

1986 AND 1990-91  
KAWELA-BELLOWS  
NIU

G. BALAZS

- KAWELA BAY 1986

- NIU

- BELLOWS

- BELLOWS

LIBRARY OF  
GEORGE H. BALAZS

GEORGE BALAZS  
943-1221 395-6409

- 25 FEB 86 - KAWELA OBSERVATIONS ... p. 9  
20-21 FEBRUARY 1986 (KAWELA BAY . . . . . P. 4 -  
(1 CAPTURE 8851, 8852)  
27 FEB 86 NIU STREAM . . . . . P. 13-15  
28 FEB 86 KAHU PT. POWER PLANT . . . . . P. 17-19  
(2 Released 8861-8864) (8868-69)  
5-6 MARCH 86 BELLOWS NETTING . . . . . P. 20-21  
(8865-67 - 2 recapture)  
28-29 MARCH 90 Kawela p. 110-111  
13-14 MARCH 90 Kawela p. 112 (LIVE -  
Gillnet  
Release)  
18 MARCH 91 KAWELA p. 26



**COMPOSITION BOOK • 9¾ IN. x 7½ IN.**

AVAILABLE AS:

VM COMPUTER NO.	B&P STOCK NO.	SHEETS	RULING
09-9130	13534	60	COLLEGE RULED & MARGIN
09-9132	13535	60	COLLEGE RULED & MARGIN & PAGED
09-9134	—	100	COLLEGE RULED & MARGIN

BOORUM & PEASE CO., ELIZABETH, N.J. 07208

MADE IN U.S.A.

TAG NO. < 8850 PREVIOUSLY SENT TO BILL POLELOA, MOLOKAI  
1

JIM YARBROUGH - 293-9178  
BOX 904  
KAHUKU, HI 96731

TERRY WALKER - 293-5837

EISNER

FEBRUARY 1986

-1 hr 36 min  
Halciwa

MIDNIGHT

MONDAY

TUESDAY

WEDNESDAY

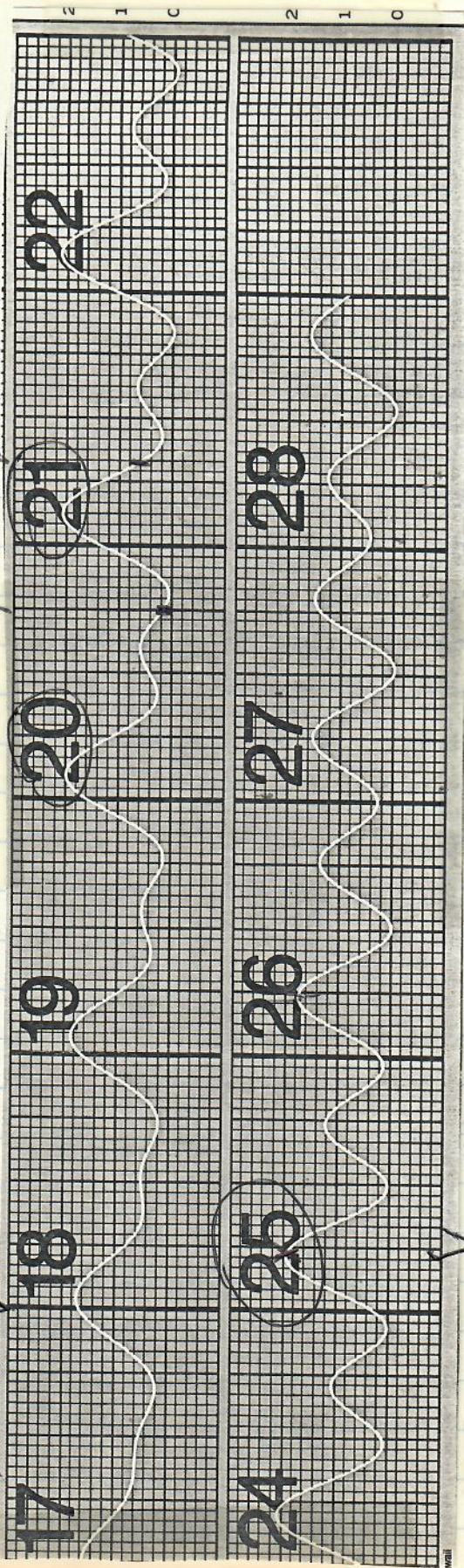
THURSDAY

FRIDAY

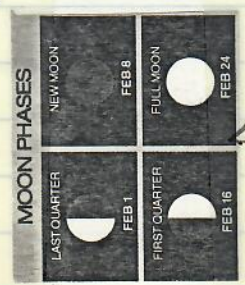
SATURDAY

2:10X's  
Kawela  
inside 14 hours  
Zephyr Netloc

6 pm



6-7:45 am  
spotting  
(seen westwardly)



