

KEWALO TURTLES
BASIN 1980S

G. H. BALAZS FILE

George -

The turtle hatchlings that
died @ Kewalo had small
tags - 1 each -

693 - crippled flipper - never ate ^{13 March 83}

689 - drowned 3 March 83

These are now "out of
use" -

Gail

42 Days

EXPERIMENTAL FLIPPER TAGGING OF FIVE 6-WEEK OLD GREEN TURTLES
OBTAINED FROM FRENCH FRIGATE SHOALS

by

George H. Balazs

Date obtained: 11-16-82
Date grafted: 11-17-82
Date tagged
and photographed: 1-3-83
Rearing site: Kewalo Basin NMFS Lab

Turtle No.	Straight Carapace Length	Tag No. and Site on Front Flipper			
		2SR	LFL	3SR	1SL
1 (photos 1-4)	7 cm	287	288	-	-
2 (photos 5-6)	7 cm	289	290	-	-
3 (photos 7-10)	7 cm	-	-	291	292
4	6.5 cm	-	-	296	297
5	7 cm	-	295	294	-

2SR = 2nd Scale Right

LFL = Left Flap

3SR = 3rd Scale Right

1SL = 1st Scale Left

Turtles shipped to FFS 10/22/81

All injected with
Oxytetracycline

- ~~5475~~
~~5~~
1. 5742
 2. 5744
 3. 5712
 4. 5704
 5. 5733
 6. 5701
 7. 5719
 8. 5727
 9. 5736

10. L916 R919 → 5467 new tag applied

11. 5735
12. 5734
13. 5731
14. 5743

(5761 - Died)

22 Oct 81

Dear George,

Just time for a hurried note before the plane leaves.

We released the second group of head-starts ~~yesterday~~ ^{today} and all seemed to be fine.

I haven't seen any head-start-size turtles here prior to that, but we will keep watching.

We have found 9 dead hatchlings so far (since 18 kept to present) on Tam, ~~of~~ all have been in the Tamara court area.

Hope all is well with you. Say hello to Linda & Christian for us. Come and see us sometime.

Peace,
John A.

14 total
TAG NOS. RELEASED
at FFS 10-22-81:

5742	5719	5731
5744	5727	5743
5712	5736	
5704	5467	
5733	5735	
5701	5734	

Captive Reared 1-Year Old Green Turtles Released into the
Wild as of September 18, 1981

Location	Date	No. of Turtles
Kauai		
Kilauea Point	9-5-81	20
Maui		
Paia	9-11-81	10
Hawaii		
Hilo Bay	9-11-81	25
Oahu		
Bellows - Waimanalo	9-10-81	15
" "	9-15-81	8
Hanauma Bay	9-9-81	10
Chun's Reef	9-15-81	24
Mokuleia	9-22-81	14
Makaha	9-24-81	15
French Frigate Shoals		
Tern Island	9-15-81	9
	10-22-81	14
TOTAL		127 169

(All from Sea Life Park -
no NMFS turtles remaining
at this facility).

Recommended release sites for the remaining turtles now at Kewalo Basin:

Oahu	
9-22 Mokuleia-	10 14
Kailua Bay-	10
9-24 Makaha-	10 15
Lanai	5
French Frigate Shoals-	10 (air transport not possible until October 20)

G. H. Balazs

Captive Reared 1-Year Old Green Turtles Released into the
Wild as of September 18, 1981

Location	Date	No. of Turtles
Kauai		
Kilauea Point	9-5-81	20
Maui		
Paia	9-11-81	10
Hawaii		
Hilo Bay	9-11-81	25
Oahu		
Bellows - Waimanalo	9-10-81	15
" "	9-15-81	8
Hanauma Bay	9-9-81	10
Chun's Reef	9-15-81	29
French Frigate Shoals		
Tern Island	9-15-81	9
	TOTAL	121

(All from Sea Life Park -
no NMFS turtles remaining
at this facility).

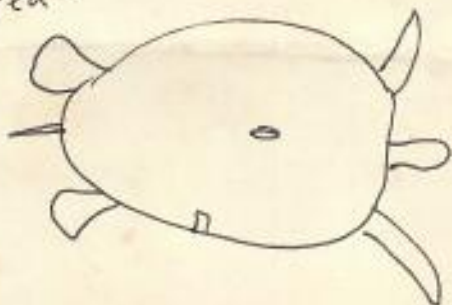
Recommended release sites for the remaining turtles now at Kewalo Basin:

Oahu
9-12 Mokuleia- 10 14
 Kailua Bay- 10
9-24 Makaha- 10 15
Lanai 5
French Frigate Shoals- 10 (air transport not possible until October 20)

George,

I wanted to let you know
that I saw one of the marked turtles

3 Jan. 82 Yea!
0900



Two marks on
the carapace

There was another turtle (same size) with
it between the tide gauge and the dump.
I could see no tags on either one but
they could have been missed due to the
waves.

Ruth

ITHNER

Box 87
KILAUEA, HI
96754

Beth Flint
Tern I. FFS

ET

Wind

light

subs

wet bulb

dry bulb

Date
Plot

1981
Beth Flint
Tern I FFS

ET

light

Subs

wind

wet bulb

dry bulb.

Date
Plot

Dates of flights - ?
contract telemetry - ?
date they return?

FWS-Tern:
828-1431

Dear George, ^{BASKING on Tern?} "kathy" ^{BASKERS} 17 Jan. 82
³⁰⁷
^{Bentley} 19

I was expecting your request of more info. ~~of~~ on the marked turtle and I wish I could tell you more. You may understand if you imagine the situation: rough choppy water - the turtle was completely submerged most of the time - and it didn't remain within close range for more than a few minutes. I can't even tell you if they were on single scutes or half on one and half on another.

Dark ^{or} ^{light} ?
Scum ?

Two days ago I saw another small turtle (it looked a bit larger than what we released) along the sea wall near the tide gauge. It also had a white patch on the carapace but the water was calm enough to see that there were no tags or tag rips on either fore flipper. I was surprised. The patch was whiter than what I'd imagine a barnacle to be and it didn't look elevated from the carapace at all. What could that be? Would you prefer we try to net those little ones for more info. or leave them be?

We haven't been over to the other islands since your visit - we've had some real bad spells of weather.

Will be back in Honolulu sometime in February. Talk to you then.

Your post cards are a big hit with visitors out here.

Ruth
ITNER

Call Kaiser - art nest old tags at 5LP

April 7

check on availability of turtle tags / was ordered 5/12/83

Collin J. Limpus



Home: P.O. Box 189
Aitkenvale
Townsville, 4814
Australia
Telephone 73-2674

Business: National Parks and Wildlife Service
Pallarenda
Townsville, 4810
Australia
Telephone 74-1411

749

25 Aug 83

Dear George,

Looks like our letters crossed in the mail.

I've already commented on my discussion with John Lereham on small titanium tags. I have asked him to quote on the size tag we have been using in large numbers with crocodile studies see attached



I think something intermediate in the range between your tag and the chicken wingband may be of greatest use in ensuring larger orders and hence getting the price down. The above tag is really too big for hatchling green and loggerhead turtles but I would like them to carry as large a tag as possible. Over to you for comment on how much bigger than your tag do we need.

lol



Colin J. Limpus

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Aitkenvale
Townsville. 4814
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Telephone 73-2674

Business: National Parks and Wildlife Service
Pallarenda
Townsville. 4810
Australia
Telephone 74-1411

23 August, 1983.

George Balazs,
Hawaii Institute of Marine
Biology,
P.O. Box 1346,
Coconut Island,
Kanoeha,
HAWAII 96744

Dear George,

Thanks for your usual flood of correspondence. It was good to catch up with the gossip with you in Costa Rica and again on the phone in Hawaii. I certainly hope we don't lose Archie from the Chairmanship of the Committee. It probably means that people like me have to do more to support him. You certainly have made a major contribution through your unique information dissemination service.

I'll try to answer some of your many questions:-

Ventral pigmentation in C. mydas: I have seen dark grey pigmentation develop in one clutch only which I can recall - obvious grey on plastron new growth areas and under flippers when about 1 month old. The colours were lost by approximately 20 cm CCL. I don't recall seeing it on any others we have reared but then I may not have been astute enough at the time.

Titanium "chicken wing band tags": I have contacted Stockbrands and John is investigating the possibility and costing for setting up production. He seems positively interested and could see no immediate problems. Your observations that the tags aren't overgrown or dropped out as little turtles grow to 'biguns' says that long life tags should work.

Thanks for the address re "Tetrapod Reptiles" - I've written off for details.

Did I take any photos for you in Costa Rica? I can't remember. Let me know. I expect my photos back in a day or so. Like you I found our time together in Costa Rica profitable and stimulating - even if there were a few rough moments. I hope I can maintain the drive to organise my data into a few extra papers. Obviously those of us who are working regularly with turtles have a lot of ideas not quite inline with the mainstream of ideas coming from some of the armchair biologists. I am still disturbed by P.C.H.P.'s 3yr old nesting Dermochelys and Rene's 6-8yr old L. kempf. (Rene is not an armchair biologist in my book).

Several days later:

You have also sent a note on the Lord Howe Island turtle harvest by crew of Supply in 1788. I have all the relevant references on this. It was the only time that a crew found any turtles there. I've disagreed with Cogger's recent interpretation that it was a rookery now gone to extinction. I've suggested it was a basking group of turtles. This is all contained within my Ph.D. draft manuscript.

I have now received the photos from you - thanks. My photo's of you within buildings were all under exposed but I have some nice shots of turtles and beach at Tortuguero.

I have just finished a rough analysis of my growth data (Caretta males) and the average male in southern Great Barrier Reef will take 33yr to grow from 75cm CCL to average breeding size (95cm) and the 95% confidence limits will be approximately 15 - ∞ yr. The final analysis awaits computer time. The slowing of growth as maturity approaches seems to be of major importance. By the way, this is based on a minimum of 2yrs growth per turtle and most involved 3-4yr growth increments. Also the reason for the 75cm limit is that I have few Caretta smaller to analyse - unlike the 35cm upwards size of C. mydas and Eretmochelys.

We are now trying to plan our summer program and hope to have several months in the field starting in early October. The extent of the work is dependant on grants which we will hear about in late September.

Must close.

Regards,



COL LIMPUS

P.S. This letter will self destruct on any attempt to return it.

CJL:RL

FISH AND SMALL & LARGE ANIMAL TAGS



NATIONAL BAND & TAG CO.

Newport, Ky.

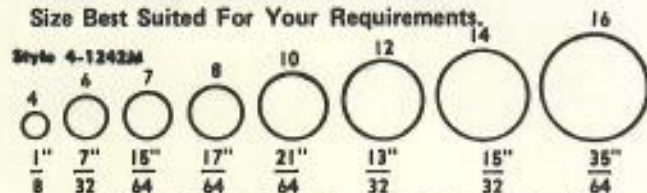
• MONEL METAL BUTT END TAGS — FOR FISH & SMALL ANIMALS



Style
4-1242M-MONEL

Style 4-12425

Actual Inside Diameters — Choose Size Best Suited For Your Requirements.



Style 4-1242M

Used as leg bands for small animals and rodents — also as jaw tags for fish. Manufactured from rustproof Monel metal. Can be consecutively numbered and specially stamped; the extent of which is governed by the size of the tags. For stamping charges — see price list. Special plier with tapered nose easily opens bands. Pliers available to both open and close size 5 and up. **SIZE 4 PLIER CLOSES BANDS ONLY.** Bands are inserted in circular opening of plier and closed into solid circles. **EACH SIZE BAND REQUIRES ITS OWN SIZE PLIER.**

When ordering, specify style, size, numbering and stamping desired.

MINIMUM QUANTITY 100 PER SIZE
(See actual sizes indicated on opposite side)

PACKING:

Style 4-1242M Monel Butt-End Tags — 100 bands in numerical order on a string.

Size	I.D.	Material	No.	Size	To Identify
4	1/8" 135"	.020 x .140"	5	1/32"	Mice, Baby Fish
5	3/16" 180"	.020 x .140"	6	1/32"	Fingerings, Small Rodents
6	7/32" 211"	.020 x .140" .020 x .13/64"	7	1/32"	Fish up to 3 lbs.
7	15/64" 244"	.020 x .140" .020 x .13/64"	9	1/16"	Fish up to 3 lbs.

Letters & Nos. Poss.

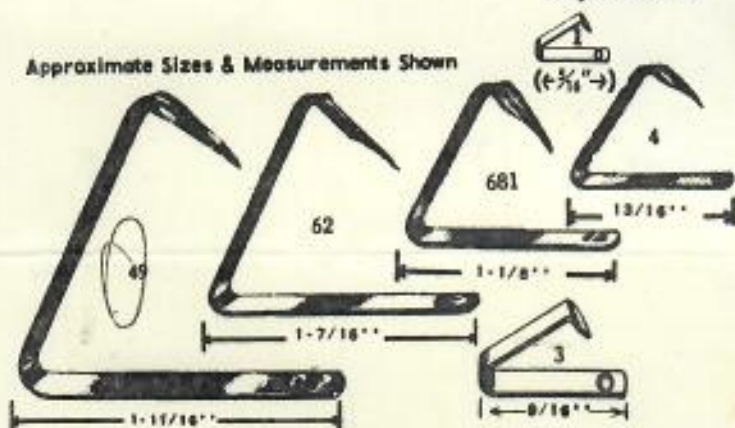
Size	I.D.	Material	No.	Size	To Identify
9	17/64" 274"	.020 x .140" .020 x .13/64"	11	1/16"	Fish 3 lbs. to 8 lbs.
10	21/64" 336"	.020 x .13/64"	15	1/16"	Fish 3 lbs. to 8 lbs.
12	13/32" 418"	.020 x .13/64"	16	1/16"	Herring Gulls, Fish 5 lbs. to 10 lbs.
14	15/32" 479"	.030 x 5/16"	10	1/8"	Pickeral
16	35/64" 550"	.035 x 3/8"	10	1/8"	Fish 10 lbs.

When ordering, specify style, size numbers and stamping required. Also mention breed or variety of birds you intend to band. Be sure to select the proper size to afford a comfortable fit on the birds you wish to identify. For assistance in selection of the proper size bands, use Size Chart on page 14.

• SELF-PIERCING TAGS — MADE OF MONEL METAL

Style 4-1005

Approximate Sizes & Measurements Shown



SPECIFICATIONS

STYLE 4-1005

- 1 Identifies Fingerling Fish (small baby fish), (Bluegills) and small Fur Bearing Animals: Least Tern, Mink, Shrews, Muskrats, and animals of similar size.
- 3 Identifies Fish 1 to 3 pounds, Small Animals, Rabbits, Coons, Small Foxes, Sea Otters (Ear Tagging), Toads and animals of similar size.
- 4 Identifies Fish 4 to 10 pounds, Large Coons, Foxes, Sea Otters, (Web and Hind Foot) and animals of similar size.
- 681 & 62 Identifies Fish 10 pounds and up — Extra Large Game Fish, Muskellunge, etc. Small Deer, Beaver, Seals and animals of similar size.
- 49 & 62 Identifies Antelope, Large Deer, Large Sea Turtles, Large Alaskan Seals, Moose, and animals of similar size.

Use as ear tags for small or large fur bearing animals as well as for identification of fish.

For fish — apply to Caudal or Dorsal fins, or in tail. Used widely by State Fish Hatcheries for jaw tagging.

Made of rustproof Monel metal. Easily, swiftly applied in one operation with applicator. Each size tag requires its own size applicator.

PERMANENT IDENTIFICATION:

Can be specially stamped with any lettering you require, as well as consecutive numbered.

Size 62 Only — MINIMUM QUANTITY — 5000 per order.



