present on the flippers. The tags were removed, and sent with the letter. Tag numbers (5485 and 5487) revealed that I had tagged this turtle at Kaaualu Bay on the Island of Hawaii on July 23, 1981, at 0400, in a net set within the bay. At that time the turtle was recorded as a small adult female.

It is not uncommon to hear about cases of Hawaiian turtles being shot, or shot at. This activity represents one more reason, in my view, why the French Frigate Shoals breeding colony is showing such slow recovery. Increased public awareness through education, as well as greater enforcement effort, would undoubtedly be of benefit.

P.O. Box 489
Captain Cook, Hawaii 96704
October 13, 1983

Hawaii Institute of Marine Biology
University of Hawaii 95744

To whom it may concern:

In July of this year, while exploring the beach area at South Point we came across an adult sea turtle washed up on shore dead because of a bullet shot in the head and another penetrating shot in the neck. I have enclosed two tags found on the flippers. → 5485 & 5487

Sincerely
Janet Pikala

ORIGINAL DATA:

23 July 1981
>90 cm
Kaunalu Bay
5484, 85, 86, 87, 88 but one of these tags dropped
Tagged in net -

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

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P.O. Box 489
Captain Cook, Hawaii 9676

October 13, 1983

Hawaii Institute of Marine Biology
University of Hawaii 95744

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Sincerely
Janet Pikala

ORIGINAL DATA:

23 July 1981
>90 cm
Kaawaloa Bay
5484, 85, 86, 87, 88 but one of these tags dropped
Tagged in net -

November 1, 1983

Dear George,

Thank you for the beautiful poster and information about your work. The literature is much appreciated. We recognize the importance of such research.

It seems we found the turtle washed up on shore where you had tagged her. (Ka'alualu) We are reasonably sure it was shot by a bullet because of the clean wound through the head. The turtle was still fresh when we spotted her. The killing must have been done the same day. It's so unfortunate that she would be killed and for no reason.

Again thanks for the literature. Enclosed is a picture taken of the turtle with one of my friends pointing to the gun shot wound. If you have any more questions, I would be glad to answer them if I can.

Sincerely,

Jan Pekala

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

September 27, 1983 F/SWC2

TO: William G. Gilmartin, Leader, Marine Mammals and Endangered Species Program

FROM: George H. Balazs, Wildlife Biologist

SUBJECT: Outline of activities undertaken during my September 23-25, 1983 trip to Hilo--National Marine Fisheries/Sea Grant green turtle project

September 23, Friday - 1730 -- Arrived at Hilo via Aloha Airlines and transported gear to storage area.

1830-2000 -- Surveyed potential diving sites along the Hilo Bay coastline from Puhi Bay to Leleiwi Point.

2200-2300 -- Surveyed the same areas as above, but during low tide.

September 24, Saturday - 0830-1000 -- Discussed project goals and turtle capturing techniques with 15 Marine Option Program (MOP) students at the University of Hawaii at Hilo.

1030-1500 -- Scuba diving and turtle tagging with MOP students using inflatable boat launched from Leleiwi Beach Park. Two turtles captured, an adult male (84 cm) and a 69-cm immature animal.

2100-2320 -- Night dives (nonscuba) with four students to survey potential shallow-water sleeping areas for turtles.

September 25, Sunday -- 0830-1400 -- Scuba diving off Leleiwi Beach Park with student dive leader (William Oricutt). Rained all day.

1420-1630 -- Cleaned and stowed all gear.

1820 -- Depart for Honolulu.

2200 -- Arrive home.

Alan Kam accompanied me on his own free time, although his travel expenses were paid out of the Sea Grant budget.

My next trip to Hilo will be over the Thanksgiving holiday (November 24-27) following the completion of field work at Johnston Atoll.

September 22, 1983 F/SWC2

TO: William G. Gilmartin, Leader, Marine Mammal Endangered Species Program

FROM: George H. Balazs, Wildlife Biologist

SUBJECT: National Marine Fisheries Service/Sea Grant green turtle tagging project--report of my trip to Hilo on 12-13 September 1983

After an approved 3-month delay in initiating this cooperative project things seem to be progressing very well. In Hilo, I met with my co-investigator, Dr. Walter Dudley, and 19 of his Marine Option Program students. At least 10 of these enthusiastic and capable students will be receiving stipends of $50 per month to work in the project. I plan to return to Hilo on the weekend of 23-25 September for our first round of field work. This will be aimed at locating one or more suitable study sites in the Hilo Bay area. A promising candidate is the Leleiwi Point area where the Army Corps of Engineers previously proposed (and later withdrew) plans for construction of a small boat harbor. This site is reported by some to host one of the highest concentrations of turtles on the coastline.

As a result of my preliminary trip to Hilo, the following conclusions have been drawn.

1. The project really does have potential for making valuable contributions to knowledge of immature green turtle growth, movements, feeding, recruitment, and stock size.

2. Supervision of project activities is essential; Walt Dudley and I will be sharing these responsibilities. Safety during diving and net-setting operations is of major importance. All students who will be involved in scuba diving are being flown to Honolulu for the University of Hawaii certified diving physical.

3. A major portion of the on-site time that I devote to this project will have to be on weekends, holidays, and University breaks. During normal Monday-Friday workdays, the student workers are in class, and Walt Dudley is teaching class.

4. The Johnston Island project, and the preparation of a final report, have caused me to alter the work schedule of the Hilo project. Consequently, after the first of the year when the Johnston project is finished, I anticipate having to spend most of my time on the Hilo project in order to bring it to a successful conclusion.

GHB:ll
bc: HL, Balazs

University of Hawaii at Manoa

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

October 9, 1981

Mr. Del Dykes
430 W Kawili
Hilo, Hawaii 96720

Dear Del:

I recently corresponded with Howard Takata and he mentioned the sightings you have made of turtles sleeping in caves off Leleiwi Point. In this respect, I thought that you would be interested in the attached testimony that I submitted to the Army Corps of Engineers on their "comprehensive" study navigational report for the Hilo area. Two of the study areas contained in the report include Leleiwi Point and King's Landing. King's Landing is their recommended site for the 170-berth small boat harbor.

I personally have no objection to harbors being built when people want and need them as a means of improving the quality of life. However, I do find it objectionable when the Corps issues a report stating no impacts will result on turtles, and no known aggregations of turtles occur in the areas, when they haven't even investigated the situation or talked to knowledgeable residents (ie the "I haven't looked, and I haven't found anything" type of logic!).

I would like to hear more of your own observations of turtles and diving experiences at Leleiwi and adjacent areas. The Corps clearly needs to contract someone to survey and assess turtles, and maybe this is an area where we can collaborate. Whether the Corps will actually undertake this or not remains to be seen.

I hope to hear from you in the near future. I leave for Western Samoa on October 15th, but will be back in Honolulu by November 2nd.

Best regards- good diving,

George H. Balazs
Assistant Marine Biologist

University of Hawaii at Manoa

A Sea Grant College
Spalding Hall 252 B • 2540 Maile Way
Telephone (808) 948-8191 • Honolulu, Hawaii 96822 / Cable Address: UNIHAW

Marine Advisory Program
2349 Kalanianaole Avenue
Hilo, Hawaii 96720
(808) 935-3830

October 6, 1981

Mr. George Balazs
Assistant Marine Biologist
H.I.M.B.
P.O. Box 1346, Coconut Island
Kaneohe, HI 96744

Dear George:

Thank you for the copy of your letter to the Department of the Army dated 9/24/81 and the turtle ocean release plan.

I agree that there is an absence of adequate investigations on green turtle activities at these proposed harbor sites. A scuba diver, Mr. Del Dykes, has informed me that turtles rest in underwater caves off Leleiwi Point. He and his brother have made these observations this past summer. Who knows how extensive the resting areas are between Leleiwi Point and Kumukahi Point? I have personally seen turtles in Hilo Bay and areas south of Kumukahi Point, a popular former turtle catching ground.

I think your points are well taken and I agree that much more must be learned about the biology and movements of the green turtle.

You may be interested to know that at the recent Army Corps hearing in Hilo, local residents (non-boaters) were in favor of expanding the existing Hilo harbor rather than creating new marinas and small boat facilities at the sites studied by the Corps. Fishermen favored the locating of another site (Opihikao?), rather than those studied for six years by the Corps! Can you believe that?????

Thanks again for sending me the letter and the plan.

Sincerely,

Howard

Howard A. Takata
East Hawaii Agent

UNIVERSITY OF HAWAII

PURCHASE ORDER DATE 9-15-83 No. 440525

DELIVERY ADDRESS, PURCHASE ORDER NUMBER, AND REQUISITIONER MUST APPEAR ON ALL PACKAGES, INVOICES AND SHIPPING NOTICES.

SEND ONE ORIGINAL AND TWO COPIES OF INVOICE TO:

DISBURSING OFFICE
UNIVERSITY OF HAWAII
1627 BACHMAN PLACE
HONOLULU, HAWAII 96822

TR. CODE / ACCOUNT CODE: 21-F-84-238-F-582-B-323

FEDERAL FUNDS APPLY: YES [X] NO [ ]

REQUISITIONER'S TEL. NO.: 946-2181

VENDOR CODE:

REQUISITIONER: BALAZS

DELIVER TO: (ALL TRANSPORTATION CHARGES MUST BE PREPAID)

HAWAII INSTITUTE OF MARINE BIOLOGY,
P. O. BOX 1346,
KANEOHE, HI 96744

DELIVER ON/BEFORE: 9-30-83

DELIVER PREPAID VIA: AIR MAIL

FOB POINT IS SAME AS DELIVERY POINT UNLESS INDICATED OTHERWISE BELOW
F.O.B.

VENDOR:

NATIONAL BAND & TAG CO.,
BOX 430,
NEWPORT, KENTUCKY 41072

CONTRACT/PRICE LIST/QUOTATION NO.:

DISCOUNT TERMS:

ITEM NO.	QUANTITY ORD	QUANTITY REC	DESCRIPTION UNIT PRICES ARE E (ESTIMATED) OR F (FIRM)	OBJECT SYMBOL	E/F	UNIT PRICE	AMOUNT
1	3		TAG PLIERS FOR SIZE 681 INCONEL TAGS. PAGE 10, 1005-581S	3015	E	10.30/EA	30.90
						TOTAL →	30.90

I AUTHORIZE ISSUANCE OF THIS ORDER AND CERTIFY THAT THIS PURCHASE IS IN ACCORDANCE WITH APPLICABLE LAW AND UNIVERSITY POLICY.

S. CHASTAIN
TYPED NAME

BOX 1346, KANEOHE — MAILING ADDRESS
247-6631 — PHONE NO.
BY PURCHASING OFFICER — SIGNATURE
9-15-83 — DATE

440525

NOTICE: TIME IS OF THE ESSENCE AND THIS ORDER IS CONTINGENT UPON YOUR ACCEPTANCE OF THE SPECIFIED TERMS AND CONDITIONS AND YOUR ABILITY TO MEET THE ABOVE STATED DELIVERY DATE; OTHERWISE THIS PURCHASE ORDER IS VOID.

→ **SEE ADDITIONAL TERMS AND CONDITIONS ON REVERSE SIDE:** ←

EQUIPMENT TO BE LOCATED: BLDG.: RM.

OR INCORPORATED INTO EXISTING EQUIPMENT: DECAL NO. (OR P.O. NO. IF DECAL NOT USED)

NOTES:

I CERTIFY THAT THIS PURCHASE SUPPORTS THE UNIVERSITY PROGRAM INDICATED IN THE ACCOUNT CODE BLOCK.

P. D.
APPROVING AUTHORITY — TITLE

I CERTIFY THAT SUFFICIENT FUNDS ARE AVAILABLE IN THIS ACCOUNT FOR THIS PURCHASE.

038
FISCAL OFFICER — F.O. CODE NO.

PROPERTY MANAGEMENT COPY

FORM CD-29 (REV 2-77) PRES. BY DAO 204-1

U.S. DEPARTMENT OF COMMERCE

TRAVEL ORDER

1. OPERATING UNIT OR OFFICE	2. ORDER NUMBER
NOAA - NMFS 14	3-FT2-00091

3. NAME AND TITLE OF TRAVELER(S)	4. ORGANIZATIONAL UNIT (Division, etc.)	5. PRESENT OFFICIAL STATION
[redacted] George H. Balazs Wildlife Biologist	SWFC Honolulu Laboratory	Honolulu, HI FFO: Seattle, WA

6. SPECIFIC PURPOSE OF TRAVEL (Include, when applicable, travel to and residence quarters and travel time allowed therefor)

To conduct research of immature sea turtles under a cooperative NMFS/SEA GRANT project.

7. ITINERARY (Point of origin and places to be visited)

Honolulu, HI to Hilo, HI and return to Honolulu.

8. PERIOD OF TRAVEL	a. BEGIN ON OR ABOUT	b. END ON OR ABOUT
	Sep 23, 1983	Sep. 26, 1983

9. ESTIMATED COST (See 11, 12, 13 below)

**NO COST

Travel	$ **
Per Diem	$ **
Special Expenses	$ **
H/H Eff'ts	$ XXXX
TOTAL	$ **

10. APPROPRIATIONS/ALLOTMENT CHARGEABLE → **

11. MODE OF TRANSPORTATION (Check applicable blocks)

- a. ☒ Common carrier
  - ☐ Bus ☐ Rail Coach ☐ Rail Pullman
  - ☒ Other than Air First Class
  - ☐ Air First Class (Justify in Item 14)
- b. ☐ Privately-owned vehicle
  - ☐ Auto ☐ Plane ☐ Rate per mile_____cents (See Sec. 10 DAO 204-1)
  - (1) ☐ Determined more advantageous to the Government (Justify in Item 14)
  - (2) ☐ For convenience of traveler (See Sec. 9, DAO 204-1)
- c. ☐ Rented motor vehicle (See DAO 209-9)
- d. ☐ Other means (Specify)

12. PER DIEM RATE(S)

**

Note: Travelers authorized to operate a Government - owned or leased vehicle must possess SF-46, "U.S. Government Motor Vehicle Operator's Identification Card," in accordance with DAO 209-2, unless covered by special exception therein.