2-20-86

South wind, glassy seas, 6-8' surf

THURSDAY 2pm depart for Kawela Bay with Robert and  
Lew Consiglio.TOTAL  
TIME =  
14 HoursWest end - toward "river bed".  
120' (2x60'x5') set at <sup>5:30-PM</sup> 6pm. Swell  
last week was very large 25-30'.  
Old snop of gill net pulled off the bottom, - 30' of it.  
Net out at 7:45am.I went in ~ 11pm to untangle net from the  
bottom as tide came up.  
Watched at 20' intervals throughout the  
night.Few felt certain that he saw a turtle  
inside west pocket. Saw turtle's back.  
Many fish (mullet?) splash when  
spot-light is flashed.Sunrise at about 6:15am. Net  
taken in at ~ 7:45am, at which time  
a turtle was found, probably very  
recently entangled. I had walked to  
the east end to "spot" for turtles in  
front of Terry's house. None seen -  
tide very low now - coral head showing  
in front of Terry's house. Talked to  
Norman Walker who said that  
not as many turtles have been seen  
lately.At the west end, Robert said a few  
(2-3?) turtle were seen in the

2-21-86

FRIDAY

"channel" area outside of our netting site.  
Jim said turtles were seen around  
last week, when the N surf was  
much higher.

Yesterday ~~and~~ after the net was laid  
I snorkeled the area observing the  
bottom. Noted Acanthopora, but  
didn't seem as dense as last seen.  
However, no Ulva reticulata seen  
entangled. Avansia seen on emergent  
limestone rock. Stubby Ulva fasciata  
along shoreline - patches look to have  
been squashed off, which seems consist  
with the observation of sand built  
up around limestone rocks where we  
get into the water. High surf  
has scoured off lots of algae  
on the bottom? Water transport  
in Bay must be different, depending  
on the direction of the big surf.  
Temperature - 22.5°C

Life guard at pipeline (?) that rooms  
with Jim said that he found just  
the front flipper of a turtle -  
believed to have been "torn off"  
by high surf.

8678-

8688

9/85  
yearling at  
SLP

8694 ?  
found in plier  
Where were others used?

Sunrise 7:15am 7

2-21-86

Caught 7:45 am -  
Found just inside of  
midpoint when picking  
up the net.

8851 RFL S - 46.3 x 36.2

NOTCH 46.1

8852 LFL C 48.5 x 41.5

PL - 37.8

HEAD - 8.0

TAIL - 8.0

RFF - 8.3

Many Platycephalus skin barns; patch of pink  
coralline - corals & plaster.  
Almost no skin algae

- Stomach sample (dovche)
- Tried blood - TUBES <sup>USED</sup> EXPIRED. NEED SYRINGES
- 10th right bone wedge - frozen

NO PHOTOS TAKEN.

TESTED 20 TUBES - ONLY 2 SOUNDED "LOUD" when  
opened. 1 barely had any vacuum.  
Most sounded "WEAK."

2-21-86  
FRIDAY

Depart W. Kawela about 10am -  
Drove to Turtle Bay - noted fewers  
dogs and people around. Drove  
into vacant yard nearly at the end  
of the road. Limestone outcrop  
directly from here - toward the  
hotel is "Turtle Bay"; to the left  
must be "WILD BEACH". Nothing that  
looked like Pterocladia red lime growing  
here, as per John Naughton. However,  
Sargassum present, plus possibly something  
reddish. Very rough water, strong  
currents. Seems impossible that  
a turtle could ever sleep here under  
these conditions.

Returned via Wahiawa and Jack-in-the-  
Box.

2-23  
Sunday

Backnote - yesterday <sup>2-22</sup> and last  
night, there was huge surf  
on the north shore - worst in "11 years".

Where and how do turtles sleep under  
these conditions? How do they  
come up to breathe? Without getting  
swept away? Surface and sleep  
just outside the "break"? Seems  
reasonable for big, deep-diving turtles,

25 FEB  
TUESDAY



not for juveniles (< 65cm).

HIGH SURF WARNINGS UP.

25 FEB 86 Arrive Terry's house at 6am with  
 TUESDAY Lew C. I walked to the West pocket  
 arriving at 6:20. Sat on grassy slope in  
 front of house. Start of twilight when I  
 arrived at 6:20 - at 6:30 can see my watch  
 and writing on notepad. At 6:35 enough light  
 so that turtle heads should be seen, if they  
 are there. Eyes & binoculars scanned area  
 but nothing seen until 7:05 (Sunrise apparent)  
 one head surfaced seen in the area where  
 the net is usually set. That's all - not  
 seen again. Good visibility. Depart to  
 East end at 7:10am / slow walk  
 returning to Terry's house at 7:25.  
 Lew (didn't see any turtles at  
 east end. Tips of limestone here  
 showing now. Several area photos  
 taken). Weather report West wind  
 15 - 25 mph. Windy on Terry's side.  
 Sheltered on East side. Depart  
 Terry's at 7:40am. Drove to  
 Turtle Bay (with beach) for a quick  
 look. Rough & strong currents.  
 Kaveh - Surf wash line all the way  
 into Terry's yard.

25 FEB 86

IDEAS - Set out limestone boulders for algal habitat - like one at east end.