APPLICATOR

Style 4-1005S
(Size 1 & 3
Style Shown)

IMPORTANT: Our National tags are designed to function perfectly when piercing through an ear, wing, web, etc. The piercing through ear tissue, cartilage, wing web, etc., plays an important role in assurance of perfect tag functioning. The sealing of tags with a plier or applicator without actual piercing or application through or to anything whatsoever could result in malfunctioning of the tag.

MINIMUM ORDER-\$15.00

Style No.	Size	Wt. Per 1000	Each	100	500	1000
8	890N Zip wing band	1.75, 3, 4	1-1/2#	3.25/C	3.00/C	25.80/M
9	1242 Aluminum	2 1/2 thru 5	1/2#	7.95/C	5.20/C	44.45/M
9	1242 Aluminum	6 thru 14	3#	9.05/C	5.75/C	50.40/M
9	1242 Aluminum	16, 24, 28	12#	10.80/C	7.45/C	65.80/M
MAKE-READY CHARGE - Sizes 2 1/2, 3, 4, 5, 6, 8, 10, 16, & 28..LESS THAN 1000 PER SIZE PER ORDER - \$6.00						
Above pricing is for plain aluminum bands, for colored bands, see charges page 7.						
9	1242S Pliers	2 1/2 thru 14	3/4# ea.	-	-	-
9	1242S Pliers	16, 24, 28	1# ea.	-	-	-
9	381 Aluminum	14	1-3/4#	3.10/C	2.20/C	19.65/M
9	384 Aluminum, Adj.	12/14/16	1-3/4#	3.10/C	2.20/C	19.65/M
9	384L Aluminum, Adj.	20/22/24	2#	6.50/C	4.50/C	44.05/M
9	1614G Aluminum, Adj.	Quail size	1/4#	1.90/C	1.40/C	9.50/M
This style tag is no longer available with consecutive nos.series.						
10	1242M Monel	4 thru 8	3/4#	8.00/C	5.25/C	45.65/M
10	1242M Monel	10	3/4#	9.15/C	5.85/C	51.55/M
10	1242M Monel	12-14-16	3 to 4#	10.90/C	7.55/C	66.95/M
MAKE-READY CHARGE-ALL SIZES-WHEN ORDERED IN QUANTITIES OF LESS THAN 1000 PER SIZE - \$6.00						
These tags sealed with style 1242S Pliers, priced above.						
10	1005 Monel	1, 3, 4	2#	6.10/C	5.65/C	52.20/M
10	1005 Monel	681	10#	12.15/C	9.35/C	90.65/M
10	1005 Monel	49, 62	23#	15.30/C	14.55/C	138.25/M
10	1005-1S Plier	1	1/2# ea.	-	-	-
10	1005-3S Plier	3	1/2# ea.	-	-	-
10	1005-4S Plier	4	1/2# ea.	-	-	-
10	1005-681S Plier	681	1# ea.	-	-	-
10	1005-4PS Plier	49	1# ea.	-	-	-
10	1005-6S Plier	61	1# ea.	-	-	-
For black filling nos. and/or stamping on style 1005 tags, see page 7.						

NATIONAL BAND AND TAG COMPANY
 NEWPORT, KENTUCKY
 PHONE 606-261-2035

Identification Designers and Manufacturers

STOCKBRANDS CO. PTY. LTD

53 Edward Street, Osborne Park, W.A.

Telephone 444 4877

All correspondence to P.O. BOX 80, MT. HAWTHORN, WESTERN AUSTRALIA 8016

September 30, 1982.

University of Hawaii at Manoa,
Hawaii Institute of Marine Biology,
P.O. Box 1346, Coconut Island,
Kaneohe, HAWAII 96744.

Dear Mr Balazs,

We are enclosing a sheep tag for your consideration, but advise that the titanium tag enclosed is the one we manufacture for turtle tagging in Australia and the United States. These tags can be manufactured in stainless steel also, but trials have proven the superiority of Titanium for corrosion and particularly abrasion resistance for the tagging of turtles.

Titanium tags cost \$A1.00 each, nylon tags approximately 10¢ each.

Yours faithfully,



JOHN FOREHAN.

FORM CD-45
(REV. 3-76)

U. S. DEPARTMENT OF COMMERCE

2. CHECK APPROPRIATE BLOCK

SUPPLY, EQUIPMENT OR SERVICE ORDER

PROCUREMENT

OTHER (Specify)

GCMartin

FOR: **National Marine Fisheries Service**

1. THE NUMBER SHOWN IN BLOCK 5 MUST APPEAR ON ALL SHIPMENTS AND/OR DOCUMENTS RELATING TO THIS ORDER ↓

3. REQUISITIONER DOCUMENT NO. 4. BUREAU CONTROL NO. 5. PURCHASE ORDER NO.
80-JJA-00340

6. ISSUED TO: **National Band and Tag Co
721 York Street
Newport, Kentucky 41072
(606) 261-2035**

7. DESTINATION
**S
H
I
P
T
O**
**National Marine Fisheries Service
P.O. Box 3830
Honolulu, Hawaii 96812**

8. ACCOUNTING CODE **FT2000/88C5H100/2619** 9. QUOTATION REF. OR CONTRACT NO. **open market** 10. DISCOUNT TERMS

11. DELIVERY F.O.B. **** shipping point** 12. GOVT. B/L NO. 13. DELIVERY DATE

14. FUNDS AVAILABLE (Budget Office) 14a. STATION

15. LINE NO.	16. DO NOT USE	17. DESCRIPTION	18. QUANTITY	19. UNIT	20. ESTIMATED TOTAL COST	21. ACTUAL	
						UNIT PRICE	TOTAL COST
1.		Tags, style 4-1005 monel, size 1 Inscription: NMFS numbering: KI to 1099	1000	ea			52.20
2.		Setup charge for inscription	1	ea			3.50
3.		Application Pliers #1005-15	2	ea		9.70	19.40
							<u>\$75.10</u>

**** Ship AIR PREPAID and add shipping charge as a separate item on your invoice.**

CONFIRMATION - phone request 8/22/80 to Linda Collins

22. SIGNATURE OF REQUISITIONER DATE 23. SIGNATURE APPROVING OFFICER DATE

TITLE INITIALS 25. NOT AVAILABLE-BUREAU STOCK/EXCESS INITIALS 26. SIGNATURE-BUREAU CONTROL OFFICER TITLE 27. NOT AVAILABLE-DEPARTMENT STOCK/EXCESS INITIALS

28. APPROVAL DATE 29. PURCHASING AGENT *[Signature]* DATE **8/22/80**

30. RECEIPT ACTION - Quantities shown in Column 18 above have been received and accepted, except as follows: (If additional space is needed, use reverse side.)

31. SIGNATURE-RECEIVING OFFICER DATE 32. PROPERTY CONTROL NO. TRADE-IN RECEIVING REPORT

33. SEND INVOICES IN DUPLICATE TO: →

X Carr, 1967, So excellent a fisher.
The Natural History Press, Garden City,
New York, 248 pp.
Rebel - - nothing

P 224 X Rudloe, J. 1979. Time of the
turtle. Penguin Books Ltd.

X ^{attached} Hirth H.F. 1971. Synopsis of Biological Data
on the green turtle Chelonia mydas
(Linnaeus) 1758. FAO Fisheries
Synopsis No. 85

X P 138 Bustard, H.R. 1972. Sea turtles.
Taplinger Publishing Co., New
York, 220 pp.

Hughes, G.R. 1974. The sea turtles of
South-east Africa. II.

J.R. & X L.P. Hendrickson, 1980. "Living tags" for
sea turtles. Report to USW Fisheries
Center, National Marine Fisheries Service,
Contract #80-ABW-00062.

Ed. board 8:1
8:7 Mrosovsky, N. 1978. Is roaching
hatchlings a reliable tagging
method? Marine Turtle Newsletter, 8:2.

cow tags slough off

X Mrosovsky, N. ¹⁹⁸² Editorial, Marine
Turtle Newsletter, 22:1-2.

X Hendrickson, L.P. and J.R. Hendrickson.
1981. A new method for
marking sea turtles? Marine
Turtle Newsletter, 19:6-7.

Cars - Audubon mag & NO/
- Sargassum → NO
- Cramerfeld & NO/

TABLE

~~HURT~~ syn
Pritchard exc

Bustard 72

p138

(notching)

1965-66, marked
all hatchlings

" Carr 1967 p108

"to be able to mark hatchlings in a way that would make them recognizable when they reach maturity"

"a permanent tag for a hatchling is frustratingly hard to devise"

Holes - notches - banding - pigments

"And the fastening on of mechanical devices is completely impractical. Any external tag is soon either overgrown or popped off by the increasing thickness of the tissues it perforates"

radioactive -
magnetic tag

cover leaf -
page 92

Cimpos - notching?

VII. HUGHES 1974 p 5

"As in all localities, hatching tagging has proved an almost insurmountable problem.

Carr (1967:108-110) describes the difficulties encountered in trying to tag green turtle hatchlings. Several methods have been tried in Tongland

- ① Small plastic tag normally used for trout 623 loggerheads. Edge of carapace held by monofilament line.
- ② 2-3mm stainless wire under a vertebral scale with 9 hypodermic syringe.
- ③ notching (as per Bustard)

This "living-tag", as it has
been termed, is a promising
and ingenious marking procedure.
But like nothing and other
tissue alterations, it
only be capable of coding ^a limited amount
class. The identification of individuals
will not be possible, and the
^{recovery} recognition of marked animals
will only be possible by those
~~agents~~ having some knowledge
of the appearance of the mark.

1971 Hirsh - Synopsis of Biological data on the green Turtle

116

FAO Fisheries Syn. No. 85

FIRM/S05 Green turtle

morphology; Mick (1913) on the development of the skull; Ruckes (1929a, b) on osteology; Deraniyagala (1939) on general ontogeny and scalation; Villiers (1958) on general anatomy; and Parsons (1959) on the nasal cavities. A study of respiratory muscles in *mydas* has been made by Shah (1962). The total lack of the lung muscle, *muscularis striatus pulmonalis*, is notable. Mlynarski (1961) has described the structure of scutes and Brongerama (1968b) described some variations in vertebral scutes of Sarinam turtles.

Parsons (1958) examined the choanal papillae of green turtles but was unable to give it a function. Later, Smith (1961) proposed that the choanal rakers in adult green turtles are correlated with its herbivorous diet.

1.32 Cytomorphology

According to Makino (1952) the female green turtle has one less chromosome than the male. Working with *Chelonia mydas japonica* from the Bonin Islands, he found, through histological examination, that the diploid number was 56 and 55 in the males and females respectively.

Characteristics of the haemoglobin of *C. mydas* have been studied by Doxy *et al.* (1964). Stephenson (1966) relates how the cells of *mydas* have been used in cell culture studies.

1.33 Protein specificity

The serum protein concentration in *Chelonia m. mydas* is 1.8% (Prais, 1964). In most turtles it is between 2 and 6%. Serological studies suggest a close relationship among the five genera of sea turtles (Prais, 1969).

1.4 Measuring and tagging turtles

The standard measurements of sea turtles (all of which are straight-line distances) are length and width of carapace, length of plastron and width of head (see Fig. 2). The lengths of plastron and carapace are anteriormost to posteriormost extensions of each. The width of the carapace is the distance between its lateral margins at the widest point. The head measurement is taken at the greatest body width.

The most common method of tagging marine turtles employs the use of a stainless steel tag clamped onto the trailing edge of a front flipper (see Fig. 3). The tags are numbered on one face and on the other side are inscribed instructions for the finder in various languages. Adult females are usually the only ones tagged because they can be easily caught on the nesting beach. One of the problems in sea turtle biology is to invent a tag that can be placed on or in a hatchling and which will identify it some years later. Attempts to mark or tag hatchlings by branding, tattooing, and use of magnetic tags have not been successful

(Garr, 1967b). Notching marginal scutes is the most common method used today by turtle biologists, but the long-term success of this method has yet to be established. Identifying individuals through immunological reactions has been suggested by Hendrickson (1969). Hughes (1970) in experiments with loggerhead (*Caretta caretta*) hatchlings is implanting a piece of stainless steel wire under selected carapace scales in hopes of identifying individuals later recaptured by x-raying them (see also Anon, 1969k). Pough (1970) has recently suggested a method of marking hatchlings using a plastic plug.



Fig. 2 Measuring the plastron length of a South Yemeni green turtle. The use of "giant" calipers gives straight-line measurements. The man on the right holds a pair of tagging pliers



Fig. 3 A tagged Western Samoan green turtle. The stainless steel tags, numbered and inscribed in various languages, have been adopted by marine turtle biologists throughout the world

263 / Conserving sea turtles 1983

Conventional tags attached to hatchlings either slough off or become incorporated as the turtles grows.

Various other methods including tattooing (Boley 78) injects rare elements such as europium (Shoop 78) or inserting pieces of metal into the body (Hughes 71a Schwartz 81) have failed or provided a tag that can only be detected with special equipment or at dissection

- Notes
- 1) crushing tags more prevalent in captivity
 - 2) make into a ring
 - 3) Replicate elsewhere, other species too.

* Not being able to mark small turtles is one of the critical barriers to reliably feed-backing, monitoring survival rates, discerning whether turtles return to their natal beaches and answering many demographic questions.

Mrosovsky, Editorial. MTN 22:1-2.

"Conventional tags applied to hatchlings slough off as the animals grow" + living tag photo.

M Rosovsky Editorial MTN 8:1.

* "If only turtles could be permanently tagged as hatchlings several outstanding gaps in our understanding of their biology could be filled: 1) How long do they take to mature 2) Survival rate 3) sex ratio 4) only return to natal beaches for nesting" (followed by Shoop, me & other accounts of failures)

Rudloe p224

"Sea turtles may very well imprint on their natal beach, but there is no way to prove it. A tag would have to be devised that could be affixed to a turtle the size of a half dollar and remain on for 10 to 20 years as the turtle grew to a minimum of a yard long and weighed nearly 200 pounds. Until such a device is developed, we can only speculate that the tiny hatchling that emerges... is the same creature that returns years and years later to nest again"

MR. JOHN FOREHAN
STOCK BRANDS CO. PTY. LTD.
P.O. Box 80, MT. HAWTHORN
WESTERN AUSTRALIA 6016

12-12-83

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

Dear Mr. Forehan:

I am writing to inquire further about the production of small "hatchling" tags made of titanium. The exact size and style are as I have attached to this letter. I need to know the cost of these tags for a small trial lot of, say, 4000 tags. In your letter of Aug 15 you stated a price of \$120. per 1000, with a 10,000 tag quantity. Also, how many letters/numbers can you fit on this tag? Colin Limpus has told me that you can also stamp the inside of the tag. If possible, this is an excellent plan. Can you stamp letters/numbers of a smaller size than on the tags attached to this letter? It seems to me that $\frac{1}{2}$ size would still be readable to the unaided human eye. What is your opinion?

If Mr. Limpus and I show good tagging results with these small tags, I can imagine your company receiving a "flood" of orders from other sea turtle researchers!

Looking forward to hearing from you,
Sincerely, George Balazs

GREEN TURTLE MORTALITIES EXAMINED AT KEWALO LAB

By

G. H. Balazs

	Tag No.*		Straight carapace length, cm
	Left	Right	
1.	744	344	17.9
2.	-	517	19.8
3.	714	314, 5715	23.3
4.	765	465, 5761	21.2
5.	829	529, 5740	18.7
6.	764	-	19.6
7.	-	690	6.8
8.	-	684	6.7
9.	-	692	6.5
10.	-	694	6.5
11.	290	289	7.9
12.	810	510	18.4
13.	788	690	20.6
14.	820	520	24.9
15.	830	530	18.2

*All tags removed and retained.