** 13. SPECIAL EXPENSES AUTHORIZED (Check applicable blocks)

- a. ☐ Meeting registration fees
- b. ☐ Hire of taxis between lodging and/or place(s) of business
- c. ☐ Excess baggage, not to exceed_____pounds
- d. ☐ Other (Specify)

14. SPECIAL PROVISIONS/REMARKS (No. of Transportation Requests needed, justification of Air First Class, exception to Requirement for SF 46, etc.)

**All travel costs to be paid for by University of Hawaii Sea Grant program.

Travel voucher must be submitted within 15 days after completion of travel, and travel advances must be refunded at that time unless you have a standing travel advance.

15. CHECK APPLICABLE BLOCK → ☐ CHANGE OF OFFICIAL STATION ☐ REPORT TO FIRST PERMANENT DUTY STATION

It is hereby certified that this action is not primarily for the convenience or benefit of the employee, or at his request. Items b, c, d, and e, when completed, are authorized in accordance with Office of Management and Budget Circular, A-56.

a. TO (Traveler's new/first permanent station)	b. TRANSPORTATION OF IMMEDIATE FAMILY →	NUMBER

c. SHIP HOUSEHOLD EFFECTS FROM (Location)	d. TO (Location)	e. EST. WEIGHT (Pounds)

16. SIGNATURE OF REQUESTING/APPROVING OFFICER: Mary Lynne Godfrey

TITLE: Administrative Officer

17. Certificate of Authorization By Designated Authorizing Officer — You are hereby authorized to travel at Government expense under the conditions noted on this Order, and in accordance with the Standardized Government Travel Regulations. The number and approval date of this Order must appear on each voucher claiming reimbursement for expenses incurred consequent to this Order.

a. SIGNATURE OF AUTHORIZING OFFICIAL: Richard A. Thompson

b. TITLE (Please type): Director Honolulu Laboratory

c. DATE ORDER APPROVED: 9/22/83

(SEE PRIVACY ACT STATEMENT ON BACK OF LAST PAGE)

ROOM	NAME	DATE	FOLIO NUMBER
106	George Balazs	9-23	032460

RATE	ADDRESS
$16	992 Awaawaanoa PL

NO. PARTY	CITY & STATE
2	Honolulu HI

IN	OUT
9-23-83 i	9-26-83

1		1		:	16.00 : ROOM
2		2		:	00.64 : TAX
3		3	1 848#23	:	16.64 BAL :
4		4		:	16.00 : ROOM
5		5		:	00.64 : TAX
6		6	1 966#24	:	33.28 BAL :
7		7			
8		8			
9		9		:	02.21 : LD
10		10	1 034#25	:	35.49 BAL :
11		11		:	35.49 PAID :
12		12	1 044#25	:	00.00 BAL :
13		13			
14		14			
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25		25			
26		26			

Hilo Hotel

142 KINOOLE STREET
P. O. BOX 726
HILO, HAWAII 96720
PHONE 961-3733

U.S. official lauds selection of

1-23-88 HONOLULU ADVERTISER

By Jay Hartwell
Advertiser Government Bureau

U.S. Secretary of Transportation Jim Burnley yesterday hailed the selection of Palima Point as the best place to build a Big Island spaceport, calling the choice "a major step forward for America's commercial launch facility.

"Today, private sector companies launching telecommunications and weather satellites can only use federally owned launch facilities," said Burnley. "The State of Hawaii's decision both creates an alternative and sets an example. I hope we'll see many states follow Hawaii's lead."

His statement came a few hours after the state announced results of a $200,000 spaceport study by a Cambridge, Mass., consulting firm.

Arthur D. Little, Inc., said the commercial launching facility should be built at Palima Point, below the plantation town of Pahala in Ka'u, south of Hawaii Volcanoes National Park.

The firm picked Palima after studying seven Big Island sites: one at Hamakua, three at Puna and three in Ka'u near South Point. The firm examined each site's geology; safety; land ownership and development potential; population; environmental, cultural, astronomical and socioeconomic concerns, and infrastructure requirements.

Arthur Little vice president Harry Foden told legislators yesterday Palima is the best site because the 11,000-acre area is uninhabited; there are only four landowners (Bishop Estate, C. Brewer, State of Hawaii and International Air Service Co., Ltd. of California, which has macadamia nut trees on some of its 5,400 acres); and present land use is passive agriculture. The closest town — Pahala — is beyond a 2.9 mile radius safety zone where the public would not be permitted during launchings.

The state Department of Business and Economic Development wants private industry to build a four-launch pad facility, capable of handling Titan III booster rockets, although the state expects most of the estimated 12 launchings a year would use smaller Scout or Delta booster rockets, which are about 120 feet high. The facility would not be used for manned shuttle launchings.

The study estimates it would cost the state about $7 million to provide power, water and access to the site.

Before anything happens, the state must fund an environmental impact statement for the site. A bill providing $1.2 million for the study is before the House Finance Committee.

The consultant's second choice was Kahilipali Point, which is closer to South Point and where 500 acres of free

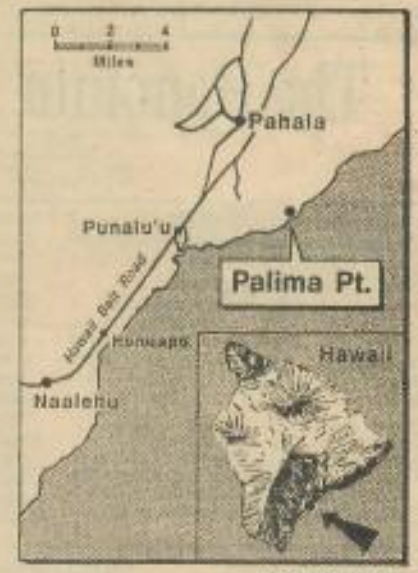
Palima for spaceport

land was offered by C. Brewer. Mufi Hannemann, Brewer spokesman, said the same offer would apply for Palima, where the firm owns less than 500 acres.

Ulveling also said the department has applied for a NASA space technology research grant; is negotiating with unnamed Mainland interests to establish a Pacific Space Center, which would be supported by the University of Hawaii and Stanford University, as well as private space and communication companies.

Meanwhile yesterday, state Rep. Andy Levin announced he will conduct a public meeting at 6:30 tonight at Ka'u High School cafeteria to discuss the Palima choice.

Levin said he has asked the Department of Business and Economic Development to take part in the meeting.



Advertiser map

Palima is consultant's choice for space port site on Big Isle

Identical letters, September 9, 1983, by George H. Balazs

Big Island People Contacted

1. Mr. Alika Cooper
   163 Kaiulani Street
   Hilo, HI 96720

2. Mr. Douglas Blake
   P. O. Box 307
   Kailua, HI 96740

3. Mr. Dexter Cate
   167 Lahaina Street
   Hilo, HI 96720

4. Mr. Ken Ellingwood
   110 Huaalani Drive
   Hilo, HI 96720

5. Mr. Dave Harrington
   P. O. Box 4840
   Kailua, HI 96740

6. Mr. Ken Hupp
   913 Kaneolehua
   Hilo, HI 96720

7. Mr. Moses Kahumoku
   358 Eulani Street, #104A
   Hilo, HI 96720

8. Mr. Bill Kalei
   688 Kinoole Street
   Hilo, HI 96720

9. Mr. Gerald Kang
   2848 Pulima Drive
   Hilo, HI 96720

10. Mr. Robert Kim
    236 Kanoelani Street
    Hilo, HI 96720

11. Mr. Alfred Long
    104 Alae Street
    Hilo, HI 96720

12. Mrs. Ruby McDonald
    75-5744 Alii Drive, #281
    Kailua, HI 96740

13. Mr. Tom Nahiwa
    2476-A Kinoole Street
    Hilo, HI 96720

14. Mr. Robert Nishimoto
    P. O. Box 936
    Hilo, HI 96720

15. Mr. Howard Takata
    2349 Kalanianaole Street
    Hilo, HI 96720

THE UNIVERSITY OF HAWAII
SEA GRANT COLLEGE PROGRAM

TO WHOM THESE LETTERS SHALL COME GREETINGS

THE MARINE OPTION PROGRAM

CONFERS ON

George Balazs

A CERTIFICATE OF APPRECIATION
FOR CONTRIBUTIONS IN

Marine Education - Sea Turtle Research Training

GIVEN AT THE UHH CAMPUS, Hilo, HAWAII THIS May 5, 1989

SEA GRANT HAWAII

Director, Sea Grant

Director, Marine Option Program

Campus MOP Coordinator

MARINE OPTION PROGRAM UNIVERSITY OF HAWAII

UHH Marine Option Program

Changing Tides

Vol. IV, No. 7 *May 8, 1989*

This is It!

The last of this school year's newsletters but not the last of the requests. During the summer we plan to put out at least one newsletter but the problem will be where we should send many of the copies. If your summer address will be different from your present address drop us a note so we can keep in contact.

The year has been productive and we hope the newsletter has kept all of you abreast of our activities along with some information about a variety of marine related topics.

The bottom line on this year's activities seems to be; the amount of energy invested produces fun and worthwhile projects. Our hope is that next year, besides our usual functions, some new events arise through your increased desire to make the ocean and the Marine Option Program part of your undergraduate days. The experiences gained at M.O.P. could be shared by many more Moppers so our hope is that every member will attend at least one function next year.

As editor and main author of the newsletter this year, I, Jan Heckman, have thoroughly enjoyed the work. The highlights were many and the disappointments few. I would like to thank all those who kept doing interesting things so I could fulfill a journalistic fantasy and be an "editor".

****

Summer Plans

The Marine Option Program office should be open this summer. Some work that may produce "recreation" is planned for this period. The two used Laser sailboat hulls need some fiberglass and rigging work and, of course, they must then be given sea trials. A little fishing and snorkeling are not out of the realm of possibilities, plus who knows if help will be needed on some faculty research project. If your around campus this summer drop by the office.

****

Turtle Rodeo

On April 10th, eight brave turtle wranglers, which included seven Hilo students and one UH Manoa student, plus Dr. Dudley headed for Punaluu Bay to catch turtles for an ongoing demographic study of the Green Sea Turtles in Hawaii. A switch of crews occurred on the 11th and a dozen students with Dr. Hallacher finished up the three day expedition. George Balazs, turtle expert with the National Marine Fisheries Service, had mentioned that the behavior of the animals seemed to have changed recently. They were coming into the bay during the day for feeding and therefore we might have to chase them down instead of watching a net all night. With hindsight the two choices are almost an even tradeoff, exhaustion vs. no sleep.

As George had predicted we saw many turtle heads popping up as they came up for air. After unloading a considerable amount of gear helpfully

Turtle Rodeo (cont.)

assembled by Laura Zara, the area was scouted and a short net placed in the water close to the pavilion. Another group set up a shelter designed to shield captured animals from the sun. Shortly after the shelter was erected Barry (an assistant to Mr. Balazs) and George brought in a turtle and the hunt started in ernest. A total of 8 turtles were caught the first day, ranging in weight from 130+ to 30 lbs. The largest was caught by the team of Barry and Jan Heckman, our student co-coordinator, in some heavy surf near the boat channel. It should be mentioned that Barry played a major role in catching at least 6 of the 8 turtles caught and some of us wondered if he wasn't part turtle himself, somewhat like the Hawaiian legends about human/turtle deities. A larger net was deployed for the usual all night vigil, but since so many turtles were caught during the day, George decided a good nights rest was more important. The large net was rolled up at around 10:30 pm and most people headed for the sack.

The next day, the 11th, a breakfast of scrambled eggs, banana pancakes, grits, coffee, and Tang was consumed earlier than many had hoped. Thanks should go to Dennis Jones, student co-coordinator, for the spicy spaghetti and breakfast on the first leg of the trip. Kelli Blaine took over the cook's duties for the second two days. After breakfast, before the curious tourists showed up, turtle processing began and everyone got a chance to tie up a turtle for the weighing process. The animals were measured about nine different ways, weighed, checked for general condition, parasitic barnacles removed, tagged and released. Anyone interested in more details on the processing procedure should come by the office or better yet plan on going on the next expedition.

The second crew caught 5 more turtles and sighted some of the ones that had already been caught and tagged. You might ask how would the snorkerlers know a turtle had already been caught? Answer: The ones caught the day before were painted with numbers on their carapace. We were told that after the students left Wednesday afternoon one more turtle was caught by Barry and George, bringing the grand total to 14. David Rose should be thanked for organizing the second crew and bringing back all the assorted gear in good shape.

The highlight of the trip has to be seeing the turtles head for the water upon release.

****

Our New Baby

On March 30th, during the Spring Break our new UH-Hilo research vessel was christened and blessed. The vessel is now called Ka'imi Na'auao or Seeker of Knowledge. Having a safe, reliable boat from which to teach marine courses and do research is a step in the right direction if UH-Hilo desires to become a center for undergraduate oceanographic studies.