Beach algae - Turbinaria Sargassum and Dictyota (?) Nothing edible for turtles. "VERY VISIBLE (MARINE ANIMALS)"

Conclusions: Few turtles coming into bay now, even though tide "high enough"

Explanations:

1) Food sources way down - broken off from waves - currents.

2) Too rough to get in and out for these size classes.

Sleeping (semi-hibernation) outside water break.

Development needs "outreach" - to help and promote turtles in the area (note - Hotel's name!)

*[Faint, illegible handwriting covering the main body of the page]*

27 FEB  
THURSDAY  
WEST  
WIND

FEB 86

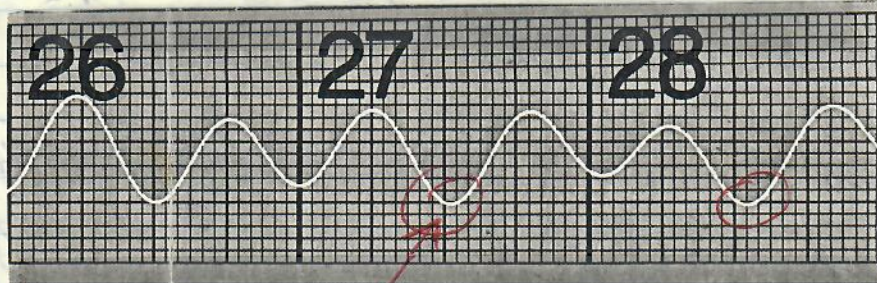
HALEMANA BAY  
0-55

13

WED

THURS

FRI



NIU "BLUE HOLE"

27 FEB 86 Robert and I went to Ni'u Valley  
 THURSDAY stream at ~ 11:30am. to examine  
 WEST "Blue Hole" reported by "Steven", Tel. 235-6602  
 WIND 119 HALEMANA, HI 96821

When night diving there he saw 2  
 turtles, larger, are believed to be a  
 loggerhead in a "cave" on the kohakohak side  
 of the hole. He was worried that  
 they will get speared, as many  
 people frequent here, spear fishing.  
 Robert and I walked out  
 slightly to the left of the stream  
 mouth. After a distance, the hole  
 became visible just inside the reef  
 line. When ~ 50 yards from it  
 we snorkeled. Hole has a  
 sand bottom with detached  
 coralline algae heads in the center.  
 Noted Lymnaea on the shallows going  
 out, as well as Spyridia(?) and  
Acanthophora. In crevices at the  
 hole, numerous patches of

2-27-86  
Thursday

Amansia were present. On the ocean side of hole, vertical relief was absent - mostly sloping rubble leading seaward. Steven said that "cave" was on the left side - we didn't see anything that fit his description.

Amansia<sup>on head</sup> by seaward side was obviously grazed - marks on sard under fit too supporting this speculation. Presumably by turtles. Leaving hole, we swam to the east to what looked like another blue area. Tide low now and reef exposed. Channels through here where wave action get through, as evidenced by schools of surgeon fish (kala-like).

Lots of Amansia growing here - but no obvious signs of grazing seen like at the other spot. Lots of coralline algae - mostly that Burgundy-red coating on small smooth rubble. 2 collected.

Offshore and slightly to the west I noted dive boat with red flag, and also ~ 4 surfers at what must surely be "TURTLES" dive site. Along coastline, noted mostly rock & cement sea walls

2-27-  
Thursday

2-27-86

Thursday

fronting residential houses. Returned  
at 4:45 pm.

2-28-86  
 FRIDAY  
 KAHE PT. HAWAIIAN ELECTRIC PLANT  
 CAUGHT IN INTAKE POND -  
 RELEASED NIU STREAM SAME DAY

PL - 34.3  
 8863-LF GC 42.9 x 34.5 N-42.4

8864-RF ~~SC~~ CC - 44.7 x 41.0

T - 8.2

RFF - 6.9

H - 6.9

PL 29.4

8862-LF SC - 37.2 x 30.6 N-37.1

8861-RF CC - 39.0 x 36.0

T - 7.0

RFF - 6.8

H - 6.2

(MODERATELY ENERGETIC)

Letter in file

28 FEB 86 Visited Kaha Pt. Power plant  
FRIDAY with Robert & Lew after Brenner  
Munger called yesterday reporting  
sea turtles showing up in "forepord"  
one died in the past few days... ~ 40x50"  
discarded into dumpster.

ENVIRON. Dept, Hawaiian Electric Co.  
Box 2750, HONOLULU 96840

Met Jim Peck, Don Fukuda and Keith  
Oda from ENVIR. Dept.  
Also Richard KEANE - Superintendent at the plant.

4 small turtles swimming hard in the  
current. Photos taken. Report  
that yesterday a large one ~ 75 lbs.  
was seen. Not seen today.

I leaped one two of them,  
catching both. Few tried and  
missed, thereafter the two were  
very skittish.

No algae seen, but lots of 1/2 beaks  
and other fish. "Travelling screens"  
filter water before it goes into plant.  
A second "forepord" was also seen.  
Much newts and turtles never seen  
in here. Inspected intake gates  
which were very rusted - vertical piece  
seen missing. Base way not be



QUESTION: Waijau & Honolulu Harbor  
plants - INTAKES & DISCHARGES?