January, 1984

Carapace measurements and photograph records of Hawaiian green turtles reared at Sea Life Park
(Source: September 1980, French Frigate Shoals)

By George H. Balazs

Dates	SL cm	SW	SL	SW	SL	SW	SL	SW	SL	SW	SL	SW
	5738	5604	5612	5688	5674	5748	5662					
	504(104) 804	648(248) 948	480(80) 780	618 918	643 943	316(16) 716	326(26) 726					

9/21/80			⊗	Photographs representative of newly hatched										
10/07/80	Photo only											⊗ Photo only		
11/04/80	⊗ 7.4	6.3	⊗ 8.3	⊗ 7.3	⊗ 7.9	6.7	⊗ 8.4	7.1	--	--	⊗ 8.2	7.2	⊗ 9.5	7.3
12/30/80	⊗ 10.4	8.9	⊗ 11.2	9.8	⊗ 11.4	9.7	⊗ 11.6	10.0						
03/19/81	⊗ 16.1	13.9	⊗ 16.3	13.3	⊗ 17.0	14.0	⊗ 16.4	14.0	⊗ 17.3	14.0				
05/18/81	--	--	⊗ 20.6	16.6	--	--	⊗ 19.5	16.1	--	--	--	--	--	--
08/21/81	--	--	(c-22.5	19.5)	--	--	(c-21.0	18.4)	--	--	--	--	--	--
09/9/81	--	--	⊗ photo	--	--	--	--	--	⊗ 25.8	20.3	--	--	--	--
09/10/81	--	--	⊗ photo	(8/17- S-26.1 x 21.2)	--	--	⊗ photo	⊗ photo	⊗ photo	⊗ photo	⊗ photo	⊗ photo	⊗ photo	⊗ photo
09/15/81	--	--					(8/21- S-25.9 x 22.7)	(8/21- S-25.4 x 20.5)	(8/21- S-25.8 x 20.3)					
09/17/81							Released at FFJ							

-- = no photo

* See sheet - log of turtles followed | RESULTS

9/5-8/80 - Bill & me
experiments
with the use
of flip tags

RESULTS
TAGS for OF
FOR HATCHLING
SEA TURTLES
AN EVALUATION
THE USE OF

9/19/80 - conquest return from FHS

9/21/80 - photos representing new hatchlings

Herdinkman tags - date?

not mentioned in his MTN article; - number tested = 213
2004 7/10/7
(See his contract report)

photos of grafted turtles
w/ cadaver tags taken 10/7,
Herdinkman grafting before
this date

grafted 9/17 -
9/30

11/3/83
Question to
be answered -
more loss of
tags off 10/23

10/23 tags changed (RIGHT)
to flipper (one only - low
numbers)

5-6 cm
46-60 mm

HATCHLING SIZE - see Synopsis (OR CONTRACT REPORT)

~~12/30/80~~
11/4/80 carapace lengths -
82, 95, 74, 83, 79

53mm
48-59mm
31 grams
25-35g

recent analysis
evaluation

3/27-3/30 New tags on left FF.

S- 16.1
17.9
17.3
17.0
16.4

suggestive
SIZE? INSCRIPTION?
check Box
of tags
at home

How many letters possible
on tags?

Microchip

Graft notch - NO or little info. not easy to recognize specific info for the finder

CONCLUSIONS

DATES OBTAINED FFS ?

HENDRICKSON'S MTN

~~29.7~~ 4.82
 19 14.4 1.4
 15.8 609.9
 .57
 2 lost 1.71

NONE LOST

11/3/83 - See if
 "one lost" is stat. sig.
 for more loss on right
 ONE LOST

IIII IIII
 IIII IIII IIII
 (12) II
 (9) (11)
 (11) (9)
 (11) (7)
 (18)
 (16)

IIII
 IIII (3) (3)
 (1)
 (4) (2) (2) compute 12/2/83
 (2) lost 1/2 lost 1/2

IIII	IIII IIII
III	IIII
	III

 (2) + (18) = 26

(26)
 =
 14.9%

(1)
 =
 0.6%
 = 174

~~131~~
 (147)
 84.5%

~~147~~
 147
 (147)

Survivors -
 147
 26
 1
 174 total

174
100 Hcs

AGE?

$$\bar{X} = 2.555 \text{ kg}$$
$$0.71 - 5.24 \text{ kg}$$

$$\bar{X} = 23.21$$
$$15.8 - 29.7 \text{ cm}$$

$(\bar{X} \quad SD \quad N)$

for

- ① Turtles with 2 small tags (147)
- ② Turtles with 1 " tag (26)

- Carapace

- weight

MISSING

26

1943-
3315

-1
-1

N=26

594.8

22.8

551.6

172

527.6

318.1

317.7

248.4

202.9

256.0

473.5

489.3

607.4

3992.5

MISSOURI
APR 20 1925

-1
-1
-20
-1

23

27.67

50.29

60.08

21.01

28.47

62.16

70.5

32.33

33.37

385.88

N = 151

2.555

2.122
2.222
2.315
2.415
2.515
2.615
2.715
2.815
2.915
3.015
3.115
3.215
3.315
3.415
3.515
3.615
3.715
3.815
3.915
4.015
4.115
4.215
4.315
4.415
4.515
4.615
4.715
4.815
4.915
5.015
5.115
5.215
5.315
5.415
5.515
5.615
5.715
5.815
5.915
6.015
6.115
6.215
6.315
6.415
6.515
6.615
6.715
6.815
6.915
7.015
7.115
7.215
7.315
7.415
7.515
7.615
7.715
7.815
7.915
8.015
8.115
8.215
8.315
8.415
8.515
8.615
8.715
8.815
8.915
9.015
9.115
9.215
9.315
9.415
9.515
9.615
9.715
9.815
9.915
10.015

5652 - lateral seen full
5767 0
5639 - seen lateral white but in fish
5685 0

5665 - white lateral seen yellow

5646 0

5664 0

5637 0

5628 0

5616 0

5696 0

5693 0

5770 - pleural lateral faded infil

Dr. GEORGE H. BALAZS
National Marine Fisheries Service
Southwest Fisheries Center
P.O. Box 3830
Honolulu, HI 96812



NOEL C. ALON
Belle W. Baruch Institute for
Marine Biology and Coastal Research
University of South Carolina
Columbia, South Carolina 29208

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University of South Carolina
Columbia, South Carolina 29208

5694-0
5768-0
5643-*series folder*
5680-0

5617-0
5635-0
5747-0

5617-8

Dear Dr. Balázs,

I would appreciate a reprint of your recent publication

Synopsis of the Biological data on the green turtle
in the Hawaiian Islands

*3/17/77
small*

from NOAA-TM-NMFS-SWFC-7

Related reprints will be also gratefully appreciated.

Sincerely yours,

THANK YOU,

NCAL

TURTLE RELEASE

5 October 1982

9/80 hatchlings

FFS, Cavapau - Plaston live-tag turtles released today eastern side of Sandy Beach, Oahu 1205: TIME. (Waikiki Aquarium)

653 RFL tl (small tag) # 6345 RFL ^{NEW} TAG

5713 RFL tl ^{S 37.5 x 30.5} # 468 RFL tl (small)
768 LFL tl (small)

5726 RFL tl ^{S 35.1 x 29.9} # 772 LFL (small tag) (PC's missing)

5612 RFL ^{S 37.8 x 30.5} # ? ^{400 or 430} RFL (small tag)

5676 RFL ^{S 26.2 x 23.3} (PC's missing)

Total 5 turtles released in to nearshore waters. 5 sited staying in area around white water of submerged reef. All swimming

Alan

Turtle # 5726 which we
released on Tues was found @
1600 @ the NW end of Kailua beach
in 1' of water - the guy who found it
measured + weighed it + released it outside
the surf —

Bill

George

Rick Petit 235-2386

Turtle

Kailua Beach

nose to tail 20"

carapace width 14"

10/6/82

flippers tip to tip. 26"

1600

wt. 16.5 lbs

Tag 5726

1' deep water near shore
released outside of surf.

this turtle was released by
us (WBG + A.K.) on 10/5 @ Queens Beach

Bill

June 5, 1985

F/SWC2

TO: F/SWR - E. Charles Fullerton
FROM: F/SWC2 - Richard S. Shomura
SUBJECT: Alika Cooper's request for turtles

I asked Bill Gilmartin to follow up on your recent inquiry about Alika Cooper's request for turtles for the fish ponds at the Mauna Lani Resort (MLR). He found that Alika's "consulting" contract with the firm expires this month. His future association with MLR will be limited to harvesting mullet from the ponds. Bill was told that Alika has no other responsibilities with MLR and does not represent MLR when speaking about the ponds.

Last year Bill arranged for the Mauna Lani Hotel (same organization) to officially hold one immature green turtle in their ponds and a few more will be given to them this year for temporary holding for tag retention evaluation tests. The single turtle is apparently doing a good job of controlling algal growth in the pond it is in.

I don't expect we'll be hearing more on this subject from Alika.

cc: Gilmartin

DO

HL ✓

TS

In neat file

Suite 2860
737 Bishop Street
Honolulu, Hawaii 96813
Telephone 808-523-8802

March 19, 1987

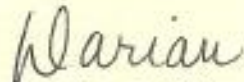
Mr. George Balazs
NATIONAL MARINE FISHERIES SERVICE
2570 Dole Street
Honolulu, Hawaii 96822-2396

Dear George,

Enclosed is a copy of the Mauna Lani Bay turtle release along with the article which appeared in WEST HAWAII TODAY.

Thank you for all your help, it is greatly appreciated.

Sincerely,



Darian Robin
Assistant Account Executive

DR:lo

Enclosure

Suite 2860
737 Bishop Street
Honolulu, Hawaii 96813
Telephone 808-523-8802

Client: Mauna Lani Resort

**For more information: Sheila Donnelly
(808) 523-8802**

Release date: Spring 1987

Title: NEW AQUATIC RESIDENTS AT MAUNA LANI BAY

KOHALA COAST, Big Island of Hawaii -- Makana Kai (Gift of the Sea) is the newest Hawaiian green sea turtle in residence at Mauna Lani Bay. There are now three such turtles at Mauna Lani on long term loan from the National Marine Fisheries Service in Honolulu. These exotic animals are classified as endangered species and are protected by the U.S. Endangered Species Act as well as the laws of the State of Hawaii.

The turtles were initially brought to Mauna Lani because the hotel's ponds are large enough to accommodate the turtles once they mature. They are currently part of a study being conducted by the Fisheries Service to compare growth differences between turtles in the wild and those raised in captivity. Zoologist George Balazs, leader of the Hawaiian Sea Turtle Recovery Team, pointed out that, "this is the first time a federal agency and a private corporation

The Mauna Lani Bay

Add One

have joined forces on a long term study that will promote better understanding and survival of the species." Balazs went on to say that the study has shown turtles raised in captivity can eventually be released and survive in their natural habitat.

All aquatic animals at Mauna Lani are under the care of groundsman and historian Danny Akaka. Daily fish feeding tours for guests at the hotel are conducted at 10:00 a.m. There are ten feeding areas at the hotel, each with a multitude of species. On the tour, Akaka discusses the ponds and sea life in each area. He also shares ancient stories about the fish, giving insights to Hawaiian history and legends. Both children and adults enjoy learning of the rich history that exists at the hotel. The ponds are home to black and white tipped reef sharks and a large variety of Hawaiian reef fish such as parrot fish (uhu); milkfish (awa); mullet; file fish; and yellow tangs.

Over 50 acres of prehistoric ponds can be found on the hotel grounds. Interspersed with the natural pools are ten man made ponds that recreate this natural environment. They

The Mauna Lani Bay

Add Two

are home to many reef fish that guests can see close-up when snorkeling just a few yards off shore in the coves along Mauna Lani's coastline.

The 351-room Mauna Lani Bay opened in February 1983. Catering to the carriage trade of Europe, Canada, the United States, and the Far East, the hotel establishes the standard of excellence for the Mauna Lani Resort which encompasses 3,200 acres and a three-mile coast line of bays, beaches, and pre-historic fishponds. Mauna Lani Bay is operated by Emerald Hotels Corporation which operates the Hawaiian Regent at Waikiki Beach and the Emerald of Anaheim next to Disneyland.

###

New green sea turtle in Mauna Lani bay

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Luxury on the Big Island's

4-19-87 HSB & Adver.

By Michael Carlton
Dancer Post Service

KOHALA COAST, Hawaii — In the shadow of luxury, on the edge of a gray-rock pond, where a little waterfall tumbles over a volcanic shelf, one of nature's best shows takes place each day at 10 a.m.

From under the waterfall pokes a small head on top of a long, leathery neck. Soon, a baby green sea turtle is flying under the water, flapping its water wings and racing toward the shore. The baby turtle, large black doe eyes soft in a sweet face, accepts a piece of tuna from Kaniela Akaka as a group of tourists watch, enchanted to be so close to such an endangered species. Then a young girl from Wisconsin is allowed to feed the turtle, and squeals her delight; a man from northern California gives the chubby turtle a morsel, and a Coloradan tosses the creature a slice of fish.

Then it's back to the bar for a gin and tonic, and an afternoon resting in the blazing sun of the Big Island of Hawaii. Can't take this nature thing too far, you know.

Mauna Lani Bay Hotel, arguably the most luxurious property in Hawaii, offers all the usual attractions for tour-



A view of the lobby entrance at the Mauna Lani Bay Hotel. The hotel is situated at the ocean's edge on the Kohala Coast, 17 miles from the Keahole Airport.

ists — tennis and golf, fine restaurants, a splendid strand of spun-sugar beach, pools, bars and rooms heavy with comfort. But it's the daily nature walk, 45 minutes of touring the salt-water ponds of the hotel, which attracts the most applause from the hotel's guests.

Groundsman Akaka, son of one of Hawaii's congressmen and a graduate student in Hawaiian studies, leads the tour, taking a dozen or so tourists each day to 10 feeding sta-

tions scattered through the lush grounds of Mauna Lani Bay.

At each station — some located in the open-sided lobby of the hotel, others in gardens which rim the building — Akaka talks about the fish swimming in the hotel's ponds, fish only a few feet from visitors' hands.

Many of the fish are dull, gray-sided mullet, but there is electric color in others — angelfish and parrotfish, clownfish and broomfish, yellow tang and triggerfish, boxfish and

Kohala Coast

squirrelfish. There are small sharks to feed — black-tips and white-tips — and a lazy spiny lobster that creeps from under its private rock to snatch a piece of raw fish.

There are also koi — Japanese carp — their orange and white bodies heavy with mouthfuls of Purina trout chow, their preferred snack. Koi, which look like oversize goldfish to the uninitiated, live to be as old as 200 years, you learn, and a fine specimen can cost as much as \$250,000.

Tour members learn many facts. For example: Before 1819, women were not permitted to eat most fish in Hawaii, which were reserved for men; and ancient Hawaiians ate nearly all possible fish except one, called a "death-death" fish, which is today a gourmet item on Japanese menus. (And a potential killer of the unwary diner if the chef is unskilled.)

You'll learn to identify a whiskered goatfish and the Hawaiian national fish, a triggerfish, and you'll see a plump puffer fish grow even larger when threatened. Along the walk you'll see fish that are orange and powder blue, others as red as an apple or as yellow as a lemon, and some that are pink.

The three green sea turtles on permanent loan from the

National Marine Fisheries Service are the biggest attractions — two 150-pounders and a baby — which are waiting at feeding time, their heads out of the water, begging like an old hound for a bone.

As you feed these magnificent endangered creatures you'll learn a lot about them as well. They can hold their breath for two or more hours underwater, make long migrations to deserted Leeward Hawaiian islands to breed, grow to 400 pounds and live more than 40 years.