****

Ocean Politics Offered This Fall

One the courses offered next fall by Political Science professor, Dr. James Wang, is also applicable toward the earning of a Marine Option Program

Certificate. This course is Ocean Law and Politics POLSC 394, which is designed to combine the technical and scientific side of studying the ocean with the legal and political side. This course should broaden the focus of undergraduate's in the sciences, as well as being useful for social science majors.

Although this is a 300 level course in political science, there are no pre-requisites required to enroll. The class will meet on Tuesdays and Thursdays from 12:00 to 1:15. The format of the class consists of twelve curriculum blocks on different aspects of Ocean Law. Basically, the evaluation of class performance will be geared toward two to three mini-papers, rather than solely upon examinations. At this point there is no text suitable for study in this area, so the materials used will be "Management of Pacific Resources" written by John Craven, director of the Law of the Sea Institute and a judge at this year's annual Marine Option Program Symposium, which was held at UH-Hilo. Other material to be used will be the latest summation of world issues from the Law of the Sea conference, as well as numerous handouts to supplement particular class issues. Right now Dr. Wang is in the process of finishing a textbook on Ocean Politics geared toward undergraduate study. It should be finished in June and published a year or more after that date. Students in next fall's class will be lectured on material from that text before its publishing.

Dr. Wang's interest in Ocean Law began in 1958 when he was working at the United Nations at the time of the First International Law of the Sea conference. In order to explain to groups what was going on, he had to research exactly was happening at the conference. Since that time his research and interest in the subject has continued. Dr. Wang was one of two professor offering this type of class in 1974 and is now writing one of the first textbooks.

Basically, the class is divided into twelve sections, the first of which will be a brief overview of the physical features of the ocean. This is to acquaint students with basic terminology so everyone will have the same general knowledge. The next section will cover a political history of international attempts to provide some basic laws of the sea, dealing with such topics as navigation and zones of jurisdiction. The basic principles of law will also be covered as background material. After this general overview, the class will then go into specific topics, some of which are pollution and toxic waste disposal, and why previous laws have not worked. Also, military uses of the ocean, such as naval policies and rules governing submerged craft will be discussed. A section on the legal issues related to scientific research, undersea mining, and ocean exploration in general will follow.

Since this is a relatively new area for undergraduate study, there is no set framework to follow; so, there will be a lot of discussion and review of current articles. Hopefully the class will create an atmosphere conducive to the gaining and sharing of knowledge, as well as the creation of informed opinions through interaction.

****

Will MOP Be Diving On Shipwrecks In The Future?

If any of the three students, who attended the first symposium on Marine Archaeology held in Hawaii, were asked such a question the response would likely be a hopeful, YES! During the spring break, Sherri Miller, Kimber Alspach, and Jan Heckman spent four days listening to a variety of presentations and two more days at a MOP workshop learning the techniques of marine archaeology.

Marine Archaeology (cont.)

Four days of presentations were held at the newly constructed Hawaii Maritime Center which is just Diamond Head of the Aloha Tower on a pier that was known as King Kalakaua's Boathouse. The Falls of Clyde is berthed at the same pier and the double hulled canoe, Hokule'a, is tied up at the foot of the pier.

The Maritime Center holds a museum that chronicles Hawaii's interaction with the sea from as far back as possible up to present time. The ancient Hawaiian's tools for fishing and sailing are explained and displayed. Captain Cook's arrival and demise are handled with diplomatic and non-ethnocentric explanations as are many of the interactions between Western and Hawaiian cultures. The whaling days, seaplanes, sugar trade, present container shipping, and even surfing and windsurfing all receive interesting treatment.

One of the more well known presenters was Dr. R. Duncan Mathewson III who was the consulting anthropologist on the Atocha site, so well publicized due to the wealth recovered from this Spanish galleon. The work involved in documenting, let alone finding this shipwreck was considerable. The need to have proper underwater archaeological methods used when a shipwreck of historical value is found was one of the messages that Mr. Mathewson stressed many times in his various talks. Also the assortment of information that can be gleaned from a shipwreck, to the uninitiated, is staggering. History, culture, shipbuilding technique, politics, economics, and general lifestyle of the sailors and the passengers can all enter into the story behind a shipwreck. A nice historical tidbit is that a simple translation correction of the shipwreck site recorded in the Spanish archives held the key to the actual site of the Atocha. Most searchers had been looking in the wrong place and the new interpretation of one of the Florida Key names led them to an incredible find.

Not all marine archaeology is confined to shipwrecks, some is experimental anthropology such as the voyage of rediscovery of the Hokule'a. The navigator for the voyage, Nainoa Thompson, explained how he was able to guide the double hulled canoe with amazing accuracy over thousands of miles, without instruments. Replicating the use of artifacts in the most realistic conditions can shed light on the culture of the time being studied.

All of the myriad subjects of anthropology fall under the scope of underwater archaeology and the variety of presentations mirrored this fact. From pre-historic migration in the South Pacific, to preservation techniques used on artifacts, to the techniques used for finding and mapping the Atocha site off Key West Florida. The range of subjects covered was immense. Add to the list of skills discussed, the remote sensing methods needed in order to reduce the number of expensive, time consuming, and sometimes dangerous dives. Another issue, mainly connected to World War II sites, are possible legal and ethical concerns when delving into sites were many people may have died.

The MOP student workshop held Friday and Saturday included a day in the classroom planning a dive on what turned out to be a toppled light tower off Kahie Point, Oahu. Most of the participants were experience divers but what was new was the planned approach, meant to gather information not just impressions. Two hypothesis about what the structure was were entertained. One was the "light tower theory" and the other dubbed the "Orcutt Maru" since Annie Orcutt, one of the safety divers, played devil's advocate and put forth the idea that the structure was the superstructure of a Japanese warship sunk during the bombing of Pearl Harbor. While it was obvious that historical archival research could shed blinding light on the question, the steps planned that would prove or disprove either hypothesis were interesting and educational. Each team was given specific

duties many involving measurements of the structure and its position. The final judgement was that a light tower designed to warn boaters at the end of the power plant outfall pipes had been toppled by Hurricane Iwa. No World War II vintage sake bottles were found and the concrete in the structure helped scuttle the "Orcutt Maru" theory.

Dr. Mathewson informed us that he and the government of Samoa are discussing the finding of a Spanish "Manila" galleon and expressed the hope that MOP students will be able to work on the project. We will keep you posted.

****

Return Requested, Please Forward
Marine Option Program
Univ. Of Hawaii - Hilo
523 W. Lanikaula St.
Hilo, Hawaii 96720

George Balaz
2570 Dole St.
Honolulu, Hi. 96822

4-25-89 A-3 Hono. ADVER.

Top geothermal foe hit with drug, arms charges

By Hugh Clark
Advertiser Big Island Bureau

KEALAKEHE, Hawaii — Ralph Palikapu Dedman, a leader of the Pele Defense Fund that took its effort to stop geothermal development to the U.S. Supreme Court, was charged yesterday with 15 gun and drug counts.

Dedman and two other Ka'u men were arrested Saturday by Kona vice officers at the end of what officials said was a two-month surveillance that included federal drug agents and officers from several police units.


Dedman

Police spokesman Lt. Daniel Minan yesterday said Dedman was charged with 10 firearms counts for the shotgun and four rifles police seized at his Wailau home, mauka of Pahala. He also was charged with five drug offenses, including commercial promotion of marijuana.

He was held in the Kona cellblock in lieu of $6,925 bail last night, and was expected to be transferred to Hilo jail.

Dedman was arrested with a Pahala man, age 40, and a Volcano man, age 42, at his Wailau property Saturday where police said they had been tending marijuana patches in the mauka Ninole and Wailau areas.

The other two were released while a case is prepared for the grand jury.

The three suspects were observed for more than two months by members of the intelligence unit, vice section and criminal investigation section as well as Drug Enforcement Administration agents, according to police detective Julian Shiroma.

In Court

When the raid was conducted Saturday, police seized a pound of freshly harvested marijuana, 320 plants ranging to four feet, 1.2 pounds of processed marijuana and 46 black pills that are still undergoing laboratory analysis.

Dedman has been an outspoken opponent of development in the Ka'u district and joined with others last year in sponsoring Mainland newspaper advertisements that said geothermal was "ugly, toxic, costly and sacrilegious." The ads urged readers to help prevent the industrialization of Hawaii.

Dedman was identified in news accounts as the spokesman for the fund and shown as its president in the paid advertisements. The ads also contained the names of Molokai physician Emmett Aluli and activist Lehua Lopez.

Dedman and Aluli went to the U.S. Supreme Court in an attempt to overturn a Hawaii Supreme Court ruling that concluded geothermal development did not infringe on Hawaiians' right to worship Pele, the fire goddess.

The federal district court last year let stand the Hawaii Supreme Court decision.

UHH Marine Option Program

Changing Tides

Vol. IV, No. 6 *March 17, 1989*

Kapoho

We made it!! Finally the weather and schedules allowed us to make it to the Kapoho tide pools Jan 21st. Five members showed up so everyone got a chance to use the wet suits thus increasing the time spent in the water. The weather was excellent, the surf minimal and the only problems were a few scrapes (treated with hydrogen peroxide) and the added buoyancy of the wet suits which made free diving a little difficult but for cruising the surface and keeping warm they were great. Dr.Hallacher guided us and gave us some mini-lectures on some of the creatures found such as slate pencil urchins, puffer fish, sea cucumbers, and one nasty venomous wana. We stayed about three hours and some of us spent almost the whole time in the water, a la wetsuit, while others caught a little much desired sunshine. A great way to spend a Saturday morning and afternoon.

****

Our Ship May Have Come In

We are collecting monies for the T-shirts. We can only accept checks or money orders - $10.00 made out to Hawaiian Expressions. I know that the T-shirt question, caper, or whatever you may call it has taken a lot of time but the main reason for the delays is that we had to order 144, a gross, and finding that many people interested, who still don't have a closet full of T-shirts is _____. (fill in the blank)

****

Mahalo, Welcome, and Hello Again

With the spring semester, there have been some changes in the MOP staff. We've lost Dennis Epperly. He now resides in Alaska, where he is finishing the building of his house(igloo?). We've also recently acquired two new student assistants, James Wells and Kelley Blaine. We welcome them and are pleased to have them join our staff. Jan Heckman and Dennis Jones, MOP staff from the fall, are now our student co-coordinators.

Last, but not least we'd like to welcome our new members:

Laura Zara
Janet Losey
Jenni Bekeart
Patrick Duffy
Carolyn Standafer
Andrew Snelling
Troy Kindred
Dean Metz
Kelley Blaine
James Patrick Wells
Kira Cadong
Lee Hanks
John Bancroft
Matt Brown
Tracie Yokui

OFFICE HOURS SPRING '89

Monday 9:00-11:45 2:00-4:00
Tuesday 8:00-12:00 1:00-4:30
Wednesday 9:00-11:45 2:00-4:30
Thursday 8:00-12:00 1:00-4:30
Friday 9:00-2:30

****

Turtles, Turtles, Everywhere

This photo is from the Oct 26 -28th expedition to Kiholo that was reported on in the November 17th *Changing Tides*. As reported in our last newsletter, on April 10th - 12th we will be going to Punaluu Bay. As a reminder those dates fall during the week so instructors will have to be asked and anyone interested can attend only two of the days, either the 10th + 11th or the 11th + 12th. All the forms which need to be filled out before going can be obtained at the M.O.P. office. Bring all-weather gear (cold + rain), toiletries, sleeping gear, and any personal dietary supplies. Bring personal snorkel gear including wetsuits and weights. Reminder: personal dietary supplies does <u>not</u> include drugs or alcohol!

****

Symposium

by Kelley Blaine

Saturday, March 4th, marked M.O.P.'s Sixth Annual Student Skill Project Symposium. This year UH-Hilo had the honor of hosting this important event. The symposium included fourteen presentations given by UH-Manoa, UH-Hilo, Maui and Windward Community College students. The presentations were classified into two categories, Research and Internship.

The Symposium began with inspirational remarks by Dr. John Craven from the Law of the Sea Institute. The Keynote Address was made by Dr. Tom Daniel, director of the Natural Energy Laboratory of Hawaii. Presentations were made by UH-Hilo M.O.P. students, Stephen Skipper, Joseph Kalua Jr., Sherri Miller, Kimber Alspach, and Julie Beardsley along with six students from UH-Manoa, two students from Maui Community College, and two students from Windward Community College. The presentations were reviewed by a panel of distinguished judges, who determined which would be honored with one of three awards. Lani Teshima of UH-Manoa won the internship award for her Video Documentation of the 1988 M.O.P. QUEST (Quantitative Underwater Ecological Survey Techniques) Workshop. The research award ended in a tie between Sherri Miller of UH-Hilo for "Sewage Pollution: 24 Hour Monitoring Study" and Ligaya Stice of Windward Community College for "Nucleotide Divergence Detected By Direct Sequencing of Enzymatically Amplified DNA". The John P. Craven award, went to Steve Holly of Maui Community College for his "Line Islands IV Educational Video Documentary".

****

So You Would Rather Be Fishing

MOP recently received a letter from the American Fisheries Society-Hawaii Chapter and they asked if any of our members would like to join. The chapter has just been reorganized and if you're interested in meeting some local professional fishermen or have an interest in fisheries come by the office and get the details.

****

Coordinators Corner

Sorry that we didn't put out a newsletter last month but the planning for the symposium and staff changes, necessitated that we put out the newsletter at a later date.

The symposium is over and everyone involved from judges to volunteers should be thanked for having been part of a successful symposium. A nicely appointed dinner at Reflections Friday night set a serious tone for the next day's presentations. All of the presenters were well prepared, and amazingly the whole day's schedule varied by only five minutes at any given time. Saturday night was special as all the pressure was off and the dinner/party at Mun Cheong Lau was a fitting way to end the day. Despite lack of sleep and reduced stamina due to late night friendship enhancement everyone was in good spirits for the Sunday field trip.