28 FEB 86  
FRIDAY

cement. Rock seawall of  
bay here has Enteromorpha -  
no other algae seen. Reported  
starting at Kaha Pt. (elevated  
limestone) lots of Pterocladia  
along there. Beach people used  
to set lots of nets off here.  
Reported that Hurricane Owa  
"cleared out" lots of off shore areas  
providing caves/cracks - up to ocean  
depths of 40'.

Need to inspect intake grates  
at night with lights. Also  
take Pt. at high tide at  
night.

Two turtles taken to  
Niu stream and released at  
about 2 pm.

Brought by DON FUKUDA & KEITH ODA TO NMFS LAB.

3/6/86

Thursday

S - 41.9 x

NORTH - 41.5

8868 RFL

Cots of scum & pink coralline on  
its back.

8869 LFL

Moderate evocation - but fairly  
active.

Recovered 8/3 Waijau - hole in plaster

MARCH 1986

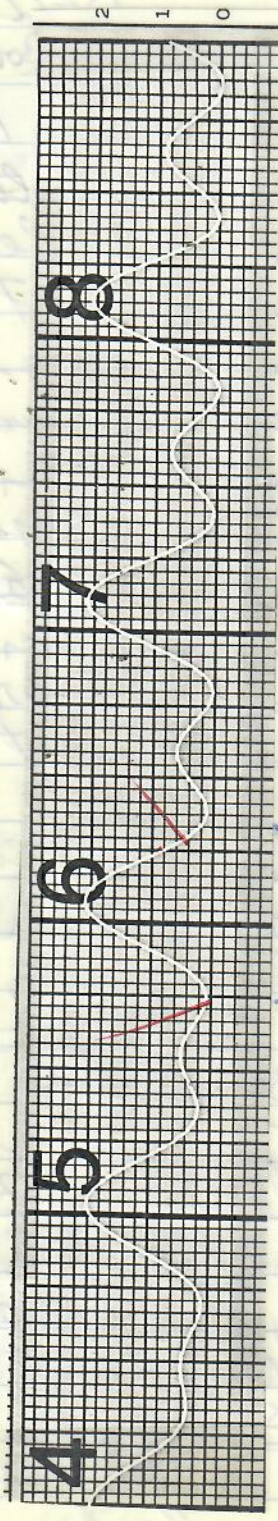
TUES.

WED.

THURS.

FRI.

SAT.



BELLOWS  
SITE #1  
JETTY  
NETTING

only a thin slice of mood.

WAINWALD - 1:15

5 MARCH 86  
WEDNESDAY

BELLOWS NETTING, SITE #1 JETTY  
w/ Lew & Robert

2<sup>5</sup> x 60' x 10-12' set out at jetty,  
same as in the past, at 5:30 pm.  
Area had been roped off my AF  
security. Set tents on cement slab  
dove van <sup>very light</sup> 3/4 way out. SW winds -  
glassy Waianalo Bay.

TOTAL  
FISHING  
TIME =  
14.5  
HOURS

New weather tower being installed.  
Lots of fleshy algae on jetty rocks,  
including Ulva, Hypnea, Asparagopsis  
only a sliver of moon.  
3 1/2 hour watches starting at 8 pm  
Checked net every 20-30 minutes

Calm, little wind, little swell all  
night. Lew saw a turtle at  
~6 am into net, and woke me up in  
the tent. Sunrise ~6:45 am  
2-3 turtles seen surfacing outside  
net. I went out to get the  
turtle at 7:30 am - turtle seen by  
John Naughton swimming seaward between  
jetty and inside end of net.  
Net out ~ 8 am

Several tourists/vacationers -  
one said that in recent days a  
man fishing on the jetty had hooked  
a turtle. She would try to find  
out more.

Be  
6 M  
TH

14a 8.388  
#52  
Bellows  
Log

8.6  
in  
57 ps  
(70 mon  
.123  
5/  
5/

BELLOWS

6 MARCH 86  
THURSDAY

~ 6 AM CAPTURE - JETTY SIDE OF NET

S - 59.1 x 51.3 ~~63.5~~  
NOTCH 58.3 CL ~~63.9~~

C - ~~51.3~~ 63.5 x 66.0  
CW 66

PL - 48.3

HEAD - 8.9

TAIL - 12.5

RFF - 9.0

[S Width] - 51.7  
from bottom

14a 8.388  
#52  
Bellows  
Log

Bellows, live sampling, 3/6/86, #5988

Ulva fasciata 99%  
Acanthophora spicifera 1  
Spyridia filamentosa Trace

64 lbs

→ Tags LFF 8865  
RFF 8866 Right 1-2  
LHF 8867

8.6 cm - NO BLOOD obtained - TRIED WITH A SYRINGE FOR  
in 57RS 10 mon. - Stomach obtained - VIBRIO STUDY, BUT IT  
(70 months) in it. - Photos - dorsal & ventral + net w/ turtle  
.123 cm/mo or

5/14/80 SL - 50.5 cm 45 lbs originally

5/30/79 SL 47.0 cm 35 lbs } 3090  
3091

86 8-28-86 Thursday - Kawela Bay  
 ~ 11:45 - 12:45 PM

JOY COONELLY  
 BO 677 672  
 Haleiwa, HI 96712

WORKS  
 DOOR  
 HOTLINE  
 +NOSC

Tel. 293-5579

ED FARWELL  
 4/85

KAMMIE'S MARKET - Sunset beach  
 Turtles seen at surfing spot called  
 "Kammies". - According to JOY.