You also learn to love these gentle creatures, and to appreciate all the rainbow fish flashing about in the many ponds and waterfalls of Mauna Lani.

After the tour you can go back to all the tropical vacation activities such as golf and tennis, and dress up that night for dinner at the elegant and formal Third Floor restaurant. But the next day, I wager, you'll be back with Kaniela Akaka, walking along the ponds feeding your new-found friends their breakfast.

If you go:

For more information, write the Mauna Lani Bay Hotel, P.O. Box 4000, Kohala Coast, Hawaii 96743. Or call toll-free 800-992-7987. Rates at the Mauna Lani Bay range from \$195 to \$295.



DEPARTMENT OF
SPECIAL CLINICAL SCIENCES

College of Veterinary Medicine
Box J-6, JHMHC
Gainesville, Florida 32610
(904) 392-2792

THE UNIVERSITY OF FLORIDA

April 14, 1987

Dr. Linda D. Banish
Veterinary Medical Officer
National Marine Fisheries Service
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St.
Honolulu, Hawaii 96822-2396

Dear Dr. Banish:

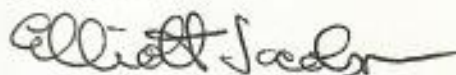
Over the last 10 years I have worked up several sea turtle necropsy cases with steatitis. Grossly, typical lesions of brown fat disease were seen and histopathology confirmed the diagnosis. In all cases the turtles were being fed fish that were previously frozen, allowed to thaw and also apparently which rancidified prior to being totally consumed. I have also seen this disease in captive crocodilians on an exclusive fish diet (See JAVMA. 183:1202-1204, 1983). It is my opinion that by the time the disease is recognized, no amount of vitamin E will reverse it. The key is to feed these animals fresh food, which if not consumed in a short period of time, should be removed from the feeding tanks. Further, you may already be aware, adult green turtles are primarily herbivores in the wild and an all fish diet is unnatural. Also, there is a commercially available (Purina) green turtle chow which was developed and used by Cayman Turtle Farm, Grand Cayman, BWI. This diet appears to be nutritionally complete for green turtles.

In reviewing the slides you sent, I concur with your diagnosis. Both turtles had severe vacuolar change of hepatocytes and although turtle #1 was poorly preserved because of freezing, the granulomatous inflammation in the liver could still be appreciated. Turtle #2 need granulomatous steatitis with the amorphous staining material (somewhat yellow with H and E) seen within the fat, liver, lung, probably representing ceroid.

Elliott Jacobson, DVM, PhD
Page 2
April 14, 1987

It never ceases to amaze me how people kill these animals with poor diets. Several months ago I sent a letter off to the Florida Department of Natural Resources, to try and set up a committee to standardize sea turtle diets; at this point in time nothing has been done. Good luck and if I can be of any further help, feel free to contact me.

Sincerely,



Elliott Jacobson, DVM, PhD

EJ:nr

SMITH ORIG. DATA SHOULD BE IN OED Daily logs

Summary = 2 Seam; 1 center; 2 marginal

8-9-83 - Kewalo Basin Turtles - originally GRAFTED By J Hendrickson

1. Center of 1st Lat Graft - Big & white/yellow - faint Blk mark on PL.

photo #1 - 5683, 45.1 (whole turtle)
" #2 - 5683, 45.1 (close up)
straight length 40.2
width 30.2

left Mary - injured indented, but healed.

2. 5659, 630 - photo #3
straight carapace length - 41.4
width - 35.4

8/23/83
42.5 cm

1-2nd Lat on seam white & Big; PL Blk mark distinct - also on seam

3. 6478, 5608, 815, 515 (4/12/83 S-39.1 x 31.8) 8/23/83
straight carapace length 40.3
width 33.5
11th May left ventral distinct Blk spot - dorsal - nothing

Right 11st has scars of old robe (?)

4. 6499, 5725, 73
straight carapace length 41.8
width 35.2

8/23/83 Gaudy
42.5 cm beach release

11th May. left - 2 Blk spots ventral
1 Bigger than others.
Dark one close to skin of pelvic area.

5. 5711, 6477, 902
straight carapace length 46.7
width 36.9
1-2 Lat on seam PL - faint Blk in center.

Big & white - seam lifted up - compared to other side. PHOTO #4

+ 3 Much smaller turtles - all with white carapace graft.

TO BE RELEASED

TO BE RELEASED

Captive-reared green turtles retained at Kewalo Basin.

Size 681 tag Nos.	Size 1 tag Nos.	8/21/81			9/22/81		Weight kg	8/9/83 SCL tag Nos.
		length	width	width	width			
1. 5608	513	815	24.6	27.3	21.0	30.2	2.98	40.3 515 815
2. 5612	480	780	26.9	32.8	22.7	34.5	3.43	
3. 5659	630	—	22.0	26.4	18.7	29.4	2.12	41.4 630 —
4. 5676	542	842	19.8	22.2	16.6	24.9	1.31	
5. 5683	459	759	20.0	24.4	15.7	27.8	1.50	40.2 459 —
6. 5711	602	902	24.3	31.3	19.5	34.6	2.93	46.7 — 902
7. 5713	468	768	23.6	29.0	19.7	32.7	2.60	10-9-81 2.9kg 34mg
8. 5725	331	931	20.9	27.0	18.1	30.2	2.07	41.8 — 931
9. 5726	772	—	20.8	25.7	17.0	26.5 (rest)	2.07	
			202.9			21.01		

March 26, 1987

F/SICZ:LDB

Dr. Elliot Jacobson
J. Billie Miller Health Center
College of Veterinary Medicine
Department of Special Clinical
Sciences and Health Center
Animal Resources
Box J-6
Gainesville, FL 32610-0006

Dear Dr. Jacobson:

As the Veterinary Medical Officer for the National Marine Fisheries Service (NMFS), Honolulu, I was recently called upon to attempt diagnosis and treatment of a gravely ill, green sea turtle. The turtle was one of two that were part of a NMFS study on growth rate in captivity. They were being housed at a hotel on the Big Island of Hawaii. They had been offered on a diet of approximately 1 lb/day of fresh fish from the hotel kitchen. When this was unavailable, they got frozen mackerel or smelt. Additionally, they were provided on a generally biweekly basis with seaweed which they were observed occasionally to eat. The diet was not supplemented with vitamins. There was a recent algae bloom in an adjacent and communicating pond. Also insecticides and fertilizers could run off the lawns into the ponds. Fish in the ponds, however, were healthy.

One of the turtles died on March 1 or so. It was found on the bottom of its saltwater, silt bottomed pond 2 days after it was last seen alive. The caretakers said both turtles were somewhat anorexic and lethargic for a week prior to this occurrence. It was frozen as it could not be sent to us immediately. Bill Gilmartin and I performed a necropsy on March 4. We found the turtle to be extremely obese. The turtle was autolyzed but there were some significant gross findings. The lungs were brick red, and severely congested. The liver was round edged, large and friable, and had a mottled color pattern of golden brown and black. The stomach was full of fluid and remnants of fish scales and parts of coarse vegetation--stems or leaves. The esophagus had a good deal of food between rugae and the lower G.I. was empty.

I flew to the Big Island to treat the second turtle with injectable vitamins E and B (thinking steatitis). This turtle died 2 days later and was shipped to us fresh for necropsy. I've enclosed its necropsy report.

The state animal health center here prepared these H&E slides. They don't have much experience with marine animals. In hopes of learning, I thought you might be willing to look at these slides and see what you think. A friend of mine on Oahu, Dr. Leilani Sims, who was an intern student under you at Gainesville about

9 years ago, recalled an incident with turtles from Cayman which had streptitis. She suggested I contact you. Also, I know George Balazs has been in communication with you about trematodes (which by the way I have been successful at finding in other recovered carcasses).

Please let me know what you think (if you have time for this). I'd appreciate any literature you may have on the subject.

Sincerely,

Linda D. Banish, DVM
Veterinary Medical Officer

LDB:ey
cc: Banish
HL

DATE
March 10, 1987

SEA TURTLE
NECROPSY REPORT SHEET

Manna Leia
SUBMITTING ID N
tags 5659 R
5688 L

Submitting Prosector		Address		Phone		
Linda Danish Durn		2570 Dale St, Honolulu HI 96822		943-1254		
Genus	Species	Carapace LXW	Plastron LXW	Head W	Weight	Sex
Chelonia	mydas	Str ^L 64.3 cm W-46.5 cm Curv	Str Curv			F

HISTORY & CLINICAL SUMMARY: (Water quality; environmental contaminants, stranding location date and time of autopsy, etc.)

Water quality: fairly clear - salt/brackish pond, silt bottom.

Environmental contaminants - pond lined on banks with vegetation, palms + shrubs.
lawn occasionally fertilized (about once/mo)
possible for fertilizer to wash into pond system
possible for insecticide wash-in also but fish in same pond - ok.
large algae bloom noted in adjacent pond around time of initiation of anorexia

History
march 4 - Anorexia
Lethargy for ~ 1 week

march 7 - Treated after death of pond mate for possible steatitis, vit B def, intestinal blockage.
with vit B complex, B-150, 2ml } repeat dose left to march 10 injections
Sel-toc - 1.5ml

march 10 - Died in early am
30cc mineral oil - oral w/ tetracycline

Specimen submitted	Preservation	Condition of Specimen at Necropsy
Moribund <input type="checkbox"/> Dead <input checked="" type="checkbox"/> Tissues <input type="checkbox"/>	Fresh <input type="checkbox"/> Fixed <input type="checkbox"/> frozen	autolysis

Tissues submitted:

Histopathological - liver, lung, renal, ovary, spleen, muscle, fat.

Bacteriological (smears, tissues, cultures) -

Virological (frozen) -

Parasitological (AFA) -

Toxicological (frozen) -

GROSS FINDINGS:

External (including skin, plastron, carapace)

Obese - severe plastron convex, all extremities full.

Head (including mouth, eyes, nares, salt glands, brain)

Gastrointestinal Tract (including liver, spleen, pancreas, mesentery)

Esophagus - remnants of ingested limu. (seaweed)

Stomach contents - fish parts, bones + fins
- some small amount of sand + silt
- some fibrous matter

alt stomach - fluid filled

lower intestine - some = boluses of feces, 1 fish rib bone (?) large + sharp
4" long.

liver - edges very round; very friable, yellow tinged color - homogeneous

mesentery - fat laden.

Lungs and Heart (including trachea, bronchi, great vessels)

lungs pink + spongy; stoth throughout airways
no flukes found in heart or great vessels

Urogenital System (including kidneys, bladder, gonads, accessory tubes, cloaca)

kidneys - laden with black pigment
ovaries inactive

Skeletal Muscle and Osseous System

all fat in body - dispersed orange-brown nodules $\approx 1-3$ mm
in diameter.
gritty texture, spherule, fat surrounding - necrotic, spaced
variably, (mostly $\approx 5-1$ cm apart)

VL-4
9/83 -

*Do you have this George?
For you*

Owner's Name Linda Banish
Address Nat'l Mar Fisheries

State of Hawaii
DEPARTMENT OF AGRICULTURE
Division of Animal Industry
Veterinary Laboratory
99-762 Moanalua Road
Aiea, Hawaii 96701

Date Rec'd. Jan. 23, 1986
Log No. 86-0339
Hist. No. 86-01-92

Report to Dr. Linda Banish :

Date August 19, 1986

Species & Breed: Turtle (Green Sea) Sex: _____ Age: _____
Type of Specimen(s): (A) PM body [] (B) Fixed [X] (C) Blood [] (D) Others []
Examination completed: PM [] Histo [] Bacti [] P/O [] Cyto []
Viro [] Chem [] Hemato [] Toxic [] Others []

*The I.D. was submitted
they did not record it here - I don't have a card*

Code(s)

Pathology Result(s)

_____ : Tissue: Autolysis.

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

Bacteriology: _____ :

_____ :

Parasitology: _____ :

_____ :

Other Tests: _____ :

DIAGNOSIS ~~Provisional~~ (Final):

- (A) Autolysis.
- (B) _____
- (C) _____

Telephone report date: _____

Comments: _____

cc: Head, DAI

Pathologist: Crane H. Hahn
CRANE H. HAHN, D.V.M.

For you if you don't
already have it

State of Hawaii
DEPARTMENT OF AGRICULTURE
Division of Animal Industry
Veterinary Laboratory
99-762 Moanalua Road
Aiea, HI 96701

ACCESSION No.: 86-3441
DATE: 09/18/86

Linda Banish, D.V.M.
National Marine Fisheries
2570 Dole St., Room 106
Honolulu, HI 96822

OWNER
Nat'l. Marine Fisheries Serv.
2570 Dole St.
Honolulu, HI 96822

SPECIES: Gr. Sea Turtle
BREED: ID# T-14
AGE:
SEX:
Submitted on: 09/05/86

SPECIMEN: Paracystic cyst
HISTORY: Dead. No history.
CLINICAL DIAGNOSIS:
NECROPSY FINDINGS: Took samples of each organ. This was a rel. "fresh" dead for us. No significant gross lesions.

For the following Histo. result(s):

Microscopic:

Lung = Several possible remains (keratin) of a parasite.

Kidney = Autolysis; few macrophages & lymphocytes.

Spleen = Autolysis.

Intestine = Autolysis; some remains of parasitic eggs in mucosa.

FINAL LABORATORY DIAGNOSIS:

COMMENTS: Unable to make diagnosis, except for possible parasitic problem.

PATHOLOGIST/DIAGNOSTICIAN:

Thomas R. Sawa
Thomas R. Sawa, D.V.M.

VL4
CC: Head, DAI

George
Fyfe

March 16, 1987 P/SWC2:LB

Mr. Allan Brown
Mauna Laní Bay Hotel
Engineering Department
P. O. Box 4000
Kawainae, HI 96743

Dear Mr. Brown:

The two green sea turtles that we received from you for necropsy, No. 8689/5683 and No. 5659/3688, both were extremely obese. Obesity alone is a serious health hazard but the type and quantity of food fed which led to such great adipose deposition can cause vitamin deficiencies with life threatening ramifications.

Steatitis, a disease most often associated with all fish diets (and especially oily fish), is related to vitamin E deficiency and high unsaturated fat intake. Loss of agility, lethargy, anorexia, and sudden death are common symptoms all of which were seen in these turtles. The gross necropsy revealed lesions in the fat consistent with this disease. Tissues have been submitted for histopathology for confirmation.

A deficiency of B vitamins may cause some similar symptoms in turtles, and is a common problem in animals fed on all fish diet without vitamin supplementation. Additionally the microbe flora in the intestine of a naturally herbivorous animal, like the green turtle, is designed to produce these vitamins when on a proper diet. This flora is upset by a fish diet and will not produce vitamins.

As we discussed during my visit to treat turtle No. 5659, it is imperative to adjust the diet of the remaining young turtle to avoid the same problems. I suggest making such changes slowly as illness can follow any abrupt diet disruption.

As of Monday, March 16, turtle No. 6913/N395/N396 should have had its all fish diet cut in half. On Monday, March 21, the existing quantity should be reduced by one-third. Maintain the turtle on this quantity until Monday April 6 at which time you should reduce the current quantity by one-third again. Maintain the turtle at this level until mid-May then decrease the amount again. At this point you may only be feeding fish once per week as the daily quantity would be very little. The turtle should be observed routinely to make sure it is eating the limu that is in the pond and to make sure there are no sudden or drastic changes in its appearance or attitude. If any changes are noticed, our office should be consulted.

I will call as a check before my departure for the Northwestern Hawaiian Islands March 30 and upon my return early August at which time we can discuss any problems/questions.