****

Politics of the Sea

Changing Tides recently talked to Dr. Wang who teaches the "Politics of The Sea" course which is one of the courses which can be used to fulfill the marine - related course credit requirement for a MOP certificate. He is now planning to offer the course in the Spring of 1990 but he mentioned that if enough students expressed interest he would consider offering the course next fall. As we all know, interest in a course does not always translate into being able to enroll in the course. Anyone interested in taking the course either semester please drop us a line. To gain the knowledge needed and then to affect a bad ecological situation sounds exciting.

****

Campus Involvement

All the old adages about having to pay your dues to attain a goal seem to have come true for some of the MOP staff members. I guess the goal is having a good job on campus; the dues seem to be showing up at campus activities like booth day or fulfilling requests to talk about MOP. This semester alone there has been the club/organization booth day, a student "leader" forum for a class of Micronesian students, an Upward Bound student shadow day, MOP open house for Homecoming, and 30 students from the Outreach Program Science Fair who recently came by to look in on us. While these activities can play havoc with one's schedule, the rewards are considerable. Despite the fact that such high-profile activity is a responsibility of any MOP staff member there is a thrill to the idea that perhaps one's own interest in the marine realm will spark someone's future commitment.

****

On Dean's List

Changing Tides would like to recognize the following M.O.P. students for the hard work inherent in being on the Dean's list.

Brion Duffy
Shelly Ebersole
Thomas Ault
Ken Babcock
Eve Hayworth
Jan Heckman
Kin Man Li
Konrad Mossman
James Schwarber
Stephen (Mega-mouth) Skipper
Waicheng Wong
Laura Zara
Kerry Stewart
Sherri Miller
Jon Hodge
Zoe Jacobi

NEHL Field Trip

by James P. Wells

On Sunday, March 5th, MOP faculty members from UHM, UHH, and MCC as well as students who gave presentations at the previous day's symposium were given a tour of the National Energy Laboratory of Hawai'i (NELH) at Ke-ahole point in North Kona. Participants of the tour were shown the latest developments in Ocean Thermal Energy Conversion (OTEC) and aquaculture.

Ocean thermal research, conducted principally in warm water areas such as Florida and Hawai'i, involves the utilization of warm and cold ocean water to provide energy to power electrical turbines. Ke-ahole point is a prime area to conduct this research because of the readily accessible depths immediately offshore from where cold water can be pumped and because of the warm surface temperature of the ocean.

Essentially, an OTEC operation pumps warm seawater from the surface through a heat exchanger where it converts liquid ammonium to a gas. It is this gas that turns a turbine that drives an electrical generator, much like steam running a conventional generator. The ammonium gas is then condensed back to a liquid by cold seawater and is reintroduced into the system. The OTEC apparatus is much cleaner than fossil fuel generators because the "fuel" of OTEC is hot and cold seawater and, hence, the release of CO_2 into the atmosphere is avoided.

Other projects being conducted at NELH deal with aquaculture. Cold seawater pumped from the offshore depths is used to raise salmon, trout, and abalone. This cold water is nutrient rich and relatively free of pathogens. It also allows greater variation in the sea life of any particular region. In the near future, the aquaculture technologies that NELH is developing will help to offset world hunger by increasing nutritional food supply.

On one hand, the research being conducted at NELH will provide the world with a more efficient form of food production as well as new profitable techniques in commercial aquaculture. On the other hand, OTEC research is establishing alternative methods to fossil fuel combustion as the worlds leading power supply. Once fully out of the research mode, this clean system of energy production may power much of the state of Hawai'i and other parts of the world as well as aid in slowing down the greenhouse effect.

The MOP staff would like to thank Kelen Dunford for giving an excellent tour of NELH.

For any further information about NELH please contact:
National Energy Laboratory of Hawai'i
P. O. Box 1749
Kailua - Kona, Hawai'i 96740

Return Address: Return Requested
Marine Option Program
Univ. of Hawaii-Hilo
523 W. Lanikaula St.
Hilo, Hawaii 96720

George Balaz
2570 Dole St.
Honolulu, Hi. 96822

From "IMUA HILO" Univ. of Hawaii at Hilo Vol. 3 No. 12 March 15, 1984

M.O.P. Update

The Hawaiian Green Sea Turtle is on the endangered species list and has been protected by both state and federal law since 1978. How are the turtles doing? Is their population growing or continuing to decline? Answers to these questions and others including turtle feeding behavior, growth rates, and sex ratios are being answered by a group of UH-Hilo Marine Option Program students in a project funded by the Sea Grant College Program.

The students are being trained and directed by George Balazs, internationally recognized sea turtle expert with the National Marine Fisheries Service and The Hawaii Institute of Marine Biology.

Two different techniques are used for catching turtles in the study. In one, a team of specially trained student SCUBA divers search for turtles sleeping in caves or holes just offshore. The turtles are carefully wrestled to the surface, pushed into a rubber boat and briefly taken ashore for measurement and study. The second technique involves catching the turtles at night in special turtle nets. There have been numerous weekend SCUBA diving expeditions since the beginning of fall semester and netting expeditions in December, January, and February, with more planned for March, April and May. The following account of the most recent netting expedition catches the spirit of the students' experience.

M.O.P. Goes Turtling on the Big Island

By Nancy Bernard

The Turtle Project contingent of Hilo M.O.P. has just returned from a long weekend of tagging turtles at Punaluu, on the south side of the Big Island. Lucky for us (one again), we had beautiful weather. We keep hearing rumors about the cold strong winds that come tearing down off the slopes of Mauna Loa, but all we've seen so far are sunny clear days and calm, full moonlit nights. It's almost worth getting up to watch the turtle nets at 2:00 a.m. when you know there is a big beautiful full moon, swaying palm trees and a gently lapping sea. Of course, there is always the ever approaching reality that at any minute you might be forced to climb into soggy swim suits just to wrestle the 250 lb. turtle that is caught in the net.

But it's all good fun and very worth it, even after you look through the binoculars and spot the flippers flashing about in the moonlight. OH! OH! another turtle bites the net. So, you put down the binocs and turn to your buddy, "Should I wake up George or Chris this time?" knowing that George hasn't slept more than an hour all night and Chris just got off watch at 3:00 a.m. Guiltily I run back to the pavillion and shake Chris awake, it's 3:30 a.m. "Hey, Chris, wake up, there's a BIG one in the net!" Chris looks at me in shock and disbelief. "You weren't supposed to check the net for another 10 minutes." Poor Chris, up again just so we can plunge into the icy cold water.

Meanwhile, back on the beach, the others are suiting up: two people to pull the turtle out of the net and one to hold the light. Chris comes back half asleep and the three of us swim out to the net, and to our surprise we discover a second turtle stuck in the net. Wow! that makes six turtles caught tonight. After forty-five minutes both turtles are on the beach lying on their backs next to the other caught turtles. There they rest for the duration of the night, all in a line like beach chairs on the French Riviera, waiting to be tagged, measured, and weighed.

Morning arrives. The breakfast crew prepares pancakes, fruit, cereal, coffee, and hot chocolate. Ono grinds! Hilo M.O.P. is really getting the gourmet food prep down to a science, no one starves at the Punaluu Pavillion Diner. Head chef Leon Hallacher really out-did himself this time: Tacos for dinner, saimin and sandwiches for lunch, and French toast for breakfast.

After breakfast, the half-awake group gathers on the beach to (as George puts it) "processa" the turtles who are calmly sunbathing on their backs. The sun is already up and the turtles are starting to look kinda hot. Diane pours water on their bellies to cool them off, and picks off parasitic turtle barnacles. Every inch of their turtle bodies are measured, then they're tagged and weighed and finally blood samples are taken so that their sex can be determined. And then the moment we've all been waiting for: freedom! The turtles are turned over on their stomachs with their heads pointed towards the sparkling sea. On little flippers they charge to the water and fly through the surf, freedom at last.

Turtles work at night so the daylight hours are mostly spent sunning on lounge chairs and picnic tables or sleeping in steaming hot vans. We all rest waiting for the two-hour night shifts. Two days of turtling can really be exhausting but it's always challenging and it's always fun. As the end of the weekend approaches we all prepare to leave. The nets are taken out of the water and then the long process of untangling the knots begins. Six big turtles trapped in a net can really twist things up. After three hours of untangling and mending, the gear is packed up in various vans and cars and we're off! Another exciting weekend of turtling has come to an end. □

campus corner

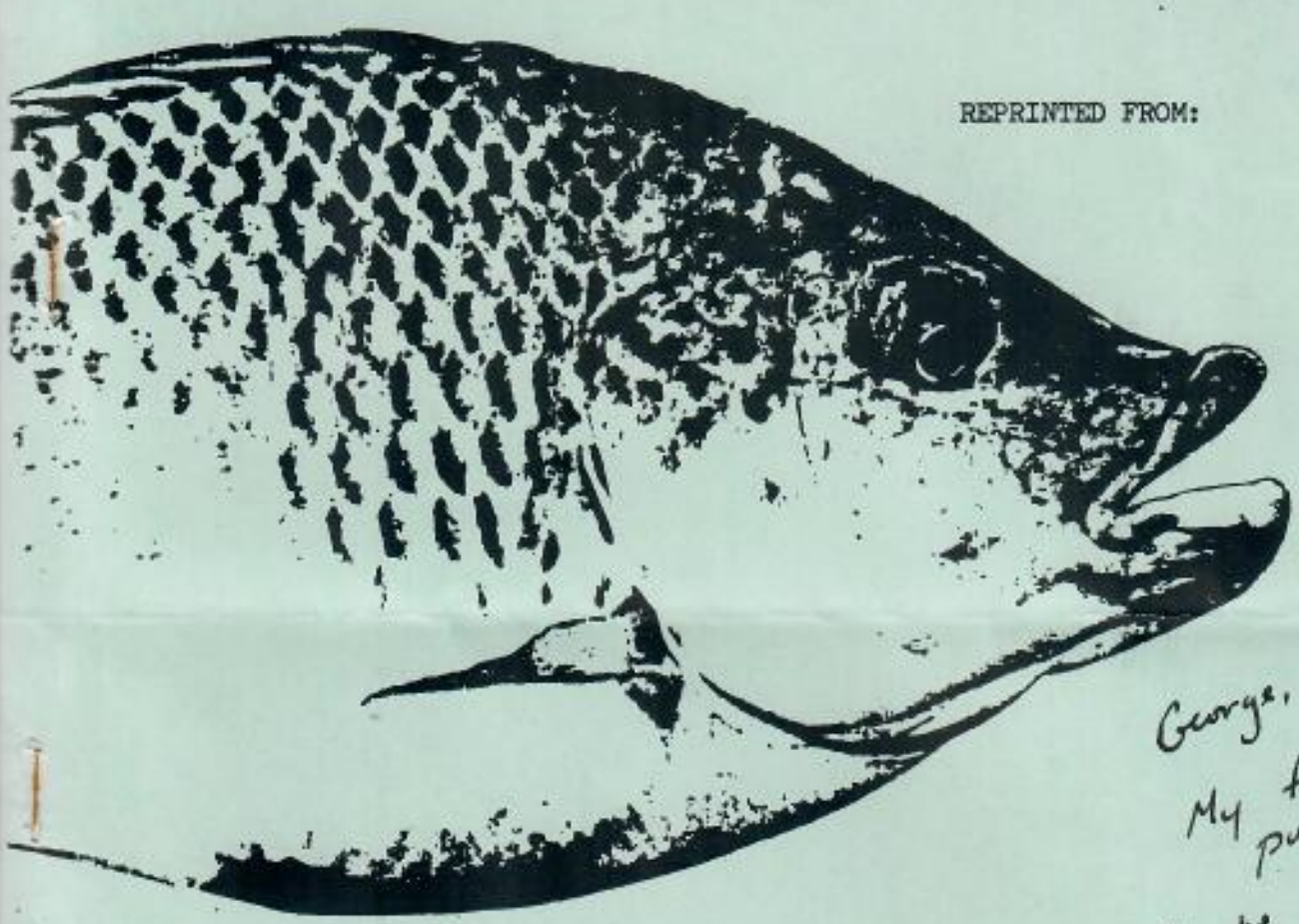
Dr. Donald A. Wells, Emeritus Professor of Philosophy, College of Arts and Sciences, University of Hawaii at Hilo, has just published a new book, War Crimes and Laws of War, by the University Press of America. This is his second volume on the subject of war. His earlier book, The War Myth, was published by Bobbs-Merrill in 1967.

Professor Wells

The starting point for the present book is the war crimes trials held both at Nuremberg and Tokyo and later in "occupied" countries following World War II. These Trials prosecuted Germans and Japanese for three offenses: 1) war crimes, 2) crimes against humanity, and 3) crimes against the peace. The major arena for both war crimes and crimes against humanity were the extermination camps and the prisoner of war camps. The victims were either soldiers who had surrendered or civilians. The crimes against the peace were based on the premise that "aggressive war" was an offense.

The major argument of the Nuremberg prosecutors was that those who were charged had committed "excessive" slaughter, that the slaughter had not been militarily necessary, and that they had ignored the traditional combatant - non-combatant distinction. They appealed to the declarations of the Hague and Geneva Congresses, all of which had forbidden attacks on either prisoners of war or civilians. At the time of the Trials the Allies had disagreed over whether there existed adequate grounds for having the Trials at all. War, after all, was a sovereign right of nation states, so how could there be anything criminal about killing in wartime? The fact was that no German or Japanese was prosecuted for deeds committed against soldiers or civilians on the conventional battlefield. They could all be shot, stabbed, napalmed, gassed, poisoned, or bombed indiscriminately from the air. The only protections were for those imprisoned.