Gate "737"

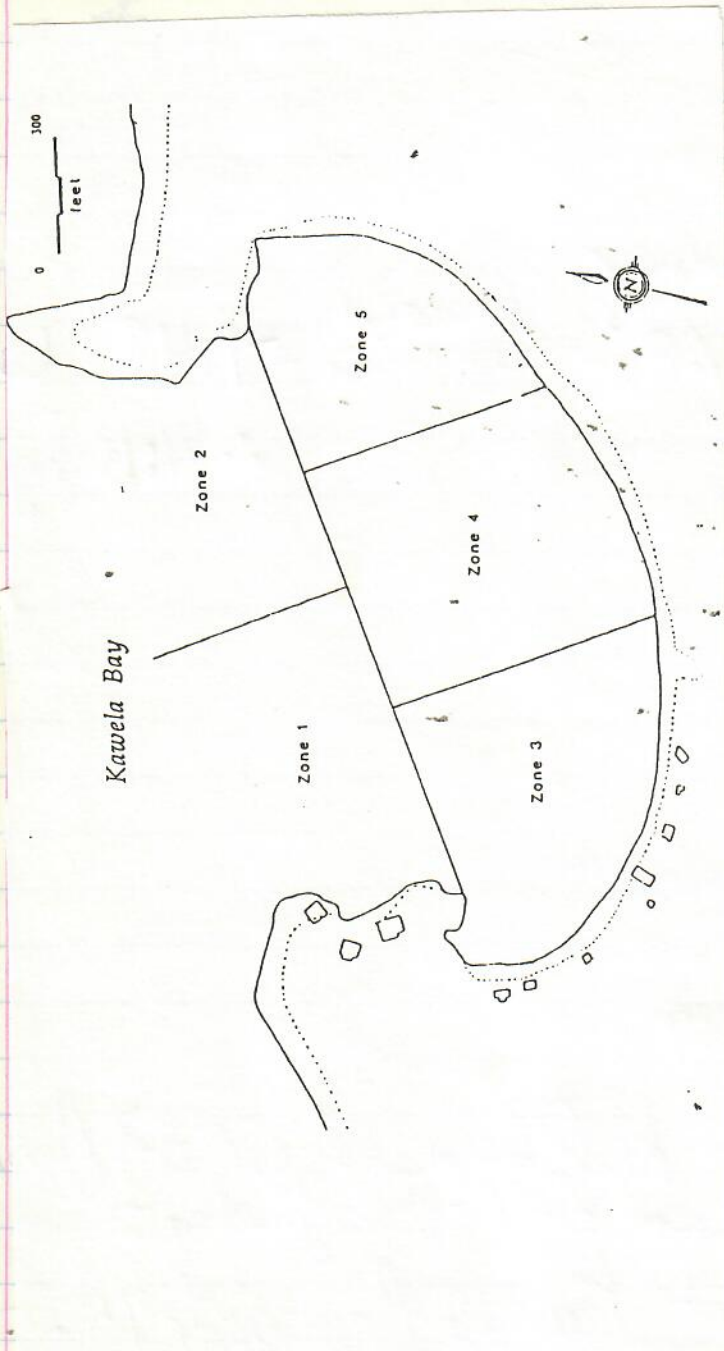
TO Terry's new house 57329  
 Lohipahialua - Moved here in May.  
 Series of photos taken of  
 Bay - of all house except one down  
 on east side. Plus some bulldozing  
 on point. Terry heard of turtles  
 seen in middle of day - (due to  
 less activity along shoreland?)  
 Walked down "right of way".  
 Picked up block muskies, dried,  
 noted small drifts of *Acanthoebora*  
 and green stringy (sample taken).  
 Walked to cement-based house.  
 Picked up numerous and saw  
 numerous turtle fecal pellets -  
 are fairly large. Cling to  
 Need to evaluate diameter w/ size from  
 mortalities using material in

SIVAZVE MOLLUSCS ID'ED BY BILL COOKE 9/2/86  
 ISOGNOMIDM CALIFORNICUM "PURSE SHELL OR TOOTH PEARL SHELL"

"FORMS DENSE COLONIES AT THE TIDE LINE IN BRACKISH WATER."  
 ALSO GROWS SINGLE CLARLY IN MARINE ENVIRONMENT. NO BILE  
 NOT PERMANENTLY  
 ATTACHED.

FISHY  
 BOOK

large intestine. 3 feces collected.  
 Joy has lived there 5 years.  
 Know neighbor Gary Greter who  
 has set gill net in area of  
 where we set turtle net.  
 Recently caught 2 turtles, but alive  
 and let go.