Thank you for your efforts and cooperation.

Davidson .. 20743

Sincerely,

DR. M. L. ...

The two glass ... Dr. Linda D. Banish ... Veterinarian ...

LDB:ey
cc: Banish
HL

... the ... the ... the ... the ...

... the ... the ... the ... the ...

... the ... the ... the ... the ...

... the ... the ... the ... the ...

DATE
March 4, 1987

SEA TURTLE
NECROPSY REPORT SHEET

SUBMITTING ID N
tag 8689R
56832

Submitting Prosector: Linda Banish Dum
Address: 2570 Dale St, Honolulu HI 96822
Phone: 943-1254

Genus	Species	Carapace LXW	Plastron LXW	Head W	Weight	Sex
Chelonia	mydas	Str L-64.3 cm W-46.5 cm Curv	Str Curv			F

HISTORY & CLINICAL SUMMARY: (Water quality; environmental contaminants, stranding location date and time of autopsy, etc.)

Water quality: fairly clear - salt/brackish pond, silt bottom.

Environmental contaminants - pond lined on banks with vegetation, palms + shrubs.
lawn occasionally fertilized (about once/mo)
possible for fertilizer to wash into pond system
possible for insecticide wash-in also but fish in same pond - ok.
large algae bloom noted in adjacent pond around time of initiation of anorexia

• anorexic prior to death ~ 1 week
lethargic

found dead at bottom of pool, probably 2 days since last saw alive

Specimen submitted	Preservation	Condition of Specimen at Necropsy
Moribund <input type="checkbox"/> Dead <input checked="" type="checkbox"/> Tissues <input type="checkbox"/>	Fresh <input type="checkbox"/> Fixed <input type="checkbox"/> frozen	autolysis

Tissues submitted:

Histopathological - liver, lung, renal,

Bacteriological (smears, tissues, cultures) -

Virological (frozen) -

Parasitological (AFA) -

Toxicological (frozen) -

GROSS FINDINGS:

External (including skin, plastron, carapace)

Obese - severe plastron convex, all extremities full.

Head (including mouth, eyes, nares, salt glands, brain)

x All internal organs - autolysis advanced.

Gastrointestinal Tract (including liver, spleen, pancreas, mesentery)

Stomach contents incl. fish parts, sand, silt, vegetative mater (brown coarse
 leave or twig type material) a great deal of fluid in the aft stomach - clear,
 yellow tinged, Esophagus contained particulate matter (unusual), lower 1/3
 empty. Black pigmented mucus pres. (not unusual
 in turtles)
 Liver - large, friable, nutmeg pattern color, round edges
 Mesentery - fat laden

Lungs and Heart (including trachea, bronchi, great vessels)

Lungs - dense, dark brick red color - congestion severe
 (pre vs. post mortem questionable)

No flukes found in great vessels or heart

Urogenital System (including kidneys, bladder, gonads, accessory tubes, cloaca)

bladder: apical 1/3 black pigmentation

ovaries inactive

kidneys - questionable architecture/color (? autolysis)

Skeletal Muscle and Osseous System

flipper history of dislocation at initial recovery
 radiographs on file; fibrotic joint capsule w/ degenerate
 cartilage at humeroscapular joint - deformed humeral
 head.

DATE **SEPT 1980 FFS**
Disk GRAFT 9/23/80
 March 10, 1987
Dead (6 yrs 5 mo)

TO MANNA LANI
9/84
 SEA TURTLE

NECROPSY REPORT SHEET

SUBMITTING ID N
 tags 5659 R
 3688 L

Submitting Prosector

Address

Phone

Linda Danish DUM

2570 Dole St, Honolulu HI 96822

943-1254

Genus	Species	Carapace LXW	Plastron LXW	Head W	Weight	Sex
Chelonia	mydas	Str L-64.3 cm W-46.5 cm Curv	Str Curv			F

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History
 March 4 - Anorexia
 Lethargy for ~1 week

March 7 - Treated after death of pond mate for possible steatitis, vit B def, intestinal blockage.
 with vit B complex, B-150, 2ml [repeat dose left to March 10] injections
 Sel-toc - 1.5 ml
 30cc mineral oil - oral w/ tetracycline

March 10 - Died in early am

Specimen submitted	Preservation	Condition of Specimen at Necropsy
Moribund <input type="checkbox"/> Dead <input checked="" type="checkbox"/> Tissues <input type="checkbox"/>	Fresh <input type="checkbox"/> Fixed <input type="checkbox"/> frozen	autolysis

Tissues submitted:

Histopathological - liver, lung, renal, ovary, spleen, muscle, fat.

Bacteriological (smears, tissues, cultures) -

Virological (frozen) -

Parasitological (AFA) -

Toxicological (frozen) -

GROSS FINDINGS:

External (including skin, plastron, carapace)

obese - severe plastron convex, all extremities full.

Head (including mouth, eyes, nares, salt glands, brain)

Gastrointestinal Tract (including liver, spleen, pancreas, mesentery)

Esophagus - remnants of ingested limu.

Stomach contents - fish parts, bones + fins
- some small amount of sand + silt
- some fibrous matter

alt stomach - fluid filled

lower intestine - some boluses of feces, 1 fish rib bone (?) large + sharp

liver - edges very round; very friable, yellow tinged color
mesentery - fat laden.

Lungs and Heart (including trachea, bronchi, great vessels)

lungs pink + spongy; froth throughout airways
no flukes found in heart or great vessels

Urogenital System (including kidneys, bladder, gonads, accessory tubes, cloaca)

kidneys - laden with black pigment
ovaries inactive

Skeletal Muscle and Osseous System

all fat in body - dispersed orange-brown nodules ~ 1-3 mm in diameter
gritty texture, spherule, fat surrounding - necrotic, spaced
variably, (mostly ~ 0.5 - 1 cm apart)

EXPERIMENTAL MARKING OF SEA TURTLES BY TISSUE MODIFICATION

L.P. Hendrickson and J.R. Hendrickson

In the Summer of 1980, we worked with three species of sea turtles (Chelonia mydas, Caretta caretta, and Lepidochelys kempfi) at four locations (Miami, Grand Cayman Island, Galveston and Honolulu), to explore the feasibility of marking them with "living tags." Our goal was to develop a technique, practicable under field conditions, for marking large numbers of hatchlings with minimal disruption of nest-to-sea progression, disadvantage and unnatural influence, but with life-long, growing markings, recognizable whatever the age or size of the adult animal. To this end, we treated about 680 animals, exclusive of controls, with tissue grafts and a chemical melanin-suppressant.

At Miami (on C. caretta) and at Grand Cayman (on C. mydas) we tested monobenzylether of hydroquinone as the melanin-suppressant with little long-term success. At all four locations (all three species) we tried four variations of autografting procedures, some of which have given very encouraging results. Disks of tissue cut with a Keyes dermal punch and transplanted to sites prepared with the same instrument grew well, as did pieces of tissue gouged out by cutting obliquely with a dermal punch, then moved to sites prepared in like manner. Disks of plastral tissue inserted into pockets cut under the keratinous layer of carapace scutes were less successful. Small cylinders cut all the way through the marginal plates of the posterolateral carapace and replaced in reversed position gave the least satisfactory results. In all cases, waterproof surgical cement was used to seal off the operated site and hold the grafts in place. Although we tried to observe reasonable cleanliness and, in the treatment of two groups, applied a germicidal ointment over the completed, sealed graft,

aseptic procedures were not followed. Handling time for the procedures was less than three minutes per turtle. Survival of the experimental animals equalled or exceeded the rates of survival in untreated control groups.

The last inspection of all surviving experimental animals took place between 10 and 11 months post-operative. The animals were then released at sea with the exception of small groups kept in Miami, Grand Cayman and Honolulu for continued observation. At the time, nearly a year after grafting, the disk and gouge treatments showed more than 90% graft success in some cases of plastral tissue transplanted to the carapace. The success rate was lower with carapace tissue moved to the plastron. Now, 2.5 years after grafting, the remaining experimental animals in captivity still show conspicuous grafts on their carapaces, as did one Kemp's ridley headstarted at Galveston, recaptured after 289 days in the wild (about 19 months post-operative), and photographed before being released again. Most of the long-term captives have already achieved sizes comparable with wild turtles of considerably greater age, as estimated from what is presently known of growth rates in nature.

On the basis of the results described, further work is planned to refine the grafting procedures. In addition, the first major field test is being considered -- cohort marking of approximately 10,000 hatchlings. We invite discussion of the technique and solicit recommendations regarding site, species and protocols for the proposed major field test. We also invite discussion of the best way to establish suitable control of this marking system to avoid confusing replication of markings and to ensure maximum information retrieval.

Discussion
Lou Ehrhart, leader

Wibbels:

Can you make a tool (for skin transplants) to automate the process and increase speed and efficiency?

J. Hendrickson:

We consulted several surgeons, but we were unable to come up with anything. The handling time is under two min/person. We can teach people to do this in about two hours.

L. Hendrickson:

An automated procedure would give precision of cut, but all the turtle shells may not have the same depth.

Witham:

The irregularity of the shape and growth may cause confusion later.

J. Hendrickson:

Until you understand tissue growth, you can't predict certain patterns.

Witham:

This is an inherent problem.

J. Hendrickson:

We now want to study the allometry of growth.

Carr:

Does this deserve mass attention? I think it does as long as you can prove you can work out the allometry problems.

J. Hendrickson:

Some of our transfers are good and some are bad. The question is, can we stretch it further? If Cayman Turtle Farm grows them twice as fast, are we seeing development now that we would normally see in the future?

Wibbels:

We got a recapture with a living mark nine months after marking. The carapace mark was good, but the plastron graft was not as good.

L. Hendrickson:

We think that plastron marks may not stay on as well because of rubbing on the cement bottom, etc. We may want to just mark on the dorsal surface, but this may present coding limitations.

Rabalais:

Can you go to the head for marking?

J. Hendrickson:

It didn't work on the head or flippers, but we didn't try very many.

Carr:

If you do a large release at a site, then coding wouldn't matter. You would just want to see if you got the tag back.

Klima:

You need a coding system or you will have confusion.

Carr:

If the coding won't work, you can at least do a large mark and release.

Harris:

If you use this instead of flipper tags, the public won't know about it.

Carr:

Flipper tags work well in the Carribean, but the living tag is good for finding out if the turtles return.

J. Hendrickson:

We are not proposing an overlap between the flipper tag and the living tag. The tags are testing for different things.

Carr:

But people will see it that way.

J. Hendrickson:

If we're ever going to get a life history table, this is the way to do it.

Owens:

The question is where to do a large study? Tortuguero is not good because there are too many places for the turtles to go. Ascension, Surinam, or Padre Island would be better, since the chances for ambiguity in interpreting tag returns would be minimal.

WESTERN GULF OF MEXICO SEA TURTLE WORKSHOP

PROCEEDINGS

JANUARY 13-14, 1983

Organized and Edited
by

David Owens
Diana Crowell
Gayle Dienberg
Mark Grassman
Sheillah McCain
Yuki Morris
Nancy Schwantes
Thane Wibbels

Department of Biology
Texas A&M University
College Station, Texas 77843-3258

October 1983

TAMU-SG-84-105

Partially Supported through Institutional Grant NAB3AA-D-00061

to Texas A&M University

by the Office of Sea Grant

National Oceanic and Atmospheric Administration

Department of Commerce

HIGH TIDE
LOW TIDES

3-4pm 3 AUG 82 TUES.

11pm 3 AUG 82 wed.
9am 4 AUG (Lowest)

3 AUGUST 1982
TUESDAY

Depart ~ 8:30am Bob Justman's
Beach 18 - Direct flight to Tern Is.
Aboard are Gail Peterson, Amy
Vemurya, Miriam Pillow.

OBJECTIVE: Teach how to gather
hatchlings each night so that
animals will be available for

a) graft marking.

b) MONITOR EXISTING NESTING AND BRACKING
TECHNIQUES - ① Walk beach & on interior

hatchlings crawling for the sea.

Start search shortly after
sunset. Most should hatch before
midnight for that night.

② During the late afternoon
before sunset look for
places where hatchling
will emerge. Females with
chicken wile (but don't

leave it that way during the day.

③ Locate sites where hatchlings have
already emerged - Dig down carefully
to recover clusters of hatchlings
that have not yet emerged, and also
hatchling that are "doomed" - would
never emerge on their own.

continued p 58

-PROBLEMS-

1. No Section 7 FWS; and perhaps none from NMFS. I need to see a copy. I was not asked questions about problems, impacts, and possible methods of mitigation.
2. Kodak glue never arrived, so regular "super glue" in the tube was packaged by Gail last night. What is the difference between this and Hendrickson glue?
3. Cibly had possibility of saving-in immature nests during the Jachuk procedure if anything but the beach slope is walked.
4. Constant walking of beach (and interior) with lights as a disturbance to nesting turtles (preparing to emerge), and marking sodas. Hocking of and bottling for anything but a short period of time is an adverse effect on egg "yolk" supply and "imprinting" mechanism. Appoint in boat.
5. Number needed to be marked in order to reasonably expect success (evening later recovery) is #7.
6. Number of years, and numbers, to recover nesting batch at FFS (or elsewhere).

8. When you recover in foraging posture, you don't know how long the turtle has actually been there.

weigh → [Benefits - VS - Risks/unknowns] The sort of decision that needs to be made by a "Recovery Team" of experts.

Benefits - are information

1. Age at recruitment (how long is the "lost year"?)
2. Age to maturity/nesting
3. Percentages recaptured to foraging pastures? (% survived through lost year)

But to achieve the above "benefits", very intensive monitoring/sampling in pastures, and at nesting sites, over a long period would have to occur.

One solution to collection problem - stake nests in June - fence in August and monitor.

Need to keep some in captivity long enough to see if profit takes.

3 AUGUST 82

TUESDAY

Arrived at Fern about 12 noon.
Ate lunch and re-packed all
gear for trip overnight to
East Faband.

Ruth has been spending a night
rotating on the different island
and I have recorded the tags
of a few nesting turtles.

Departed for East ~ 3:30 PM
Proffy people and Ruth Ethos.
Proffy people will be allowed
to stay overnight every 3rd-4th day
accompanied by either Ruth or J
Chip.

Choppy sea - it was necessary to
move slowly. At about 45 minutes, just
past Round Island, the EVERINDE
motor quit running. Finished
noting on 25 hp Johnson out.
Satt up camp on East and
started walking island looking for
emergence sites. John Angler for
reports saw heavy rain this
morning, therefore most surface
eroded from previous surface
disturbances.

3 AUGUST 82

TUESDAY

Nothing located for some time, then
just before sunset I stepped on
a sill that collapsed slightly.
Digging into it, I found a
hole of hatching. Digging the
upward ~ 5 with finger the
surface. Small portions of
uplift are still showing on many
of them. ~ 60+
found; ~ 5+ just hatched
popped over and lots of yolk
present, some blood.

Spent some of the rest of the time
up until ~ midnight walking
sections of beach - the
four others were each assigned
a "quarter" of the island to
walk north the beach slope.
I spent time at each
location talking to the people.
Only one healthy - most found -
I've seen down the beach. It
found tagged by Ruth in ~ A3.
I tagged, only good range
tags on beachers and
nesters.

4 AUGUST 1982

WEDNESDAY

At ~ 6:30am I got up

4 AUGUST 1982

WEDNESDAY

island and walked around the looking for emergency sites. Boat water still not about. Large diameter site found in 44-2. Hatching shown at surface - coarse coral pieces around them. Site excavated and ~ 65-75 turtles found. It seems to me that some already came out of the nest; even though many were just under the ^{eggshells} ~~eggshells~~ and packed up ^{eggshells} ~~eggshells~~ and motored back to Tern. John Andre is supposed to watch them to East for an overnight stay once every 3-4 days. 25hp - twin stroke going - strong one to limited. After clearing up, I got down with Gail, Amy and Miriam - we tried grafting one - two hatchlings.