See campus corner ...Page 3



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A New Floating Fish Pen for Hawaiian Waters.

Arlo W. Fast and Diane Mazarakis

INTRODUCTION

Pond reared fish may be reared directly in the pond, or they may be reared in enclosures such as floating fish pens. Although there are costs associated with fish pens, they also have many attractive attributes. Probably the two most important attributes are that pens do not require much expensive real estate, and they require a relatively low capital investment compared with most land based fish rearing operations. These characteristics are not trivial in places like Hawaii where land costs are high, and land is in short supply.

Most natural fish ponds of any size, such as the ancient Hawaiian fishponds, are very difficult to manage for a variety of reasons. In particular, most of these ponds cannot be drained. This alone severely complicates stock assessment and harvest. Without proper stock assessment, it is difficult to accurately determine feed requirements, and to adequately distribute the feed to the fish. In addition, most natural ponds are large, with irregular shorelines and bottom topography. This makes predator control often impossible, and poaching a serious problem. It is also difficult to control immigration of nuisance species, and to apply medication to the cultured species. Fish rearing densities must normally be low in these ponds.

Fish pens, by comparison, alleviate many of the problems associated with the open pond rearing of fish (Table 1). Since the fish can be reared under high density in the pen, stock assessment, feeding, harvesting, predator control and other aspects are greatly simplified. These benefits of pen culture notwithstanding, there are also some potential problems, such as siting, mooring, biofouling, electrical power delivery and access. The benefits and problems with fish pen rearing are often quite site specific, and must therefore be weighed based on site conditions.

Types of Floating Pens

Off-shore pens can be generally classified as either floating or submerged. Rothwell (1981) has done considerable work on submerged pens in Hawaii, based on this work, Huguenin and Rothwell (1979) speculated on the large scale application of this technology in a tropical setting. These designs and speculations are innovative and unique, but they will not likely be used in the near future for a variety of technical and social reasons. The only submerged pen design now in routine use is a "submersible" design used in Japan (Hanson 1974). These open mesh pens are normally operated at the surface, but can be lowered to some depth (e.g., 20 to 40 feet) to avoid damage during storm conditions.

Floating off-shore pens are constructed of either open-mesh netting, or of non-permeable, flexible plastic. The open mesh design is the most commonly used at this time. A typical example of this design is shown in Figure 1. The net pen design consists of a walkway-float from which a series of rectangular net pens are suspended. This design is particularly appropriate where tidal or other currents provide adequate flushing (water exchange) rates, and where biofouling is not severe. Domsea Farms in Puget Sound operates the world's largest floating pen design of this type. It had many technical problems with mooring and maintenance during early development, but these have largely been solved, and the installation can easily survive waves of 7 feet in height or higher (Jon Lindberg, personal communication, 1982). The floating net-pen is also used extensively in Norway where trout and salmon are reared in fjords (Hansen and Lent, 1982). Open mesh, floating fish pens are also widely used throughout Asia, and elsewhere. Papers on the design and use of these pen systems were published by the Aquaculture Department of SEAFDEC (1979).

Several different floating fish pens with plastic liners rather than open-mesh netting have been proposed and/or used. One of the most significant operational systems of this type is the floating hatchery described by Heard and Martin (1979). This hatchery was located in Little Port Walter Bay, Alaska and used to rear salmon. Water for the hatchery was supplied by gravity flow from a nearby freshwater stream. The low volume of freshwater flow limited water exchange rates in the pens to 0.1 to 0.4 volumes/hr., but fish production densities ranged from 0.2 to 0.6 lbs/ft^3 of pen volume. The pens were built in a variety of configurations and utilized nylon reinforced plastic liners of different thicknesses. Weight of the plastic liners ranged from 0.25 to 1.25 lbs per square yard. This paper also describes the benefits of plastic pen liner as opposed to netting, since they first used netting unsuccessfully.

Fremont (1972a,b) proposed two similar floating pen designs. These designs included some unique features, such as a double-walled construction of plastic liner, articulated float construction and special means for water inflow and outflow.

Fast (1977) also proposed a floating pen design which has a plastic pen liner. This design is especially appropriate for thermally stratified waters where cold water can be upwelled into the pen and fish such as trout or salmon can be reared in the pen. Compressed air can be used to upwell the water, or it can be pumped by mechanical means. This design has not yet been tested.

Water Exchange

Regardless of whether fish are reared in raceways on shore, in ponds, in mesh net pens, in plastic liner pens, or whether the pen is floating or submerged, the rate of water exchange through the pen is of greatest importance. The rate of water exchange determines the maximum number of pounds of fish that can be reared in a given pen. This in turn affects your capital costs, since a small pen with a high water exchange rate can rear more pounds of fish per year than large pen with a very low water exchange rate.

Westers (1970) has determined the theoretical relationships between water exchange rates, fish densities, fish size, and water temperatures for salmonids. Although his nomographs are for salmonids (trout and salmon), the same relationships hold for most other species of fish which can be cultured intensively in pens. According to Westers (Figure 2), 6.5 inch fish reared in a pen with only one water exchange rate per hour can be reared to a maximum density of only 1 lb/ft^3. By comparison, if the water exchange rate is 6 times per hour, maximum densities of more than 5 lb/ft^3 are possible. Consequently, if you wished to rear one ton (2,000 lbs) of fish, a cubic pen 12.5 ft on a side would be necessary in the first case, but only 7.5 ft on a side in the latter case. The smaller pen would be much less expensive to build and maintain.

Water exchange in net pens usually depends on tidal, gravity or wind driven currents. These are often unreliable, and the fish stocking density is therefore related in some way to the minimum water exchange rate during the culture cycle. This often means that relatively low fish densities must be maintained in the pen, or the grower risks a major loss. Water exchange may be increased during low current conditions by air lift or mechanical pumping. Although this is possible, it is seldom used since it requires additional expense, and a system for sensing when increased circulation is needed.

New Pen Design

Based on the foregoing considerations, and on the recent development of low-cost, low-energy axial flow pumps, we have designed and tested a new floating fish pen which uses a plastic liner and a high rate of water exchange through the pen. The principal innovation here is the application of these axial flow water pumps which were first used by Garton (1981) to artificially circulate lakes and reservoirs, and later by Fast et al. (1983) to circulate aquaculture ponds.

DESCRIPTION OF FISH PEN

The fish pen consists of three basic components: (a) flotation frame; (b) plastic pen liner; and (3) pump motor and assembly (Figure 3). The flotation frame used on the prototype pen consisted of 12 inch, class 100 PVC pipe, filled with polyeurathane foam which was foamed in place. The flotation frame had inside dimensions of 15x30 feet. The corner braces on the pen consisted of a welded steel plate configuration (Figure 4). Wooden spacers were attached to these fittings, and iron compression bands securely clamped the pipe to the corner braces. A 1 foot piece of 2" ID pipe was welded through the brace vertically to provide support for a shadecloth cover and demand feeders. The corner braces and bands were galvanized. A trip of 2x4 inch wood was bolted to the frame for attachment of the plastic pen liner.

The plastic pen liner consisted of 22 oz., polyester reinforced coated polyvinyl plastic. The configuration was a half cylinder measuring 15x30x7.5 feet (deep) as shown in Figure 3, except that the prototype also contained a 8x30 foot partition which divided the pen lengthwise into two halves. The top of the liner had a 3/8" manila rope heat sealed into a hem to facilitate attachment to the flotation frame. Two triangular outlet screens consisting of 1/4" square galvanized wire were placed on the end of the liner (not on the bottom as shown in Figure 3). The wire was attached to a PVC frame which was bolted to the pen liner in such a way that the screen could be removed (Figure 5). The inlet (pump motor) was also covered by 1/4" square galvanized wire screen. The pen liner was attached to the flotation frame by compressing it between two pieces of 2x4 inch lumber (Figure 6). One piece of lumber was lag bolted to the frame, while the other was lag bolted to the first piece of lumber. The rope hem was placed on top to prevent slippage. All seams on the liner were heat sealed. Brass grommets were placed along the ends such that knotted ropes could be placed through these holes to facilitate attachment to an outer frame (if used), and to facilitate collapse of the bag during harvest.

The motor assembly consisted of a metal frame into which the axial flow pump fit. The pump consisted of a 1/4 hp motor with gear reduction (60 rpm), and a 24 inch fan propeller. This is based on an earlier pond circulator design described by Fast et al. (1983). The pump was mounted vertically as shown in Figure 3, except that a second piece of 12 inch flotation pipe was attached outboard of the pump. An intake screen was located below the propeller, and another screen was located inside the pen to prevent fish from swimming into the pump.

The pump was configured in the frame assembly such that it could be removed in place without disassembling or removing the entire frame.

After installation of the pen, a shadecloth and frame were installed over the pen. The frame consisted of four 1-1/2x30 inch pipes fit into the corner brace pipes, and a cable strung between the tops of these four pipes. The shadecloth fit over this frame, and was attached to it by twine (Figure 7). The side flaps on the shadecloth had battens sewn on the lower edge such that 1-1/4 inch pipe could be inserted to hold down these flaps in high winds. The pipe was water filled and capped. The shadecloth served several functions: kept predators out (especially birds); kept the fish from jumping out; and prevented sunburn of the fish.

Costs

Material costs for a modified version of the fish pen will total about $5,000 (Table 2). Modifications include: (1) replacement of the iron corner braces with standard PVC fittings. Iron was used so that the pen could be easily disassembled and removed; (2) the pen liner would not have a center partition; (3) the water pump assembly would be constructed such that the blade would be in the vertical position rather than the horizontal. This revised configuration would have a belt drive, rather than a direct drive, and would be similar to an undescribed pond circulator used by ORCA Sea Farms, Inc., Hawaii (Guy Rothwell, personal commun., 1984).

The labor to construct the pen is more difficult to determine, but it most likely could be assembled by two people in one week once all of the components were assembled. The first time the pen was constructed would of course take much additional time for planning, ordering, assembly of components, and installation.

Electrical operating costs for continuous operation of the 1/4 hp motor are $425/year. Assuming only one fish crop per year of 10,000 lbs, the cost per pound for electricity is only $0.0425. Electrical rates could be further reduced by installing two smaller axial flow pumps and then staging their operation such that only one pump is operated when the fish are small. Two, 1/8 hp pumps with 16 inch fan propellers would probably suffice. We recommend this configuration in any event as a back-up in case one of the pumps fails. Each pump should have its own power line and breaker system.

Facilities cost for the new fish pen configuration should compare favorably with more conventional rearing facilities. The National Research Council (1978) estimated that trout rearing facilities typically have capital costs ranging from $1.50 to $10.00 per pound of production. Depending on the particular location, the capital costs for the pen configuration presented here should not exceed $1.50/lb of production. The materials cost only for the pen are about $.50/lb (Table 2).

STUDY SITE

The fish pen was installed and tested at Haena Fishpond, Kauai; about 8 miles south of Hilo on the Puna coast (Madden and Paulsen, 1977). The pond is spring fed with cold (18° to 20°C) freshwater. Salinity normally does not exceed $1^{0}/_{oo}$, but during strong storm conditions it may exceed $20^{0}/_{oo}$. The pond is about 200 feet from the ocean, and connected with the ocean by a man-made channel. During storms, seawater may back up through this channel into the pond. Water surface area exceeds 10 acres, with a maximum depth of 15 feet. Average depth is perhaps 3 feet. Haena Fishpond was used by native Hawaiians for fish production, but is now owned by W. H. Shipman, Ltd. It was also one of the last homes of the nene (Hawaiian goose), before this species was saved from extinction (Ripley 1965).

Like many other coastal freshwater ponds along this section of coast, Haena Fishpond is subject to tidal fluctuation of 1 to 2 feet in rhythm with the ocean tides. Although the pond water is fresh, subterranium connections between the pond and the ocean result in a hydraulic system, and thereby tidal fluctuations in the pond. The freshwater lense also floats on any seawater which may infuse underground.

There is a large net outflow of freshwater from the pond. Outflow ranges from 20 to 40 million gallons per day. It varies seasonally depending on the amount of rainfall, and diurnally depending on the tidal stage.

Water quality in the pond should be similar to other spring-fed ponds in this area, with dissolved oxygen near saturation, low dissolved solids, and generally clear, clean water. Unfortunately, the pond was contaminated by seepage from Puna Sugar Mill discharges. The mill is less than 2 miles up mountain from the pond. These discharges, which averaged 8 to 10 million gallons per day, were characterized by very high B.O.D. and suspended solids. At times oil and other hydrocarbons were also discharged by the mill operators. These discharges were allowed to infiltrate into recharge areas upstream from the pond. The discharge water blended with other groundwater and entered the pond through certain

springs. This situation greatly depressed oxygen concentrations in the pond and resulted in fish mortalities. The mill ceased sugar processing during September 1984, and the oxygen concentrations in the springs and pond have slowly improved (Figure 8).

MATERIALS AND METHODS

Our original intent was to compare the growth, survival and feed conversion of two strains of rainbow trout fed the same feed: the redband strain, and the Hildebrand strain from Lassen Trout Farms, California. We had planned to stock the respective strains on opposite side of the pen, separated by a center partition. In preparation for this comparison, we stocked 1,200 fish of the California strain into a 4x4x10 foot net cage at Haena Fishpond during July 1984. Within days most of these fish died due to pollution from Puna Sugar Mill.