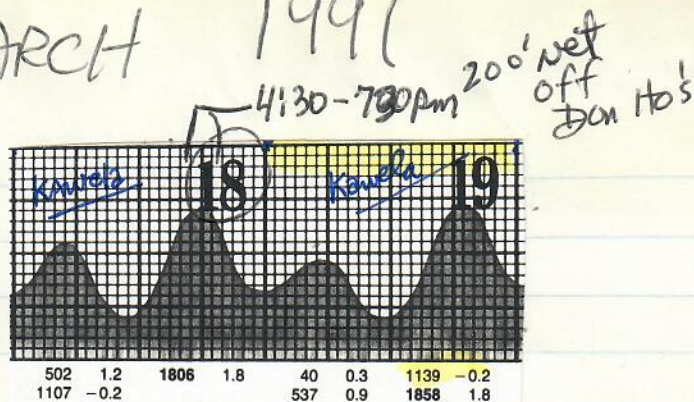


MARCH 18  
 MONDAY  
 Arrive  
 7:30pm  
 1800-1900  
 1900-2000  
 2000-2100  
 2100-2200  
 2200-2300  
 2300-2400

Straw mounds, that's what it is - straw mounds  
 of the...  
 of the...  
 of the...  
 of the...

MARCH

1991



MONDAY

6:06 pm = 1.8<sup>s</sup> KAWELA correction = -1:48 late  
 ∴ 4:15 high

- line
- Anemometers
- floats
- shackles
- spotlight
- hot chocolate

EISNER 293-5859

18 MARCH 91 Karl Bromwell, GHB&R, Ross Miya  
 MONDAY w/ Steve Ball - Photographer -

Arrive at Kawela Bay - gate 742 -  
 Strong winds, total overcast - showers.  
 However, only a slight swell  
 off Ho's property. Water reasonably  
 clear. Very little algae seen

Surface seawater =  $69^{\circ}\text{F}$   
at depth =  $70^{\circ}\text{F}$

27

3/18 along the hard substrate bottom where  
net was laid.  
200' x 8' new netting (2-100' x 8' tied  
together).

3:30pm net set - up at 7:30pm  
(through high tide), no turtles seen  
anywhere - none caught.

Back to lab at 9:15pm.



SEA TURTLE TAGGING FORM

CAPTURE DATE, LOCATION AND METHOD:

PERSON RECORDING DATA:	

OLD TAGS:


NEW TAGS: RFL


TUMOR SCORE

--

LFL

OTHER NEW TAGS:


STRAIGHT CARAPACE-LENGTH:

--

WIDTH:

--

NOTCH LENGTH:

--

CURVED CARAPACE LENGTH:

--

WIDTH:

--

HEAD WIDTH:

--

SEX: MALE, FEMALE OR UNDETERMINED

--

TAIL LENGTH: T

--

C

--

RIGHT FRONT FLIPPER WIDTH:

--

SAMPLES COLLECTED:

--

PLASTRON LENGTH:

--

--

WEIGHT:

--

--

--

DESCRIPTIVE REMARKS:

--

3/14 TO MARTIN HALL IATTC  
sent 2 - pocket books + letter art to PABLO  
locked TAG 9925

5-90cm LUANN Casey  
PAINT photos 61-569 PAKAKUHOA  
Blue on Rocks 3/14/90 Haleiwa 96712 tel. 637938  
1:30pm sent cc Judy McGuire

3/14/90 Kawela Bay 30 hour hold  
wed

9087REL S 39.1 x 33.9 BROUGHT TO LAB  
N 38.4

9088LAR C- 42.0 x 40.0 3/13 TUES  
gillnet

GATE 148  
photos/video Some whitish to ventral flippers  
NO algae or other growth  
Released 3/14/90 Wed. Kawela  
Submerged  
Recovered by Disney

also took  
Backman letter  
cards McGuire  
Dr. Eugene (April) Ambard sent  
P.O. Box 856  
Haleiwa, HI 96712  
(293-8790)

Need PLASTIC Flower  
P/astic on Pipe fields  
"Joe and the Volcano" Carlson Home

Russ/photocopy TM 36

924-7390  
PE: Tiger  
in lagoons  
and netting for them

OLD TAGS: RFL

LFL


NEW TAGS: RFL

LFL


OTHER  
NEW  
TAGS:


STRAIGHT CARAPACE LENGTH:

WIDTH:

LOCATION, SIZE, AND NUMBER OF TUMORS

	#1	#2	#3	#4	Total	Remarks
EYES						
MOUTH						
NECK						
FRONT FLPR'S						
HIND FLPR'S						
CLOACA/TAIL						
SEAMS/SCUTES						
INTERNAL						
Total						

OTHER INFORMATION:

Approximate Tumor Size Categories:

#1 = detectable patch to 1cm diameter.

#3 = &gt;4cm to 10cm.

#2 = &gt;1cm to 4cm.

#4 = &gt;10cm.

HO ENTERPRISES, LTD.