Problems: 1. Hatchlings are dirty - humus mottled from soil on East Is. - need to be washed.

2. Do alcohol rub harmful to tongue, eyes, nose?
3. How deep do you take the plug? Hendrikus report says "subdermal".
4. After cut is made with 3mm diameter biopsy tool, we could not remove the plug in one piece. Some pieces could be peeled off, but not with any underlying tissue that would be expected as necessary to make graft "take"; - Vastanlar tissue - I (John Blake).
5. Making plug-cut on scapula of scapula results in two ways it is removed. There was difficulty in deciding exactly where (and how deep) plug should be taken from pectoral. Also, same problem of getting plug out in one piece.
6. "Super" Glue spread over wound of trial turtle seemed to work fine - sealed in bleeding.

exp. 31

4 AUGUST 1982

WEDNESDAY

I suggested that ~ 5 hatchlings be kept - held in a water tank - sampled from ① beginning ② middle ③ end of hatching grafted over the study period. In order to see how it "takes" with the various variables present this time.

I asked John Angre to grind down the thickness of a "scrap" handle to be a proper tool to exist to remove (pop-out) plug once they are sent with the biopsy tool.

A "Chemistry spatula" would seem to be the ideal tool.

4 August 82

Wednesday

Departed Tern about 1:15 pm. Flew directly back to Johnston. 15,500 feet - (back coll. passed through a thick gloomy front. in Honolulu at about 4:45 pm.

TAG Summary

Newly Tagged	Female	Tag Reserves
Male	I	Male
0	(basking)	0

Female	8
(6 wearing harness; 2 Basking)	

AST
(no other 15 to 15 covered)

8-26-82 Debriefing meeting on grafting work -
 Thursday Herb & Bill Jart Kaibara Beach
 Assistant - Present - me, Bill, John Henderson,
 Amy, Miriam & Gail.

1. A report was prepared by Ruth Ittges on seal imports of collecting hatching.
2. Some hatching had to be held 48 hours before release.
3. Impossible to do properly in a tent.
4. \$2,000 done; No satisfactory answer on Bill's suggestion. What do we need to do to do 5000-6000 next year.
5. Black Emson did not work - made it black. I suggested sticking on black & white paper to glue.
6. Fences were bad - important turtles?
7. All releases at Tern in same area.
8. Nets/fences on islet did not work.
9. Most/many of the turtles were collected by digging.
10. Hatching released moved slower on beach than newly collected.
11. They stopped on at least one nest that caused it to emerge prematurely. How many

other happened that were not detected?
 12. 6 lights were set up on the beach?
 It's just hatching emerging in each light's immediate area. (A turtle started right by one of them, according to Miriam. These lights were reportedly only dimly visible from a distance. Head lamps aimed down from a stake.

3 SEPTEMBER 1982

FRIDAY
 Departed ~ 8:45 Justman's
 airplane - I am the only passenger
 aboard. Tony, Pamela's brother,
 sent me a -6 5016 (1) loge
 of Rotenone.

OBJECTIVES:

- 1) Undertake night of monitoring nesting
 greens still present at Graft
 Island. (Fix departure times).
- 2) Tag and recover tags on trackers.
- 3) Return tags released 30 posthatchlings.
 held for the past few weeks to
 assess results of grafts
- 4) Recover and re-examine juveniles
 for egg growth rates.
- 5) Look for direct evidence of natural
 predation on hatchlings.
- 6) Get soil samples for moisture
 salinity analysis.
- 7) Get insect scale counts and photograph
 front flippers.

9-3 Tagged at Cihue ~ 9:30am. Met with

Don Heacock and urged him to
 help Bill Puleston check studios on
 Mokolai. Departed at 10:30 am.

Saw Nihog and Necker.

Arrived at FF5 ~ 1:15pm.

New caretaker couple are here - found
 send them Synopsis. Names - Gail &

Silve

Washed off potholes. Due to their
 bad smell from fecal matter. Applied
 small amount (NBT0 (MIFS)) on right flipper
 as follows:

2-3 let off on 2 ab

TAG NO.	LOCATION	GRAFT	LOCATED	GRAFT
401	2nd Suck E	Distal-Volant	416	2-3 web R
402	2-3 web R	D-out	417	"
403	"	"	418	"
404	"	J-V out	419	"
405	"	D-out	420	"
406	"	"	421	"
407	"	"	422	"
408	2nd S R	D-out	423	"
410	2-3 web R	D-out	678	"
409	"	white grafts present on hand	682	"
411	"	"	683	"
412	"	"		
413	"	"		
414	"	"		
415	"	"		

26 Total - Released 9/3
 evening from Tean Island
 9 have missing grafts 3462

3 September 1982

Turtles with dorsal graft out appear to have new pigmented tissue growth where graft was. Also, these were mostly the largest turtles. Old graft site was shaped like a U. On the one that I did find the whole graft, overlying glue was still present. However, the shape of the graft was perfectly rounded, in spite of the fact that a band of new growth would be seen around each pante. On a couple, I ~~also~~ scraped lightly with my fingernail and the white (ply) peeled off.

Reached gear and departed from Tern in yellow Boston whalers. Will chop it over. Same SW swell.

Noted around the back side of Tern at 3:30 pm - 2 fresh feet of tracks visible; 1 female

Goosher proceeded to W-5; 4 pm - no markers as far as I could see. Also, no signs of recent nesting. Arrived at East

~ 1:45 pm. Walked around island counting seals and spot pits. Set trap above tent. Lookings Researed ~ 15 lookings from a couple already-edged nests.

Collected Sand Samples in Area 5 for Johannes. Selected a site where I think believed to have not nested this year.

5 - vials 1-2cm under surface

5 - vials at ~ 20-24 inches, site of eggs.

Starting at ~ 9 pm I walked around the island looking for nesters.

Identified 5 (lots); one (5471)

Tagged Aug 3, 1982; one longer term recovery 3654+; and three with

no tags (one of which had address on both flaps). My last

check was made about midnight

There is a large piece of blue band net pulled up by Ruth in Area 17. I will return it to Tern for spinning. Net pieces are still on the flag at W-5.

3 SEPTEMBER 1982

FRIDAY

New pits (1-3 days estimate) seen on East during my walk around:

Spud Point - 3

Area 7 - 3

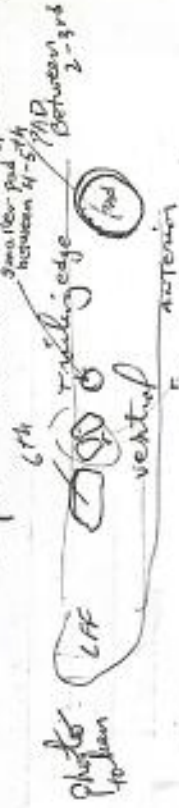
Area 8 - 4

Area 9 - 2

A log in area 8 that's been there for many years" seems to have been a "tuckaloo" (?) Old trash dump is adjacent to here, and several new logs have appeared ^{between} there. When departing from Taku, by airplane on 9/14 I saw fresh turtle tracks along the east end of the south beach.

While doing night walks for moths, I noticed huge numbers of steamers loafing on the ground.

On the ventral surface of the left front flipper (using toy 54711 as a model), I scale noted a large "round" pad, scale opposite the webbing between the 2nd and 3rd large trailing scales on the dorsal surface. In addition, the following scale pattern was noted:



The 6th scale tail dorsal is also outlined and visible on the ventral surface. There is a smaller pad opposite the 4th 5th dorsal scale, except for these two small scale, the rest of the ventral surface is yellowish skin.

On the anterior edge of the dorsal surface of the left front flipper, the scale pads faintly-lined defined. I counted and found that the 1st scale is number 15.

4 September 82 Woke up at ~7:30 am, Saturday Drank coffee, ate oatmeal and read from the Bible. Returned

4 Sept 82

Saturday

to the SP site wherever I had found 2-3 fresh looking notinked and appeared at the surface - partly emergent took several photos I also made of several front left flippers.
 pulled "one two out and they slowly woke up" and scribbled. Two others came out but they all dug around, but could find any others. Question why didn't they come out on their own last night?

Departed East Island at ~10:15am - Arrived 10:45am. Saw at least one black pup with mother on Round Island.

Cleaned up gear, packed, showed, ate and departed at ~1:10pm.
 Got a nice view of Round Reef and East (from the NW). Photos taken. Capt McDonald's workers arrived in Honolulu at 4:30pm - Bob Ferguson drove me home when flying by Ni'ihau, I thought one egg did hatch from very little and known about sea turtles

at this location - mostly and nearshore foraging.

TAG Summary

Newly Tagged
 (MKE)

Female
 3
 (westing)

Tag Recoveries
 MKE
 0
 Female
 2
 (westing)

East

(none examined
 excepting -
 only one
 broken seen
 on tag -
 no holes)



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

SE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

May 17, 1984

Mr. George Balazs
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island, Kaneohe, Hawaii 96744

Dear George:

Some months ago you informed me of work by Gail Patterson and William Gilmartin in which they used living tag methodology in August 1982, on 1,000 Hawaiian green turtle hatchlings at French Frigate Shoals; my notes read that 1,000 hatchlings were tagged on the seam between the first and second left lateral scutes and the same 1,000 were tagged on the first plastral scute after the gular scute on the anterior left side. I have not received any verification of this tagging effort for the living tag registry and I would be grateful if you would tell me how to contact Patterson and Gilmartin. Also, do you know if any other living tags have been used? Thanks for your help.

Thanks also for the article on marine turtle postage stamps. Makes you wonder why the U.S. Postal Service doesn't issue a sea turtle commemorative series doesn't it?

You are probably aware that Bill Gordon (NMFS Deputy Director) has invited Fish and Wildlife Service to participate in a Pacific Sea Turtle Recovery Team; Fish and Wildlife Service/Region 1 had decided to form a Pacific team prior to Gordon's letter, but things should be easier with Gordon's support. Region 2 will form an East Pacific subteam. Jack Woody has been named Sea Turtle Coordinator for the entire Fish and Wildlife Service and I expect he will give the Pacific a lot of his time. By the way, Jack received a Gulf Oil Conservation Award for his sea turtle work; I'm sure you are as pleased as all of us here in Albuquerque.

You previously declined to suggest names for members and consultants for a Pacific recovery team. I'll ask you again: Would you please suggest names

as possible members and consultants to a West Pacific and an East Pacific
Sea Turtle Recovery Teams? Speak now or forever work with a team you
might not like!

Hoping to hear from you soon.

Cordially yours,

David

David Bowman
Endangered Species Biologist



University of Hawaii at Manoa

John A. Burns School of Medicine • Department of Physiology
Biomedical Sciences Building T-608
1960 East-West Road • Honolulu, Hawaii 96822
Cable Address: UNIHAW

To: George Balaz
NMFS

Dear George,

This is a note in reference to our conversation many months ago about the release of a turtle that Dr. Whittow had used for many years. The attached letter was to Dr. Helfrich of HIMB, stating the intention of holding the turtle in a Coconut Island pond temporarily.

The turtle released itself, as far as we can tell, about 10/19/85. There were turtle tracks over the old fence I propped up next to the ponds. The turtle's identification tag number is _____? (which ^{will} hopefully not turn-up in a bowl of soup somewhere). The turtle is probably happily flying around Kowoke Bay.

Sincerely,

Ronald E. Dawson

Ronald E. Dawson

P.S. Dr. Whittow says you should have the tag number, because he does not.



University of Hawaii at Manoa

John A. Burns School of Medicine • Department of Physiology
Biomedical Sciences Building T-608
1960 East-West Road • Honolulu, Hawaii 96822
Cable Address: UNIHAW

To: Dr. Helfrich, HIMB

From: Dr. Whittow / Ron Dunn

Subject: preconditioning of turtle for release

A Green Sea Turtle has been used for research for the last ten years at the Kewalo PBRC lab. The tank it was held in was small (15' x 4'). The tanks have deteriorated beyond repair and the turtle is to be released back to the wild. The immediate transition could be harmful. Therefore we would like to precondition the turtle prior to release. This should allow the turtle to regain its swimming ability and relearn to scavenge and eat sea weed (their natural food).

The turtle was transferred on 10/9/85 to the first small pond opposite the boat haul-out building, which also holds a small shark. A collapsed fence was resurrected adjacent to a side of the pond that is sloped to prevent an easy escape. The other sides of the pond are steeper and less likely to allow the turtle to depart on its own. The only security available is the low-profile of the animal's presence and that it is not easily visible in the pond. This may be augmented perhaps, by placing a sign by the pond stating " Beware of Shark " .

A student resident of the island named Kevin, has volunteered to feed the turtle (and consequently the shark) once a day for the two to three weeks of the stay. Frozen smelt has been supplied and is stored in the large freezer in the main building (clearly marked Whittow/ Dunn).

I will be gathering sea weed to place in the pond in order to 'wean' the turtle a bit. After this preconditioning the turtle will be released through the side gate of the pond into Kaneohe Bay.

Thankyou for your help, sincerely;

Ron Dunn and Dr. Whittow

Kewalo
"Stumpy" Turtles

9-10-91

SL - 51.4

SW - 41.7

Weight - 32 lbs.

CL - 56.0

CW - 50.0

"Spearhead"

SL - 47.9

SW - 37.4

Weight - 28 lbs.

CL - 51.0

CW - 45.0

1-17-92

"STUMPY"

SL - 51.6

SH - 42.8

N - 51.0

CL - 56.0

CW - 50.0

A
MADE-UP
NUMBER

- photo taken of #6593 engraved
on 3rd lateral left

- 3 mm growth on lower right
eyelid

Kewals
Turtles

9-10-91

"Stumpy"

SL - 51.4

SW - 41.7

Weight - 32 lbs.

CL - 56.0

CW - 50.0

"Spearhead"

SL - 47.9

SW - 37.4

Weight - 28 lbs.