As a result of the fish kill in August, we suspended the test until November, when the pond showed signs of recovery after Puna Sugar Mill stopped processing cane. Because of this delay, and fish kill, we were also forced to limit our comparisons to the redband strain only. We then decided to make a comparison between two formulated feeds, which were produced locally.

During May 1984, eyed redband trout eggs were imported to Hawaii from the Innis National Fish Hatchery, Montana. This strain originated from eastern Oregon. The eggs were incubated and hatched in the recirculation hatchery system at the Natural Energy Laboratory of Hawaii (NELH) described by Katase, Fast and Barclay (in press) and Grau et al. (in press). The fry were then placed in a freshwater recirculation system similar to those used to rear coho salmon (Oncorhynchus kisutch) and Chinook salmon (O. tshawytscha) at this same facility (Grau et al., op. cit.). They were fed standard Rangen formulated feeds imported from Washington State, but feeding rate was greatly reduced to retard the fish's growth rate.

During the third week of November, 3,840 redband fry were stocked in the fish pen at Haena Fishpond. They were divided equally between the two halves of the pen, and fed Rangen feed as before until December 21, when the new feed formulations were fed. Feeding rates in the pen were determined using feeding schedules recommended by Leitz and Lewis (1980). The fish were stocked in October at about 5 cm average total length. Length measurements were made during the third week of December, and again a month later.

The feed formulations fed to the trout starting in December 1984 were produced by Fred L. Waldron, Ltd., a feed manufacturer in Honolulu. Mr. Bert Maxwell developed the feeds based on diets published by the U. S. Fish & Wildlife Diet Development Center, Spearfish, SD (Reinitz et al., 1978). Both diets contained 38% crude protein, except that one diet contained 25% anchovy fish meal, while the other contained 12.5% fish meal. Soybean meal was the other main protein ingredient which compensated for the reduced fish meal component in the latter formulation.

Surface dissolved oxygen was determined using a modified Winkler method (Fast 1971). The sample was collected by scooping without agitation. Surface temperatures were measured using a pocket thermometer. These measurements were made at one of the springs which was receiving mill wastes, and at a location adjacent to the fish pen.

RESULTS AND DISCUSSIONS

Pen Operation

We assembled and installed the fish pen during July 1984, and began operation during August without fish. The pen operated as planned, except for the following problems: (1) clogging of the intake screen; (2) entrapment of air under the bag; (3) power outages; (4) waste accumulation on the bottom; and (4) shade cloth damage. The intake screens were occasionally clogged by drifting macrophytes which continually break loose and float from the pond with outflow. If they drift into the vicinity of the pen, the pump current draws them onto the screen where they restrict the inflow. This is a greater problem as the fish near the carrying capacity of the pen, and during times when there are many floating weeds. This can be avoided by suspending a large mesh net around the pump area; perhaps a nylon bird net measuring 15 x 15 feet at the surface would suffice.

On one occasion, a strong storm generated ocean waves which came up the discharge channel and into the pond. The wave propagated through the pond and broke over the pen frame. Large volumes of sea water also entered the pond and increased the salinity from less than 1°/oo to more than 17°/oo over a two day period. During this time, we were aerating the pen with a blower and diffuser inside the pen. The turbulence created by the waves somehow cause the formation of an air pocket under the pen liner and it was lifted to the surface. This greatly reduced the volume of the pen, although the pen continued to operate and we lost no fish. This problem can be avoided by installing a semi-circular pipe

frame at each end of the pen, and by attaching the liner to the frame by rope through grommets in the liner.

Power outages occurred on two occasions, but fortunately the standing crop of fish was small, and no mortalities occurred. This problem can be avoided by providing an emergency generator back-up, or by providing some other means of keeping water flowing through the pen, such as: a compressor and air lift pumps; outboard motors (electric or gasoline); or water pumps. It would be desirable to locate in an area with reliable power.

More waste materials accumulated on the bottom of the pen than we expected. This problem can be avoided by using a small electric water pump and a swimming pool "vacuum" hose and sweep. Daily cleaning should not take more than 20 minutes and it will keep the pen clean.

The shade cloth was damaged during high winds when the side flaps were blown around and the PVC bottoms were ripped out. We did not have water in the pipe at that time. Water filled pipe should prevent this problem in all but the highest winds.

In addition to the above, we also recommend that removable screens be installed on the inlet and outlets, so that they can be routinely removed and cleaned. This is less of a problem in freshwater since there is little fouling problem compared to sea water. We have not designed removable screens yet.

Fish Production

The main purpose of this paper is to describe the design of the new pen and its operation, and secondarily the production of fish in the pen. The late start caused by pollution of the pond delayed our growout experiments, but we did observe two months of growth. This experiment is still ongoing.

Oxygen measurements taken in the spring, and near the fish pen clearly indicate the extent of the pollution problem. During September 1984, dawn oxygen concentrations in the spring did not exceed 0.2 mg/ℓ, nor 2.5 mg/ℓ near the fish pen (Figure 8). After the sugar mill reduced their discharges in mid-September, oxygen concentrations have gradually increased with more than 2.0 mg/ℓ in the spring and 4 to 5 mg/ℓ near the pen during most of late December 1984 and January 1985. These trends seem to be continuing. Temperatures during this period ranged between 18°C and 20°C, and did not seem related to rainfall or other obvious factors.

Fish growth on the Rangen feed (November/December), was not measured. We did measure growth on the new feed formulations during December/January. Based on small subsamples of fish, the fish grew 3.3 cm (1.3 inches), from 8.2 to 11.5 cm during this month on the 25% fish meal formulation. They grew 3.9 cm (1.5 inches), from 9.0 cm to 12.2 cm during this same time on the 12.5% formulation. We observed less than 1% mortalities during this period from either group. These results are preliminary, and we did not compute feed conversions.

Although we might expect more problems with disease, and feed conversions above 18°C (Fryer and Pilcher, 1965; Brett et al., 1969), we did not experience this with the redbands, nor have other trout farmers in the Hilo area had these problems with other rainbow trout strains, that we know of. Although prolonged exposure above 24°C is considered lethal for most rainbow trouts, they can tolerate short-term exposures even greater than 27°C (Soushi, 1982, 1983; Caldron, 1965). Redbands may be even more tolerant than other strains of rainbow trout since they evolved in an even more rigorous climate.

Although the genetics of redbands is rather complex, including species and subspecific differentiation, there are some redband groups which seem to have high temperature tolerances. According to Behnke (op. cit.), these groups are, "...the 'arid lands' redband trout, often existing and seemingly flourishing under what would be considered as intolerable conditions for trout. As I mentioned, I collected the Chino Creek trout by angling with artificial flies in water of 83°F. The stream was intermittent, consisting of warm, stagnant, green water. Yet the trout could be readily caught on flies, were in fine condition and put up an excellent fight when hooked. To a trout biologist, these arid lands redband trout are amazing fish."

CONCLUSIONS

The pen operated as intended, although there are improvements which can be made in the design. These improvements should result in more reliable operation, and better fish production.

Initial, short term results indicate that the fish grew equally well on the two locally produced feed formulations. These tests are ongoing, and will not be concluded until June 1985.

ACKNOWLEDGEMENTS

We are most appreciative of the monetary and logistical support provided by Mr. Roy Shipman Blackshear of W. H. Shipman, Ltd. W. H. Shipman, Ltd. kindly allowed us to use their Haena Fishpond; provided assistance with feeding the fish; storage areas for feed; a laboratory/office area; electricity to operate the pen; and made a monetary donation in support of the project. No less important are the contributions by the funding agencies: The Aquaculture Development Program, State Department of Land and Natural Resources; and the Department of Research and Development, County of Hawaii. In addition, many other people contributed to this project by assisting with the construction, installation and operation of the pen, including: Gerald Akiyama, Stanley Iga, Mike Young, Lisa Hall, David Barclay and Steve Katase.

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Table 1. Comparisons between an open pond fish rearing system, a net (open mesh) pen system, and a plastic bag pen system.

	Consideration	Open Pond	Net Pen	Plastic Bag Pen
1.	Predator control (birds, fish, etc.)	(-)	(++)	(++)
2.	Stock assessment & control	(-)	(++)	(++)
3.	Harvestability	(-)	(++)	(++)
4.	Feeding	(-)	(++)	(++)
5.	Vandalism and poaching	(-)	(++)	(++)
6.	Medication application	(-)	(-)	(++)
7.	Biofouling	(0)	(-)	(++)
8.	Capital costs	(++)	(-)	(-)
9.	Operating expenses	(++)	(+)	(-)
10.	Fish rearing density	(-)	(+)	(+++)
11.	Wave action	(+)	(+)	(0)

(-) = Negative feature with this system relative to other systems.

(0) = Not applicable, or unknown.

(+) = Positive feature.

(++) = Very positive feature.

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Table 2. Materials cost estimates to construct one 15x30 foot floating fish pen of the basic design described herein.

	Item	Cost
1.	Flotation Frame	
	a. PVC pipe; 12 inch dia.; class 100; 90 ft @$6/ft.	$ 540
	b. PVC 90° elbows; 12 in. dia.; sched. 40; 4@$200 [1]	800
	c. Polyeurathane foam; 2 part liq. to foam in place; 2 lb/ft^3 density; 16 gal. @$22.50/gal.	360
2.	Plastic pen liner, 15x30x7.5 ft. (depth); 22 oz. coated vinyl/polyester; rope hem on top; grommets; delivered to Hawaii [2]	1,200
3.	Water pump; 24 in. axial flow design; 1/4 hp; motor w/speed reduction gears, drive shaft, belt, bushings, support frame, w/trash rack [3]	750
4.	Electric line; from shore to pen; 3 wire w/PVC pipe conduit; 10 gauge; 200 ft. @$1/ft.	200
5.	Shade screen; 15x30 ft w/2 ft. sides; 1-1/4 in. PVC pipe in battens to hold down sides; frame to support netting	400
6.	Miscellaneous lumber; hardware; anchor lines, anchors, etc.	400
	Total:	$4,650

[1] This is a modification of the prototype, since the prototype had welded iron corner fittings.

[2] Prototype custom made by American Poly Vinyl Corp., 4005 Carriage Dr., Santa Ana, CA 92704.

[3] Includes labor to fabricate. This is a modified design, not used on the prototype.

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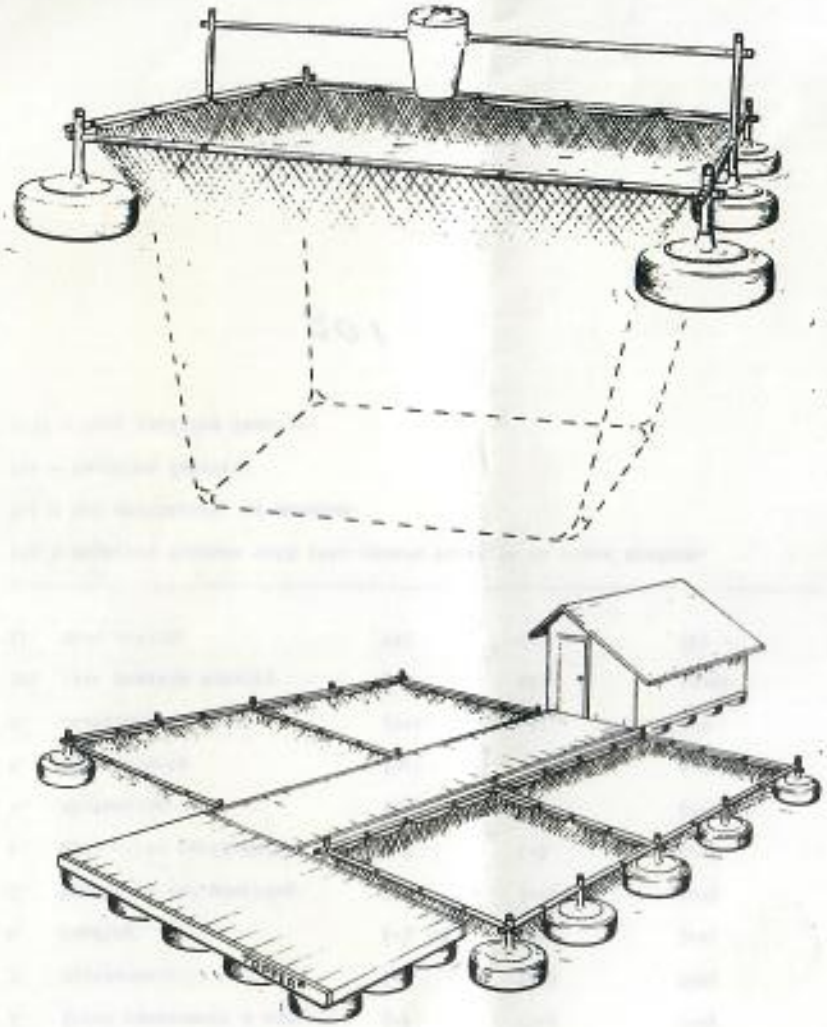

Figure 1. Typical open mesh net fish pen. The pen is suspended at the surface by a proprietary technique which used foam filled tires (from Topper Industries, Washington).