FAX TRANSMITTAL

DATE: 2/25/91  
TO: GEORGE BALAZS  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE \_\_\_\_\_  
FAX NUMBER: 942 2062

TIME: 11:00 AM  
FROM: HAU MEA  
COMPANY: HO ENTERPRISES, LTD.  
2005 KALIA ROAD  
HONOLULU, HAWAII 96815  
TELEPHONE: (808) 923-3981  
FAXLINE: (808) 923-4718

NUMBER OF PAGES SENDING (INCLUDING COVER SHEET):

HONOLULU LABORATORY  
FEB 25 11 04 AM '91  
NAT'L MARINE FISHERIES SERVICE

PLEASE CALL SENDER IF YOU DO NOT RECIEVE ALL PAGES.

COMMENTS:

GEORGE THIS FAX IS TO  
INFORM YOU THAT MR HO SAID  
NO PROBLEM FOR YOU TO USE  
HIS KAWELA BAY PROPERTY. SORRY  
IT TOOK SO LONG TO GET BACK  
TO YOU.



2005 Kalia Road \* Honolulu \* Hawaii \* Phone (808) 923-3981

HO ENTERPRISES, LTD.

FAX TRANSMITTAL

DATE: 2/25/91  
 TO: George Balazs  
 COMPANY \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 TELEPHONE \_\_\_\_\_  
 FAX NUMBER: 943 2062

TIME: 11:00 AM  
 FROM: Haumsa  
 COMPANY: HO ENTERPRISES, LTD.  
 2005 KALIA ROAD  
 HONOLULU, HAWAII 96815  
 TELEPHONE: (808) 923-3981  
 FAXLINE: (808) 923-4718

HONOLULU LABORATORY

FR 29 10 44 '91  
 NAT'L MARINE FISHERIES SERVICE

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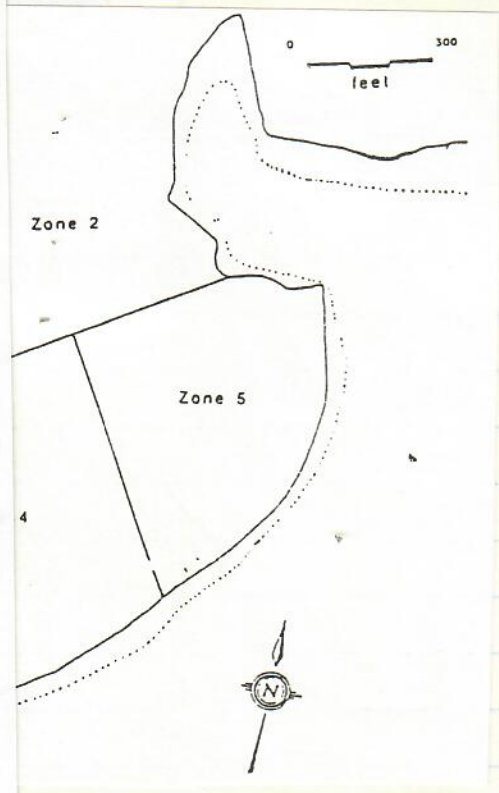
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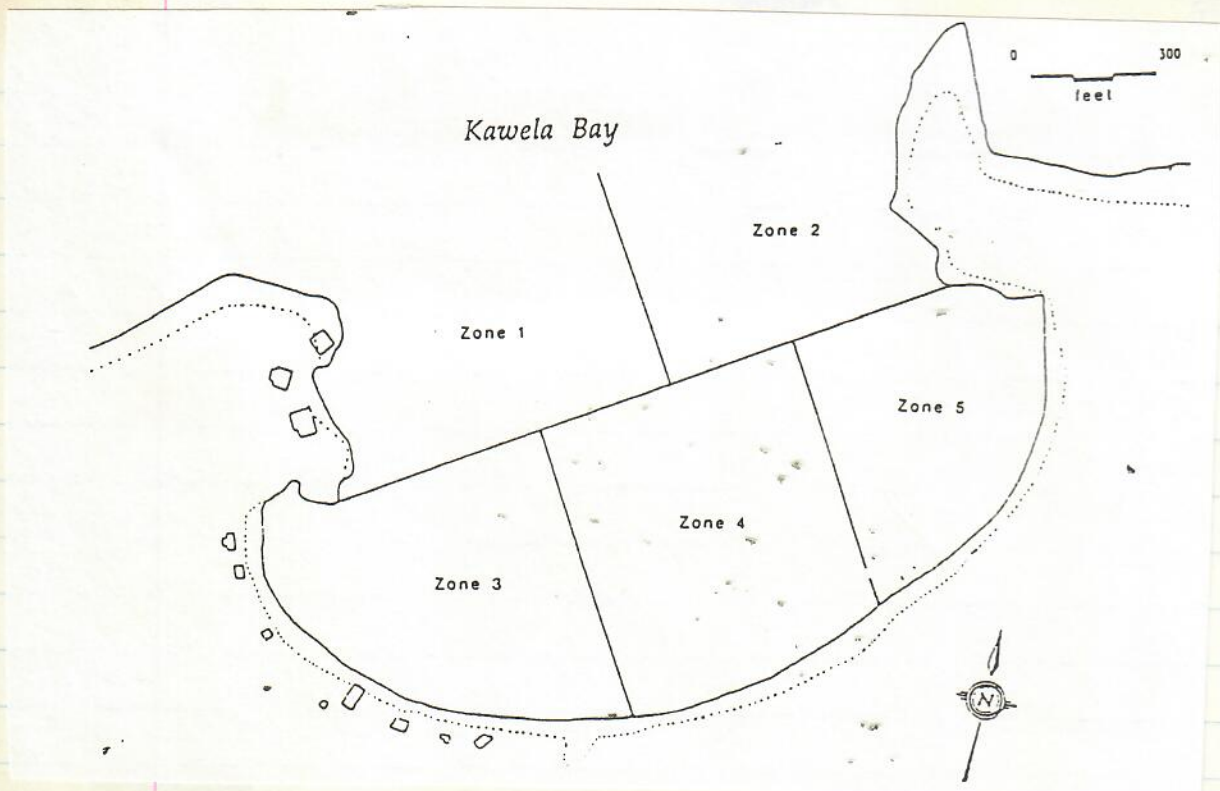
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NO PROBLEM FOR YOU TO USE  
HIS KĪHEA BAY PROPERTY. SURE  
IT TOOK SO LONG TO GET  
TO YOU.