CL - 51.0

CW - 45.0

Thurs 26 July - East

hatchlings ^{east} collected: 12

" ^{east} tagged: 12

" ^{east} released: 12

tags: # released: 12

* broken/"misfired": ?

total * for day: 12

7/9 -

8/90

RF5

tag #'s H: 004 → ~~#007~~ H: 016 size 1 #

E, H & K prefix Titanium

Tags - Stockbrand

\$USA

2542

Total tagged & released

X

12

Fri 27 July - East

hatchlings ^{East} collected: 125
" ^{East} tagged: 125
" ^{East} released: 125

tags released: 125
broken / misfired: 4
* total for day: 128

tag # is used:

H017 → H145 X

misfired

H019

abnormal scutes

H034 5-8-6

070 (bent)

^{missed hole}
but ^{on flipper}

054 5-8-4

107 bent

145 4-9-4

134 "

(missed hole -
broke when
straightened)

X 125

Sat 28 July East

hatchlings ^{East} collected: 74

" ^{East} tagged: 74

" ^{East} released: 74

tags: # released 74

* broken/misfired 6

total * used 80

tag #5

H-146 → H225

"misfired"

H 162

165

193 bent

212 "

213 "

219 "

abnormal scales

171 4-6-4

X 74

29 July (cont.)

Tagged East 7/29 Released Team 7/30 (11)

E-096 152
K-030 044
058
062
140
E 196 183
178

E-127 - broken thru " " 133 cracked on thru " " 147 149

Tagged East 7/29 (23)

Released Tern 7/31
E 613
K 004
015
030
033
038
049
054

E 059 misty
057
060 bent
064 broke
083
087
092
093
108

Tagged 29 July - DOR 8/1
K-054 182
K-030 188
YE-079 191
E 197 157
153
094
087

K-007 misty
014 broke
035 misty
045
048
052
059
272

Dug up 7/29 east - Not tagged - rtn. to East 8/1
tagged + released - X

K-007 misty
014 broke
035 misty
045
048
052
059
272

Sun 29 July

East
hatchlings collected: 314

" East
tagged: 278

" released: 244

East - see exceptions
previous pg.

tags # released 244

broken 38

total 316

tag #s used

X H 226 → H 270 (45)

{ E 004 → E 050 (47)

X { E 051 → E 100 (50)

{ E 101 → E 150 (50)

{ E 151 → E 200 (50)

K 002 → K 076 (less
skipped K075) (74)

316

no abnormal scutes -

one hell of a time w/ tags tonight

GAP's problem - opening "E" series to fit over flipper
(redged thru @ E 033)

244

6 cent. on previous pg. X
123 - road to way in - broke in 2 w 2nd piece

114

113

049 - mixed
← (50-100)

040 - mixed - then broke into 2 pieces

029 " + mixed

028 - fixed - " " " "

027 - fixed - on turtle OR

020 - GAP - added w/ 2nd it broke

014 - " piece of shit secured w/ palao"

013 - mixed on turtle - broke when straightening

012 - on turtle OR - fixed point

011 - broke on 01"

010 - mixed

009 - on turtle - fixed "point"

008 mixed

E/006 - on turtle? bleed w/ needle nose pliers

H-271 - taken off turtle

H-270 - used actual after bent on turtle

H-237

H-226 mixed

mixed

Mon 30 July

East-79
hatchlings: collected $\boxed{w/s}^{40}$ ~~119~~ + ?
" tagged 119
sum released: 119 + 10 $\boxed{129}$
East 7/29

tags released: 119 (+10 tagged 7/29 $\boxed{129}$)
broken: 3
total: 122

tag #5

K-077 → K080 + K075 (5)

X K-081 → K160 (80)

K-161 → K197 (37)

40
157
122

missives

{ K-152

X { K-155

{ K-196

(25 hatchlings ^{of 1960} Julie dug-up - all died?)

X
 $\boxed{129}$

Tues 31 July

(released 23 turtles collected +
tagged on East 7/29)

hatch. collected: 0

" tagged: 0

" released: 23

tags released:

broken: 0

X
23

for Bill / George

A.M. 7/31-

total of 608 tagged + released
(631) + 23 tagged + holding

approx. 70 - dug up - yolk sac
too protruding to release
will hold 1 more day -

tags - very brittle - weak on numbers
had a bad time due to my
opening the tag or now -

to tag 631 turtles used 682 tags -

dug up 3 nest east
2 " w/s -

Kila

?s OVER

2/5. All same letter code
* 1) The 200 tags (100 turtles)
all from same "alpha" lot?

2.) T/C schedule -

1 Aug - Wed w/ P+H 2100/5mop
3 Aug - Fri w/ Lora

3.) T/C arrive FFS -



1) Rob - stay?? @ Tern on what
floor. tagging w/ team

2.) T/C - arrive @ Tern??

3.) send up ~~at~~ pup cage

4.) overnight cover -

5.) 101/60-7.57 Macc -
? send back on T/C??

P+H f TLC - @ Midway Wed p.m.

will be up @ 2100 hrs -

if no contact try @ 2100 on Thurs.

good photos of tagging

unfertilized eggs - same 6-10
frozen

X

$\begin{array}{r} 766 \\ 641 \\ \hline 115 \end{array}$
 $\begin{array}{r} 989 \\ 721 \\ \hline 268 \end{array}$
 $\begin{array}{r} 989 \\ 200 \\ \hline 789 \end{array}$
 E-951 - 989 } 89
 E-901 - 950 }
 E-801 - 850 }
 E-851 - ~~900~~ 900 missing 899

Julie 1 pr. pleis (needle nose)

X E-801 - 850
 X E-851 - 900 (missing 899) } 188
 X E-901 - 950 }
 \$15 $\begin{array}{r} 983-989 \\ 981 \end{array}$ (E-951 - 989) (30) }
 \$5 $\begin{array}{r} K-721-766 \\ K-641 \rightarrow 720 \\ H-941-989 \\ H-881-940 \\ H-801-880 \end{array}$ } 115
 $\begin{array}{r} 188 \\ 115 \\ 188 \\ 491 \\ 151 \\ \hline 340 \end{array}$

K-~~767~~-800 } SAVE
 801-900 }
 901-989 } for 100 Hono Hatch -



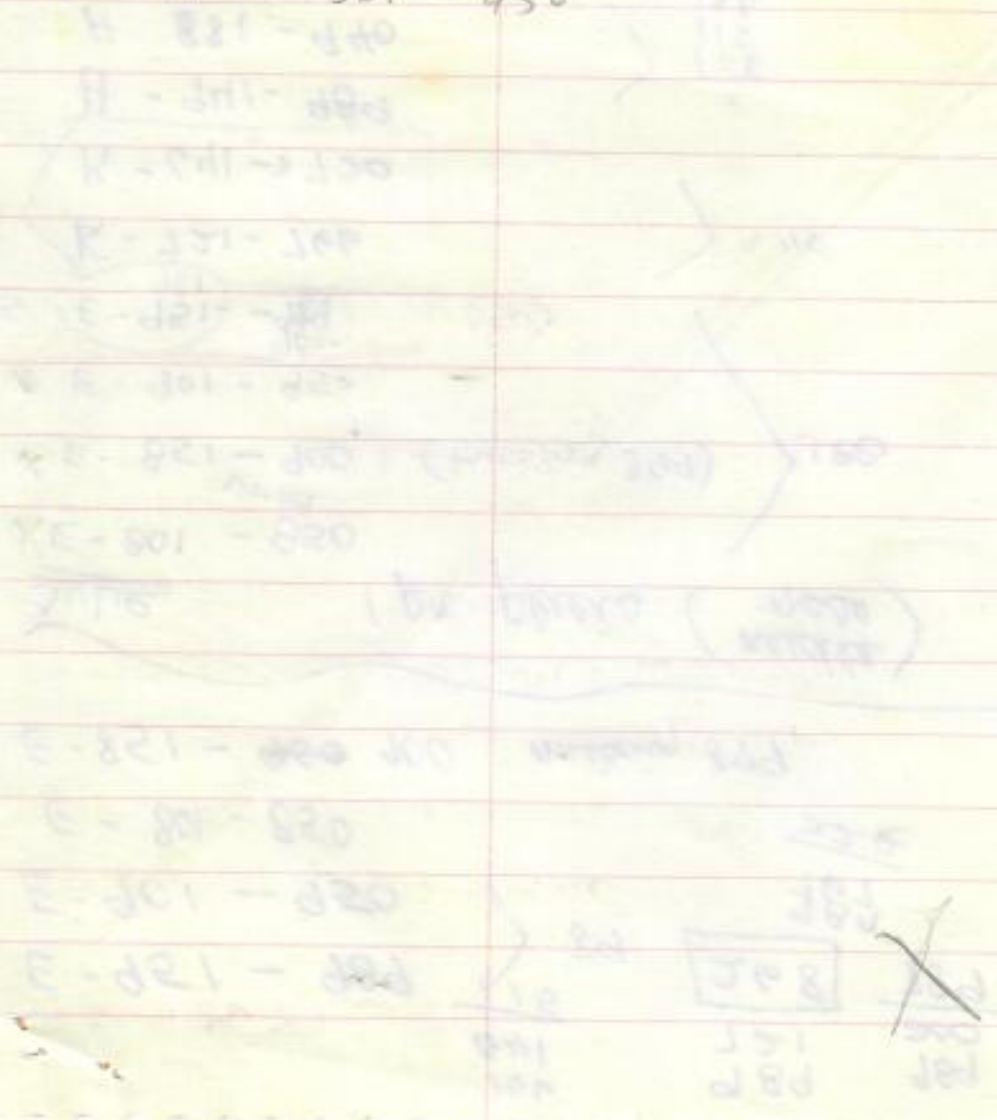
✓ K - 198 → 240
 ✓ K - 241 → 300
 E - 201 - 250
 E - 251 - 300
 H - 271 - 360
 H - 361 - 450

267
 198

 66



100 have 198



Wed: Aug 1

hatchlings collected: 86

tagged: 147

released: 147

6) (includes 36 dug up on East.
1/29 + 25 dug up on Trug 8/1

tags: #released (tag on 8/1): 147

broken 15

total = 162

tag #'s used:

X { K 198 - 240 (43)

X { K 241 - 320 (80) ✓

X { E 201 - 250 (39)

4/1/1998 149 8/1
- on -

used 8/2 { except: 241^① 224

214^② 243

219^③ 250

245^④ 212

233^⑤ 246

220^⑥

147

||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||

released untagged 1 weak

1-228 tip

(note - activity level
relayed vs. sense flipper

12
50

X

Dug Trig 8/1 released East 8/1
K 236 → K 261

X K-198 → K 235

Dug East 7/29 - released East 8/1
(boat ride East-Tern-East)

8/1 - East -

K-208 - misfired

K-218 - $\left\{ \begin{array}{l} 1 \\ 7 \\ 5 \end{array} \right\}$

K-224 - bent - tried to straighten
2nd try tip bent off in turtle's flipper

K-252 - bent wrong way

~~K-264 BAP~~

- K-265 ?

- K-287 - bent - 2nd try still no go -

- K-284 - ^{misfire} tip bent off when sh.

- K-272 bent wrong way

- K-282 misfire, didn't bend correctly

- K-300 bent wrong way

- K-308 bent wrong way

- K-294 misfire

- K-302

- K-304 - bent -

X E-211

X E-218

E-235 bent

X

8/1/84 East

unit unknown

convert to

TAB-

Caliper Reading (btm. scale)

mm

1	K-315	v	1.60
2	K-298	v	1.53 -
3	K-319	^	1.61
4	K-309	^	1.53 -
5	K-296	'	1.63 -
6	K-305	^	1.60 -
7	K-311	^	1.51 -
8	E-231	v	1.61
9	E-207	1	1.53
10	E-226	3	1.525
11	E-221	2	1.525
12	E-247	7	1.62
13	E-248	8	1.62
14	E-238	5	1.415
15	E-245	v	1.415

8-2-84

16 H-316

1.50

8/2/84 East

17 H-320

1.53

18 H-342

1.51

19 H-324

1.62

20 H-325

1.51

21 H-345

1.53

22	H-358	1.52
23	H-359	1.61
24	H-377	1.61
25	H-374	1.51
26.	H-383	1.52
27.	H-386	1.52
28	H-394	1.52
29	H-398	1.605
30	H-408	1.53
31	H-404	1.62
32	H-406	1.51
33	H-402	1.51
34	H-418	1.515
35	H-411	1.50
36	H-413	1.52
37	H-410	1.52
38	H-414	1.505
39	H-416	1.60
40	H-417	1.605

4 pms = 100 T

4 pms = 100 T

200 T

X

X

8/2 - East

hatchlings collected: 194

5, tagged: 194

25 released: 194

^{total}
(≈ 250) dug up but unsuitable for tagging not included
 ≈ 50 "lost" turtles released $\frac{1}{2}$

tags: released: 194

broken: 5

total: 199

tag # used:

see E 8/1 (tags)

X E 251 - 300

50

X H 271 - 360

90

X H 361 - 418

59

X 194

8 1/2" misfires

X E 278 bent -

X H 308 D "

X H 312 "

End 315 GAP

X H 334 modified

X H 385 bent & broke

End H 418 RLW



8/3 East

hatchlings collected 339 + \approx 300 more

tagged: 339

too lg.
yolk sac.

Released: 339

tags Released: 339

broken: 14

total: 353

8/3 East tags used

X 1	H-419	→ 450	✓	(31)
X 1	K-321	→ K400	✓	80
X 2	K400	→ 480	✓	80
X {	3	E 301 - 350	✓	50
	4	E 351 - 400	✓	50
	5	E 401 - 450	✓	50
X 6	H 451 - 461			<u>19</u>

8/3 XH-436 - bent (2x's)

- K-321 " "

- K-306 " tip broke off

- K-302 - cracked on "3" after
tip bent wrong way

X E-308 - K-381 - broken along "1"

Broken

- K-420 - bent (2x's) then broke @ ^{tip} corner

- K-440 - cracked on 440

(H 452) - K-464 bent

Died

E-316 - bent, then broke

H-544

E-318 "

E-324 "

E-460 "

END H-460

8/3

Caliper Reading

Conversion to mm

1 K-463 1.53

2 K-447 1.53

3 K-449 1.52

4 K-457 1.50

5 K-456 1.52

6 K-458 1.51

7 F-340 1.51

8 E-344 1.51

9 E-312 1.53

10 E-306 1.51

11 E-313 1.60

12 E-307 1.52

13 E-390 ~~1.52~~

14 E-389 1.50

15 E-400 1.42

16 E-391 1.51

17 E-355 1.50

18 E-363 1.42

19 E-371 1.61

20 E-361 1.51

21 E-370 1.60

22 E-438

~~1.50~~ 1.52 E-1.51

23 E-354

1.53

24 E-408

1.51

25 E-401

1.52

X

~~26 E-399 1.50~~
~~27 E-392 1.50~~
~~28 E-391 1.51~~
~~29 E-400 1.51~~
~~30 E-393 1.50~~
~~31 E-390 1.51~~
~~32 E-395 1.50~~
~~33 E-396 1.51~~
~~34 E-397 1.51~~
~~35 E-398 1.51~~
~~36 E-399 1.51~~
~~37 E-400 1.51~~
~~38 E-401 1.51~~
~~39 E-402 1.51~~
~~40 E-403 1.51~~
~~41 E-404 1.51~~
~~42 E-405 1.51~~
~~43 E-406 1.51~~
~~44 E-407 1.51~~
~~45 E-408 1.51~~
~~46 E-409 1.51~~
~~47 E-410 1.51~~
~~48 E-411 1.51~~
~~49 E-412 1.51~~
~~50 E-413 1.51~~
~~51 E-414 1.51~~
~~52 E-415 1.51~~
~~53 E-416 1.51~~
~~54 E-417 1.51~~
~~55 E-418 1.51~~
~~56 E-419 1.51~~
~~57 E-420 1.51~~
~~58 E-421 1.51~~
~~59 E-422 1.51~~
~~60 E-423 1.51~~
~~61 E-424 1.51~~
~~62 E-425 1.51~~
~~63 E-426 1.51~~
~~64 E-427 1.51~~
~~65 E-428 1.51~~
~~66 E-429 1.51~~
~~67 E-430 1.51~~
~~68 E-431 1.51~~
~~69 E-432 1.51~~
~~70 E-433 1.51~~
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~~90 E-453 1.51~~
~~91 E-454 1.51~~
~~92 E-455 1.51~~
~~93 E-456 1.51~~
~~94 E-457 1.51~~
~~95 E-458 1.51~~
~~96 E-459 1.51~~
~~97 E-460 1.51~~
~~98 E-461 1.51~~
~~99 E-462 1.51~~
~~100 E-463 1.51~~

X

~~8/4~~ - see next pg.