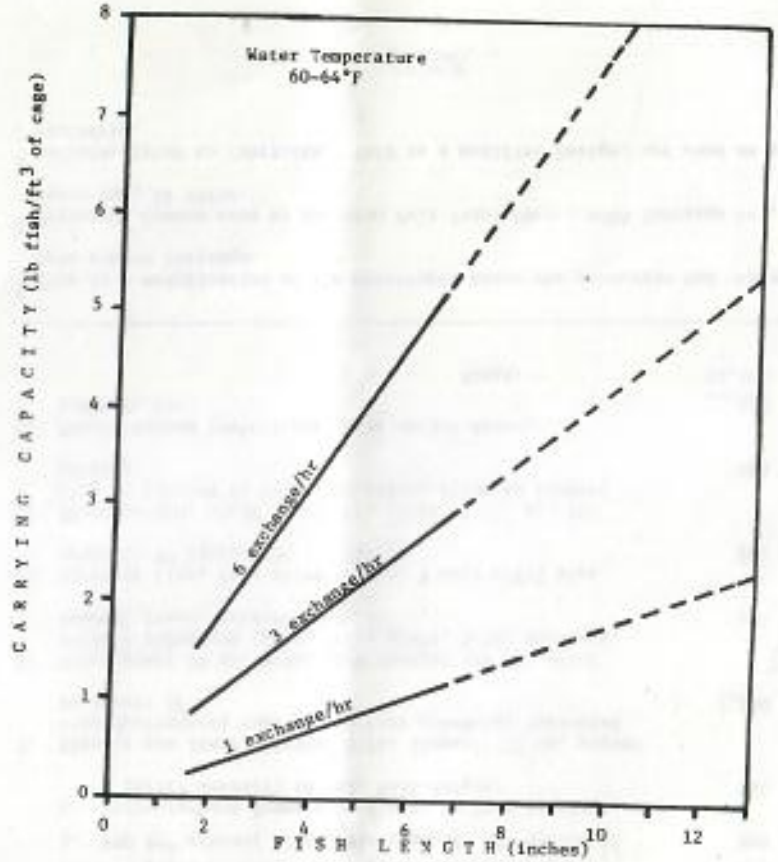

Figure 2. Theoretical relationship between fish size, water exchange rates and pen carrying capacity for salmonids reared in freshwater at 60° (from Westers 1970).

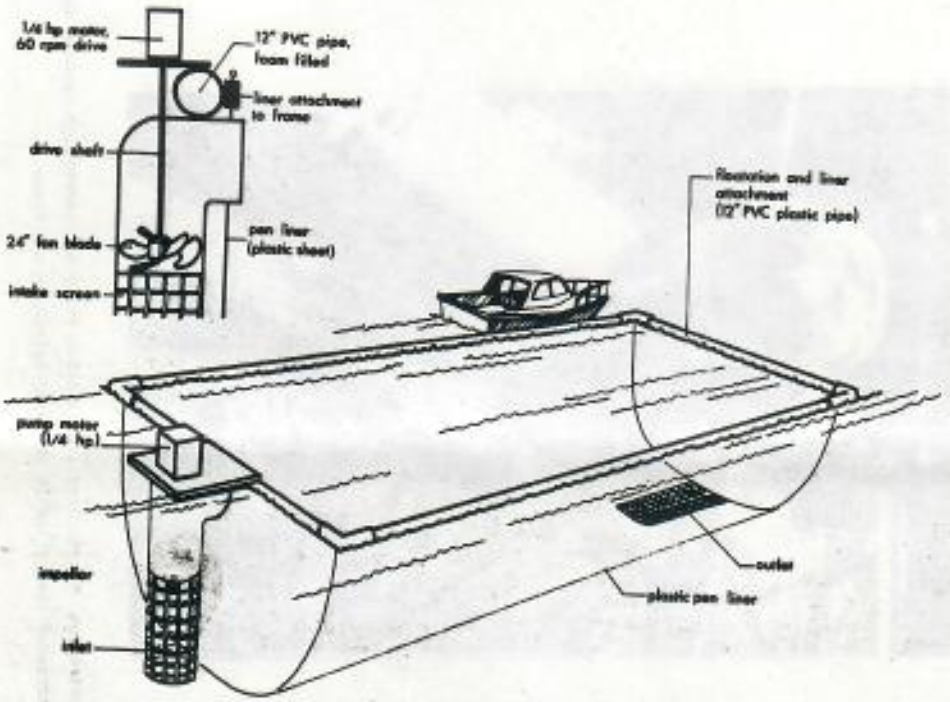

Figure 3. New floating fish pen design developed by this study. This pen uses a solid plastic pen liner, and an axial flow water pump to achieve high water exchange rates through the pen.

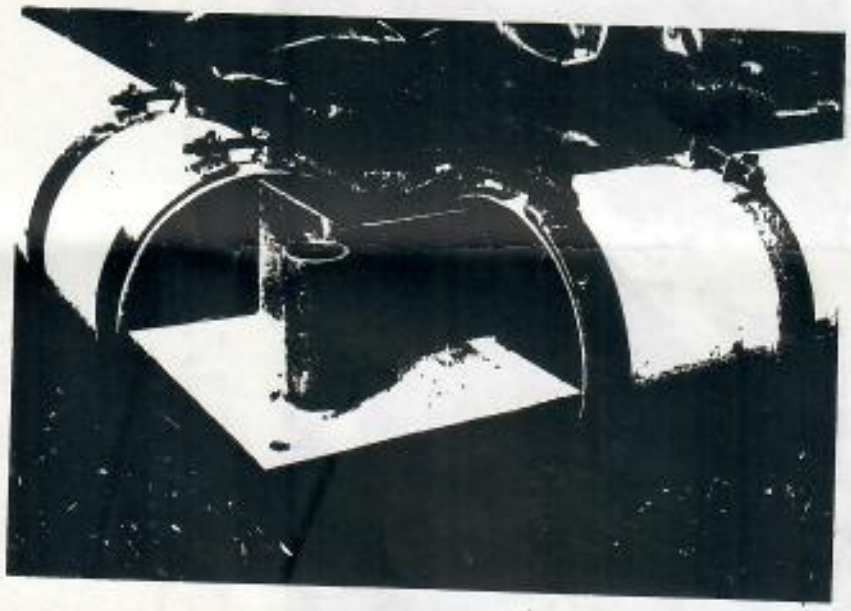

Figure 4. Galvanized steel corner braces used to hold the flotation frame together on the fish pen, and to provide support for the net covering.

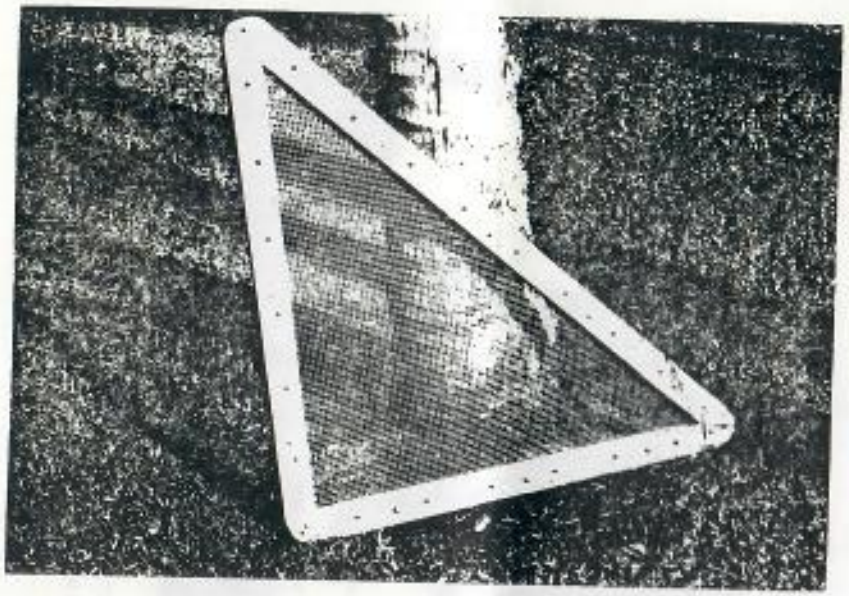

Figure 5. Triangular screen used on the outlet to the fish pen. Two screens were used, and consisted of galvanized wire bolted to a PVC plastic frame.

Figure 6. Attachment of pen liner to flotation frame by compression between two pieces of lumber, which were lag bolted to the frame.

Figure 7. Shadecloth covering over fish pen.

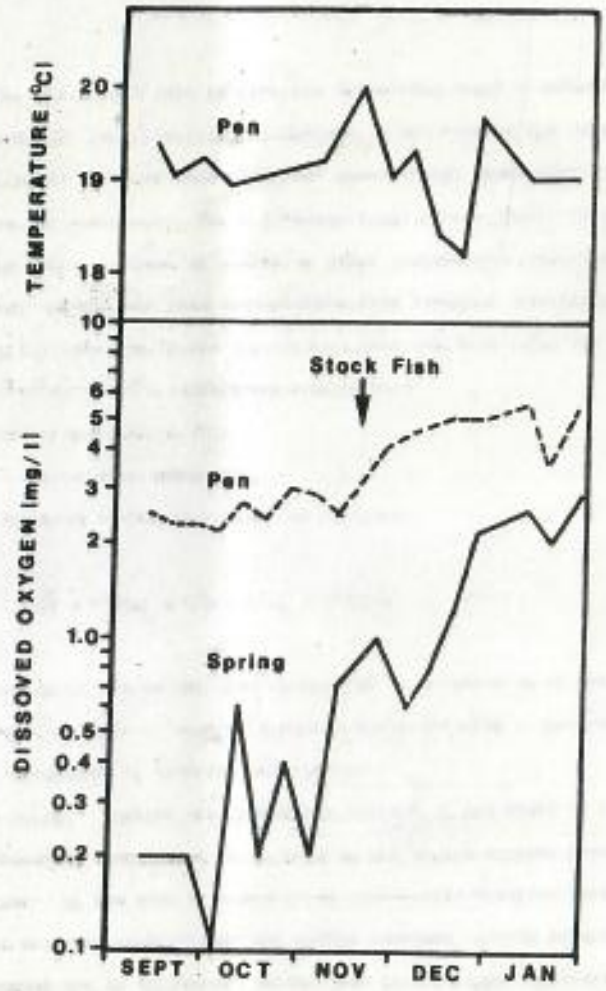

Figure 8. Surface temperature and dissolved oxygen concentrations measured at dawn in Haena Fishpond near the fish pen, and at a spring containing mill wastes during September 1984 through January 1985.

Proceedings of The Marine Option Program Student Symposium

Third Meeting

Sponsored By:
Marine Option Program - U H
Sea Grant College Program

VOLUME III

MARCH, 1986

THIRD MARINE OPTION PROGRAM STUDENT SYMPOSIUM

UNIVERSITY OF HAWAII AT HILO

CAMPUS CENTER - ROOM 306-307

MARCH 1, 1986

CHAIRPERSON: Anne M. Orcutt

SPONSORING ORGANIZATIONS

MARINE OPTION PROGRAM - UNIVERSITY OF HAWAII

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University of Hawaii at Manoa

Marine Option Program
1000 Pope Road, Room 229 • Honolulu, Hawaii 96822
Telephone: (808) 948-8433

1 March 1986

Welcome to the third annual Marine Option Program Student Skill Project Symposium! We dedicate this to Dr. Albert J. Simone in conjunction with his inauguration as the tenth president of the University of Hawaii. March has been designated as the month of activities to celebrate this event, and we are honored to be second on the calendar. During his short association with the University, Dr. Simone has shown a personal interest in MOP and has become a friendly supporter. We welcome his appointment as presdient.

The Symposium was designed as an opportunity for students to showcase their research, internships, and independent study projects. For many this is their first experience in making a formal, public presentation--this will contribute toward their practical preparation. The judges will evaluate each presentation based on content, organization, use of audio-visual aids, speaking ability, fielding of audience questions, and the abstract prepared. Those talks of adequate quality will satisfy the "final report" requirement for earning a MOP certificate. Skill project sponsors have given generously of their time and experience- each is noted with the abstract.

This is the first time the Symposium has convened away from Manoa, and we are grateful to the UH Hilo MOP students and staff for handling the local arrangements. The program was arranged by Manoa Coordinator, Anne Orcutt, and all the coordinators helped students prepare their talks: David Krupp (Windward), Leon Hallacher (Hilo), John Gerdes (Maui). Our travel was ably arranged by MOP's administrative officer, Gail Browne-MacDonald. Funding for the symposium was provided by the UH Sea Grant College Program, the Ocean Resources Branch of the Hawaii Department of Planning and Economic Development, and the University of Hawaii. We appreciate their continuing support.

Sherwood Maynard

Sherwood D. Maynard
Director

and interpretative displays to help alleviate Hanauma Bay's worsening condition. It was hoped that by educating visitors, through new signage, they would have a more enjoyable, safer experience and the bay's fragile environment would be restored. Thus, MOP began surveying the marine life, water currents and visitor usage patterns.

By Fall, enough data had been gathered to begin signage recommendations. At this point, MOP joined efforts with those ideas, talents and resources.

One problem to surmount was the visitor's frame of mind when going to the bay. Most people were likely to be more concerned with the placement of their beach towels than with signs. Hence, the sign's location, content and appearance are of great consequence.

On June 1, 1986, after extensive work and consideration, the new signage and interpretative displays will be in place at Hanauma Bay, pending unforeseen difficulties. Then, new endeavors to educate the visitors and conserve nature's beauty will commence.

3. **MAINTAINING A MARINE AQUARIA.** Patty Ramos, Maui Community College, Kahului, Maui, 96732. Sponsor: Dr. John Gerdes, Maui Community College.

An aquarium is an enclosed system. This offers the advantage of direct observation of behavioral and feeding habits of marine species. Due to the relatively small size of the system, natural processes such as pollution, disease, and elemental cycles are readily observed and sometimes difficult to manage. This presentation will focus on the procedures of setting-up and maintaining a salt water aquarium for enjoyment.