*Alan*

2005 Kalia Road \* Honolulu \* Hawaii \* Phone (808) 923-3981

... ENTERPRISES LTD ...





Summary of green turtle netting at Kawela Bay<sup>a</sup>, Oahu

by

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

study date	Net length (m)	Hours of netting	Netting efforts (meter-hrs)	No. turtles captured	Catch per unit effort
26-28 Mar 85	60	40	2,400	19	.008
15-16 Apr 85	36	15	540	6 <sup>b</sup>	.011
27-28 Jun 85	36	12	432	5	.012
2-3 Jul 85	36	12	432	6 <sup>c</sup>	.011
20-21 Feb 86	36	14	504	1	.002
28-29 Mar 90	42	8	336	1	.003
			Total	38	

Total no. of turtles--35

<sup>a</sup>All netting conducted off Don Ho's property at the northwestern side of the bay where conditions are acceptable.

<sup>b</sup>Includes one recapture.

<sup>c</sup>Includes 2 recaptures, 1 of which had already been recaptured on 15 April 1985.



**GEORGE H. BALAZS**  
 ZOOLOGIST  
 MARINE MAMMALS AND  
 ENDANGERED SPECIES PROGRAM



MEMBER, IUCN MARINE TURTLE SPECIALIST GROUP

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## METRIC SYSTEM WITH U.S. EQUIVALENTS

### METRIC UNIT (1) U.S. EQUIVALENT

#### LENGTH

millimeter	(mm)	0.04 inches
centimeter	(cm)	0.39 inches
decimeter	(dm)	3.94 inches
meter	(m)	39.37 inches
decameter	(Dm)	32.81 feet
hectometer	(hm)	109.36 yards
kilometer	(km)	0.62 miles
myriameter		6.2 miles

#### AREA

square centimeter	(cm <sup>2</sup> )	0.155 sq. inches
square meter	(m <sup>2</sup> )	1.196 sq. yards
are	(a)	119.60 sq. yards
hectare	(ha)	2.47 acres
sq. kilometer	(km <sup>2</sup> )	0.3861 sq. miles

#### WEIGHT

milligram	(mg)	0.015 grains
centigram	(cg)	0.154 grains
decigram	(dg)	1.543 grains
gram	(g)	0.035 ounces
decagram	(Dg)	0.353 ounces
hectogram	(hg)	3.527 ounces
kilogram	(kg)	2.2046 pounds
quintal		220.46 pounds
metric ton		1.1 tons

### METRIC UNIT (1) U.S. EQUIVALENT

#### VOLUME

cubic centimeter	(cm <sup>3</sup> )	0.061 cubic inches
cubic decimeter	(dm <sup>3</sup> )	0.0353 cubic feet
cubic meter	(m <sup>3</sup> )	1.31 cubic yards
cubic decameter	(Dm <sup>3</sup> )	13.10 cubic yards

#### CAPACITY, CUBIC

milliliter	(ml)	0.06 cubic inches
centiliter	(cl)	0.6 cubic inches
deciliter	(dl)	6.1 cubic inches
liter	(l)	61.02 cubic inches
decaliter	(Dl)	0.35 cubic feet
hectoliter	(hl)	3.53 cubic feet
kiloliter		1.31 cubic yards

#### CAPACITY, DRY

deciliter	(dl)	0.18 pints
liter	(l)	0.908 quarts
decaliter	(Dl)	1.14 pecks
hectoliter	(h)	2.84 bushels

#### CAPACITY, LIQUID

milliliter		0.27 fluidrams
centiliter		0.338 fluidounces
deciliter		0.21 pints
liter		1.057 quarts
decaliter		2.64 gallons