4. **UHH MOP/NMFS GREEN SEA TURTLE STUDY.** Randy I. Nevins, College of Arts and Sciences, University of Hawaii at Hilo, Hilo, HI, 96720. Sponsor: Dr. George Balazs, National Marine Fisheries Service.

From September 1983 to July 1984 the University of Hawaii at Hilo Marine Option Program assisted the National Marine Fisheries Service in capturing green sea turtles (Chelonia mydas) for tagging and collection of life history data. The study site was Punalu'u Bay in the Ka'u district of the Big Island of Hawai'i. Some of the turtles captured had been previously tagged, and exhibited the most accelerated turtle growth rates recorded in the Hawaiian Islands.

RECORD OF DIVE

Date: 17 DEC. 1983

Max. Depth of Dive 35' Bottom Time :33

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U, HI

Time of Day IN: 0913 — OUT: 0946

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTLES - 2 TURTLES CAUGHT & TAGGED -
1 - 40cm (L), 1 - 80cm (L) already tagged.
SAW: 1 - 65cm (L), 1 - 85cm (L) underwater.

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS LETTER DESIG. - E - 1ST DIVE

Approved

Diver AKIGA, LAUBE, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 17 DEC 1983

Max. Depth of Dive 40' Bottom Time : 50

Performed for TURTLE PROJ.
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U

Time of Day IN: 14:15 — OUT :1505

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTES - 1 CAUGHT & TAGGED @ 50cm (L)
SAW 3 - @ 50cm (L), 4 - @ 80cm (L)

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. REPET. - 2ND DIVE, SI - 4h 29min.
NEW LETTER DESIG. - B
OLD DIVE LETTER DESIG. - I

Approved

Diver AKIGA, LAUBE, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 17 Dec 1983

Max. Depth of Dive 52' Bottom Time :32

Performed for TURTLE PROTECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U, HI.

Time of Day IN: 1135 - OUT 1207

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTLES -

SAW: 1 - @ 65-70 cm (L), 1 @ 80 cm (L)

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS, LETTER DESIG. - G, 1ST DIVE.

Approved

Diver DUDLEY, BERNARD, ORCUTT

Diving Supervisor

Company

6

RECORD OF DIVE

Date: 17 Dec. 1983

Max. Depth of Dive 25' Bottom Time :10

Performed for TURTLE PROJ.
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U

Time of Day IN: 1415 - OUT 1425

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

TURTLES -

SINUS TROUBLE - SURFACED

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS - 2ND DIVE - REPET. S.I. - 2h 8min.

NEW LETTER DESIG. - C

END DIVE LET. - C

Approved

Diver ORCUTT

Diving Supervisor

Company

7

RECORD OF DIVE

Date: 18 DEC. 1983

Max. Depth of Dive 40' Bottom Time :30/:40/:60

Performed for TURTLE PROJECT
(Customer Company)

Vessel SHORE DIVE

Geographic Location PUNALU'U, HI.

Time of Day IN: 0945 OUT: 1015 / 1025 / 1095

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

APPREHENDED 2 TURTLES – BOTH @ 60 cm (L)
SAW MANY – > 6 (2 marked w/ paint - already tagged)

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS –
ARIGA, BLAZAS, HALLACHER, KAICHI – OUT: 1015 – D
LAUBE, BERNARD – OUT: 1025 – E
CRAIG, GEORGE MILLER – OUT: 1045 – G

Approved

Diver KAICHI, ARIGA, BERNARD, CRAIG, BALAZ, HALLACHER,
~~Diving Supervisor~~ GEORGE MILLER, LAUBE
Company

8

RECORD OF DIVE

Date:

Max. Depth of Dive Bottom Time

Performed for
(Customer Company)

Vessel

Geographic Location

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Approved

Diver

Diving Supervisor

Company

RECORD OF DIVE

Date: 8 JAN 1984

Max. Depth of Dive 40' Bottom Time : 48

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U, HI

Time of Day IN: 1508 - out : 1556

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

1 TURTLE CAUGHT - @ 30 cm (W)

SEVERAL MISSED AND SEEN - @ 4

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. LET. DESIG. - F

Approved

Diver LAMBE, ARIGA, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 8 JAN. 1984

Max. Depth of Dive 40' Bottom Time : 38

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U

Time of Day IN: 1508 - out : 1546

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. LET. DESIG. - E

SURFACED 1:10 EARLY W/ BUDDY.

Approved

Diver ORCUTT

Diving Supervisor

Company

RECORD OF DIVE

Date: 8 Jan 1969

Max. Depth of Dive 7' Bottom Time —

Performed for Turtle Point.
(Customer Company)

Vessel Shore dive - Snorkel

Geographic Location Horseshoe - Punalu'u, Hi.

Time of Day 2145 - 2220

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Caught 2 turtles - 1@ 30 cm (w)
1@ 40 cm (w)

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Surface dive

Approved

Diver AKIGA, Kuchi

Diving Supervisor

Company

10

RECORD OF DIVE

Date:

Max. Depth of Dive Bottom Time

Performed for
(Customer Company)

Vessel

Geographic Location

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Approved

Diver

Diving Supervisor

Company

RECORD OF DIVE

Date: 9 JAN. 1984

Max. Depth of Dive 40' Bottom Time :42 / :53

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U, HI

Time of Day IN: 1011 — OUT: 1053 / 1104

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTLES — ONE CAUGHT/TAGGED, @ 25 cm(w)
3 SEEN U/W.

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. 1ST DIVE
ORCUTT, KAICHI — B.T. :42 — LET. DESIG. — F
LAUBE, DUDLEY — B.T. :53 — LET. DESIG. — G

Approved

Diver ORCUTT, KAICHI, LAUBE, DUDLEY

Diving Supervisor

Company

RECORD OF DIVE

Date: 9 JAN 1984

Max. Depth of Dive 40' Bottom Time :35 / :46

Performed for TURTLE PROJECT.
(Customer Company)

Vessel ZED BOAT

Geographic Location PUNALU'U, HI

Time of Day IN: 1431 — OUT: 1506 / 1517

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

4 TURTLES SEEN.

ORCUTT, KAICHI — S.I. 3h38min — NEW LETTER DESIG. — C
LAUBE, DUDLEY — S.I. 3h27min — NEW LET. DESIG. — C

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. 2ND DIVE — REPET.
DUDLEY, LAUBE, KAICHI — B.T. :46 — LET. DESIG. — H
KAICHI, ORCUTT — B.T. :35 — LET. DESIG. — G

Approved

Diver ORCUTT, KAICHI, LAUBE, DUDLEY.

Diving Supervisor

Company

RECORD OF DIVE

Date: 10th JAN. 1984

Max. Depth of Dive 45' Bottom Time :40

Performed for TURTLE PROJECT
(Customer Company)

Vessel RED BOAT

Geographic Location PUNALU'U, HI

Time of Day IN: 0945 – OUT: 1025

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTLES –

1 CAUGHT – @ 30 cm (W)

SEVERAL MISSED AND SEEN – @ 4, 40+ cm (W)

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. LETTER DESIGNATION – F

Approved

Diver ORCUTT, LAMBE, KAICHI

Diving Supervisor

Company

14

RECORD OF DIVE

Date:

Max. Depth of Dive Bottom Time

Performed for
(Customer Company)

Vessel

Geographic Location

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Approved

Diver

Diving Supervisor

Company

RECORD OF DIVE

Date: 28-JAN.-84

Max. Depth of Dive 45' Bottom Time :45

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PAHI BAY, HILO, HI.

Time of Day IN: 0923 - OUT 1008

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

NO TURTLES CAUGHT. 1-SEEN ON SURFACE ENROUTE.
1-SEEN WHILE DIVING -@ 45 cm(W)
WEATHER - RAINY. WIND - NE @ 10-15 MPH
SEA STATE - MODERATE. VISIBILITY - POOR

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. 1ST DIVE
LET. DESIG. - G.

Approved

Diver LAUBE, OECUTT, KAICHI

Diving Supervisor

Company

15

RECORD OF DIVE

Date: 28th - JAN - 84

Max. Depth of Dive 50' Bottom Time :42

Performed for: TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location OUTSIDE RICHARDSON'S OCEAN CTR. HILO, HI

Time of Day IN: 1051 - OUT: 1133

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

CAUGHT 1 TURTLE - @ 43 cm (W)
SEEN W/W - 1 SMALL @ 35 cm (W) & 1 MED - @ 50 cm (W)
VISIBILITY - POOR (30')

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. REPET. - 2ND DIVE.
S.I. - 43 MIN.
NEW LET. DESIG. - F
END DIVE LET. DESIG. - K

Approved

Diver LAUBE, OECUTT, KAICHI

Diving Supervisor

Company

16

RECORD OF DIVE

Date: SATURDAY 10/MAR/84

Max. Depth of Dive 60' Bottom Time :37

Performed for THRTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUAA BAY, HILO, HI.

Time of Day IN -0930 OUT - 1007

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

SEEK TURTLES - NONE SEEN IN WATER

SEAS - MODERATE, WINDS - SE 5MPH, VISIBILITY POOR 15'

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS - 1ST DIVE

LET. DESIG. - G

Approved

Diver LAUBE, CRUTT, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 10/MAR/84

Max. Depth of Dive 30' Bottom Time :28

Performed for THRTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location RICHARDSON'S, HILO, HI.

Time of Day IN -1047 OUT - 1115

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

NO TURTLES SEEN IN WATER -

2 SEEN ON SURFACE - TOO FAR TO ESTIMATE SIZE,

VIS - 40'

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS - SI - :40 2ND DIVE

LET. DESIG. - G

NEW LET. DESIG - G

Approved

Diver LAUBE, CRUTT, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 10/MAR/84

Max. Depth of Dive 35' Bottom Time :42

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location RICHARDSON'S, HILO, HI.

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

NO TURTLES SEEN IN WATER

VIS - 40'

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. SI: 25 3RD DIVE
LET. DESIG. - G
NEW LET. DESIG - G.

Approved

Diver LAUBE, ORCUTT, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 17TH MAR. 84

Max. Depth of Dive 55' Bottom Time :50

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location N. OF HONOLII, HILO, HI.

Time of Day IN: 0900 — OUT: 0950

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

NO TURTLES SEEN IN WATER

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS - 1ST DIVE
LET. DESIG. — H

Approved

Diver BALAZ, ORCUTT, LAUBE, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 17th MAR. 1984

Max. Depth of Dive 35' Bottom Time :70

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location HONOLII, HILO, HI.

Time of Day IN: 1035 — OUT: 1145

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

1 TURTLE CAUGHT — @ 40cm (W)
SAW @ 6 M/W & ABOVE

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS SI - :45 2ND DIVE
NEW LET. DESIG. — G
END DIVE LET. DESIG. - L

Approved

Diver BALAZ, ORCUTT, LAUBE, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date:

Max. Depth of Dive Bottom Time

Performed for
(Customer Company)

Vessel

Geographic Location

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Approved

Diver

Diving Supervisor

Company

RECORD OF DIVE

Date: 3 Dec. 1983 Saturday 1ST Dive

Max. Depth of Dive 55' Bottom Time :45

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUHI BAY, HILO, HI

Time of Day IN: 1020 — OUT: 1105

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

1 TURTLE - CAPTURED/TAGGED/RELEASED @ 35 cm(W)
no other turtles spotted in water while diving
+0.2' HIGH-LOW TIDE (9-10AM), SEA STATE - CALM.
WEATHER-CLEAR, NO WIND, VISIBILITY - 80'.

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. LETTER DESIGNATION - H
1ST DIVE

Approved

Diver LAUBE, ORCUTT, ARIGA, KAICHI

Diving Supervisor

Company

RECORD OF DIVE

Date: 3 DEC. 1983 2ND DIVE

Max. Depth of Dive 50' Bottom Time :40

Performed for TURTLE PROJECT
(Customer Company)

Vessel ZED BOAT

Geographic Location PUHI BAY, HILO, HI.

Time of Day IN: 1155 - OUT: 1235

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

NO turtles spotted while diving.

VISIBILITY - 60'

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

NO DECO LIMITS. S.I. - :50
2ND DIVE - REPET.
NEW LETTER DESIG. - G
END DIVE LET. DESIG. - L

Approved

Diver LAUBE, ORCUTT, ARIGA, KAICHI

Diving Supervisor

Company

2

RECORD OF DIVE

Date: 10th Dec. 1983 - 1 Dive only

Max. Depth of Dive 60' Bottom Time :48

Performed for Turtle Project
(Customer Company)

Vessel Zed Boat

Geographic Location Outside Richardson's Ocean Ctr., Hilo, HI

Time of Day IN: 1005 — OUT: 1053

Equipment Used: Deep Sea Mask (Scuba)
Bell Other

Breathing Medium: (Air) Helium/Oxygen

Work Description

Letter Designation - H

Sea State - Calm, Weather - Clear, No Wind

Current - .5 kt., Visibility - 40'

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

No Deco Limits.

3 Turtles spotted while diving (@ 45 cm - width)

1 spotted on surface. (+1.8 High - High tide)

Approved

Diver Laube, Ariga, Orcutt, Kaichi

Diving Supervisor

Company

RECORD OF DIVE

Date:

Max. Depth of Dive Bottom Time

Performed for
(Customer Company)

Vessel

Geographic Location

Time of Day

Equipment Used: Deep Sea Mask Scuba
Bell Other

Breathing Medium: Air Helium/Oxygen

Work Description

Remarks (Decom. Table Used)
(Include any unusual aspects of dive or incidence of decompression sickness)

Approved

Diver

Diving Supervisor

Company