~~H 462 - H 477~~ ^{ex. 468} dug w/s 8/2
released 8/4 Tern

H 478 - 535 ✓ (58) + (59)

K 481 → 560 ✓ (80)

535
462
73

X E 451 - 500 ✓

E 501 - 550 ✓ (54) ^{east} 8/4 (41)

C 551 - 600 ✓

H 546 - 630

H 462 - 535

K 481 - 560 73

E 41

50

80

244

(230)

H-478 → H535 (57)

dug @ w/s 8/4 -
released 8/4 Tern X

X H 229 - dug w/s "

X H-492 - bent
503. " (2x's)

X K-485

X K-543

X

tagged 8/4 - but held - K554

E45's }
E504 } bent
E503 }

E541 last

several 100

hatchlings collected: w/s 8/4 = 164

X H 478-4535
+ H 229

released Tern 8/4 57

104 held 8/4, 8/5 @ Tern

X 2 w/s 8/2 released Tern 8/4 = 16
H 462-477

collected - East 8/3 released Tern 8/4

X H-478-535

K-481-560 (2307)

X E 451-541

tags: released: 295

broken: 7

total: 303

X 8/4

295

W/S - 8/1/84 : SSE

hatchlings^{w/s} collected: 54

^{w/s} tagged: 54

^{w/s} released: 46

tags * released: 46

broken: 0

total:

tag #5 E 851-854 X

E 901-950 X

X { E925 4-6-4 (4th in middle small)
E935 4-6-4 (" ")

X { E-915 } field^{hill} 8/2
919 } did overnt.
945 }

X 46

8/2 W/S-

JJE

^{w/s} collected: 35

^{w/s} tagged: 35

^{w/s} released: 40

(includes 5 from #1)

tags released: 40

broken: 0

total: 40

tags - E855-889

~~X~~ 40

8/3 W/S -

JJELIASON

hatch collected: 65

tagged: 65

released: 65

tags released: 65

broken: 3

total: 68

tag #'s

~~X~~ E-801-850 (50)

~~X~~ E-890-900 (-1) (10)

~~X~~ E-983-990 (3)

~~X~~ missing: E-899

misfired

+ E840

+ | 841

~~X~~ | 983

~~X~~ [65]

1733
144
1877

1733
144
30
2047
377
2424
30
~~2454~~
550
200

1821
-222 Tern
-155 W/S
377
30
407

750-800

8/6 - Tag Tern 8/6
 X { dug w/s 8/4 - E542 → 550 (18) 58
 E551 → 600 (50)
 released w/s 8/6

8/6 - dug East 8/3
 X { H ⁵³⁶541 → 630 90
 Tagged Tern 8/6
 Released East 8/6 (148)

8/6 dug East 8/6
 tagged 8/6 -

X K-561-640	(80)
X H-631-720	(90)
H-721-800	72
	242
	148
	390

242
 90
 332 East
 58 w/s
 390

Terr H 556 bent

H 597 "

H 602 "

H 553 "

TAGGED 8/16 Terr

DUG 8/4 East

Released 8/7?

1 H 542 ✓

2 H 579 ✓

3 H 550 ✓

4 H 577 -

5 H 564 -

6 H 570 -

7 H 559 ✓

8 H 574 -

9 H 557 ✓

10 H 544 ✓

11 H 576 -

East 8/6

+ K 465 found on floor used OK

- K-602 - bent 2xs

- K-597 - " "

- K-579 " "

✶ { H 557 found 2 hrs. after release - dead - ghost crab ate head - }
ghost crab ate

K 633 - bent

K 626 - "

K 661 - bent & broken in tent while trying to repair

K 599

END H-794 - (skipped H-793) ✶

816/84

	TAG	CALIPER
1	H559 -	1.71
2	H500 /	1.70
3	H554 -	1.52
4	H566 H500 -	1.43
5	H567 -	1.55
6	H564 -	1.425
7	H557 -	1.32
8	H561 -	1.55
9	H572 ⊕	1.53
10	H586 ⊕	1.52
11	H600 -	1.41
12	H593 ⊕	1.33
13	H610 -	1.61
14	H601 -	1.53
15	H609 -	1.61
16	H587 ⊕ H602	1.71
17	H614 -	1.61
18	H621 -	1.40
19	^K # 638	1.62
20	K640	1.61
21	K635	1.60

10 mm

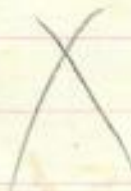
22 K637 - 1.52
23 K636 - 1.62
24 K639 - 1.60
25 ~~K632~~ -
~~K633~~ - 1.73



8/6/84 pm

same net 8/6 pm -

1 K623 - 1.53
2 K624 - 1.49
3 K629 0 1.62
4 K631 0 1.61
5 ~~K630~~ 0 1.70
6 K627 - 1.635
7 K628 - 1.63
8 K634 0 1.61
9 K622 - 1.72
10 K625 - 1.62
11 K621 ↑ 1.63
12 K620 1.63
13 K619 1.60
14 K618 1.71
15 K617 1.615 -
16 K616 1.71 -



17	K615	5	1.53		
18	K614		1.71	lost } egg young	
18	K613	4	1.61	} X	
19	K612	3	1.62		same nest
20	K599	1	1.62		
21	K611	2	1.63		

X

East 8/7

Hail - 7

(Dagged 8/7, dug 8/6 & previous)

Good 8/27
2/4

Dag Begin -

XH 793 - 800 (794 done prior)

(7)

E 601 - 650

(50)

610 - broke - bent in track

613 - broke - glanced to side before hole

617 - misjudged before going thru hole

626 - " right after entrance flipped

644 - misfired - off slightly from hole

↳ when tried pressure

(only 50 tags - 5 broke = 1/10)

E 650 - 700

(50)

E 658 - misjudged in track (1/20)

(subtally = 16 + 44 + 19 = 69 + 28 = 97
+ incl. below)

E 701 - 750

(50)

E 701 - pointer and wouldn't go far into hole
when remained

continued next page

X

Key count = 175

Hand
(some tags/pins)

44. box
91. basket
135

~~6017~~ ✓

2:32:20	-	2:46	12
2:46:50	-	2:54	8
2:54	-	2:59	4
2:59	-	3:10	11
		3:58	

~~H-798~~

9:24 pm

817 East pm

19
20

E 730-750

H 801-850

H 832 - bent when broke

H 850 - "

E 751-800

(50)

H 881-940

H 899 - bent on flipper

H 883

H 906 - snapped in flipper

H 915 - "

941-952

Last - H 952

ex. 949 - skipped

99
50
60
59
6
200

365

~~8-8-84~~

H 949 - 989

~~H 986 - bent~~

~~K 614 used 8/8/84 - broken~~

OK 614 - broke

15
+41

56 - 2

~~H252~~

~~K059~~

~~H212~~

~~K048~~

~~H226~~

~~K050~~

~~K212~~

~~E324~~

~~K045~~

~~K577~~

~~K300~~

~~K208~~

~~H602~~

~~E092~~

~~K400~~

~~Broken~~
Reused

2
E 75 - 70 graph

- 42 - I.C.U - 2 hold for Term

R 90 - graph

S 42 -

S 60 -

R 26 -

E 45

380

200 Hono

118 Term

318

50

368

12

Honolulu Turtles: (200)

measure

graph

tags (2 each)

Tagged & released
2,542

Bill 8/6 a.m.

1) Rob - stay?? - tag pups.

2) total tagged + released
1733 + $\approx 200 \pm$ on hold

3) T/C arrive @ Tern

4) T.57 - small weaner -

5) Yearling molt 7/29

6) mortality

7) Notes?

lives

blubber

50 - 100 g.

Note on # of pups.

1733

390

350

2473

100 hatch

222 - Remo.

2695

100 hatch

90 - NE back to Tern

2785

100 hatch

50 - WE NE @ W/S

2835

manel

65 - Save Honor.

2900

200

graft - Honor

100 - Tag / Release

7

50-

50.

50-

40-

80

60

347

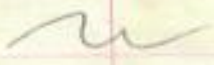
Broken Dally
as of 8/2/84 67

~~3440~~
- 67

2933

~~2933~~
- 950

1783



~~2933~~
6/1783
12

58
54

48
46

12

~~3000~~
950

2150

6 $\overline{) 2150}$
356

18
35

20
34

3				
12	7-26	Thurs		Thurs 8-7
125	7-27	Fri	37	Fri 8-8
74	7-28	Sat		8-9
278	7-29	Sun		8-10
119	7-30	Mon		8-11
	1-31	Tues		
149	8-1	Wed	①	8-12
190	8-2	Thurs	②	8-13
<u>947</u>	8-3	Fri	③	
	8-4	Sat	④	
	8-5	Sun	⊕	
	8-6	Mon	⊕	

7/26 Round Is FFS

A ♀ - Pup (4)

A ♀ - P (1)

P (W) w/tee

P (W)

P (W)

P (W)

P (W)

P (2)

P (W)

P (2)

7/26 East Patrol

Ad ♀ w/P3 pg back scan #218

Ad ♀ P3-4

Ad ♀ P3

Ad ♀ P3

pg Ad ♀

12 Hatchling-tagged H005 → H016

2 lights set up at 9 pm

7/27 - Census - 63 seals/3 turtles

1 Weaned pup

4 lights up - 5 previously (?) disrupted
nest marked -

Robin will work up the
digging -

7/28 - New born pup - AM patrol

- Robin + I to the Linn
Nice lagoons (10³⁰-4)

≈ 3 pm - Walter + Stnette + others
from state vessel the
KILA - happened up
while we were hiding from
the sun -

Got a dinner invite
went to KILA for a couple of
hours for steak + lobster
(≈ 5³⁰-8) + fresh H₂O shower -
Nice group of people -

lights set up + on by 8:30 (dusk)
Kila offshore ≈ 1/2 way to La P.

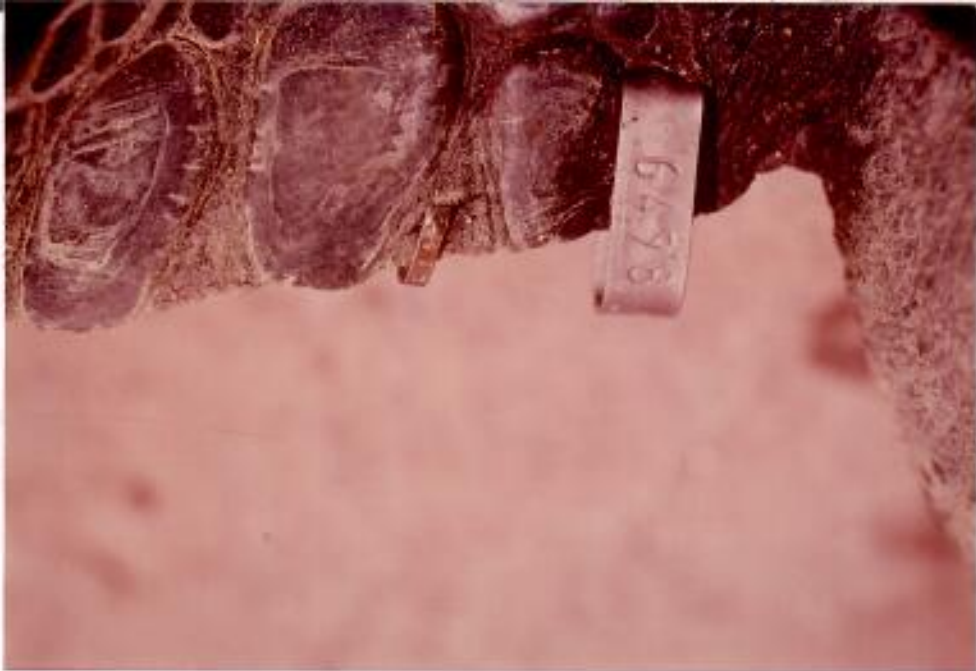


photo taken 4/12/83 Kowaco
5608, 6498, 515, 815 S-39.1 x 31.8

9/21/80 - FFS ~ 2 yr 7 mos.

Size - 681

5.20

GEORGE H. BILATS

8-9-83 S-40.3 x 33.5

FEDERATED STATES OF MICRONESIA
OFFICE OF THE GOVERNOR
TRUK STATE
TRUK, EASTERN CAROLINE ISLANDS 96942

CABLE ADDRESS
GOVTRUK

May 26, 1983

HIMB
University of Hawaii
Honolulu, Hawaii 96744

Dear Sir:


A green sea turtle with your tag (HIMB) #5626 was found by Foupo, Tol in the Truk Lagoon. Two other NMFS tags #923 and #623 were on the turtle. Turtle found on May 22, 1983 and will be released again today at Kuop Attol, Truk. Carapace length was measured at 14.5 cm.

Previous recoveries?

If there is any reward please sent to James Fritz in my care. Would appreciate information on when and where turtle was tagged and released.

Thank you.

Sincerely yours,


Marion Henry
Fisheries Specialist, Truk

Answered 6/2/83

$$\begin{array}{r} 2 \quad 1 \\ 2 \quad 2 \\ 254 \\ 14.5 \\ \hline 1270 \\ 1016 \\ 254 \\ \hline 3683^0 \\ 37 \text{ cm} \end{array}$$

FEDERATED STATES OF MICRONESIA
OFFICE OF THE GOVERNOR
TRUK STATE
TRUK, EASTERN CAROLINE ISLANDS 96942

5/31/83 PM
1. ~~Dayle~~ R
2. Gene N. gn
3. Peter
CABLE ADDRESS
GOVTRUK
cy. to G Bilazs

May 26, 1983

Peter Milone
National Marine Fisheries Services
Southwest Region
Western Pacific Program Office
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Peter:


Thanks for your recent letter and the information. Now processing Gene Avey's T.A. and will be sending it today. I am thinking that an extension of only six months will be necessary to carry out the project but I shall wait and discuss the whole project with Gene before I apply for the extension. I will have more definite information once Gene gets out here.

A green sea turtle was found by Foupo, Tol on May 22 with University of Hawaii (HIMB) tag #5626 and two NMFS tags #923 and #623. The turtle was measured at 14.5 cm, carapace length. The turtle in going to be released again today at Kuop Attol right outside the Truk Lagoon.

Please give me information on when and where turtle was tagged and released. If any reward is offered please send to James Fritz in my card. I am also sending the information to the University of Hawaii My phone number is 660 and, yes, we have started using satellite communication but only on two channels. We have to go through Ponape for any calls so services are not any better than our old system except that we could here conservation better. I have heard from Mr. Kevin Kirk, Saipan and I shall be reporting to him every month beginning next week.

Thanks again and looking forward to hearing from you soon.

Sincerely yours,


Marion Henry
Acting Chief, MRD, Truk

FEDERATED STATES OF MICRONESIA
OFFICE OF THE GOVERNOR
TRUK STATE
TRUK EASTERN CAROLINE ISLANDS 96942

1. *Boyle R*
2. *Gene N. gn*
3. *Peter*

CABLE ADDRESS
GOVTRUK

cy. to G Balazs

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Thanks again and looking forward to hearing from you soon.

Sincerely yours,


Marion Henry
Acting Chief, MRD, Truk

1 June 1983 Peter-A very interesting recovery. This is one of the turtles that was reared at Kewalo Basin/Sea Life Park for about 1 year. It was obtained as a hatchling at French Frigate Shoals in Sept. 1980. I released it on Sept 10, 1981 at Bellows Beach, Waimanalo Bay, here on Oahu. At that time it measured about 28 cm and weighed 3.8 kg. Is it possible that the resighting measurement was 14.5 inches? Also, were any photos taken? How was the turtle captured? In what condition was it in? Did it seem "normal"? Were the tags left on? There is no reward, per se, but I will send the funder lots of literature and praise when I return from FPS in 3-4 weeks. Best regards, George Balazs



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
Western Pacific Program Office
P. O. Box 3830
Honolulu, Hawaii 96812

June 6, 1983

F/SWR1:PAM

Mr. Marion Henry
Acting Chief, MRD; Truk
Federated States of Micronesia
Office of the Governor
Truk State
Truk, Eastern Caroline Islands 96942

Dear Marion,

Thank you for your recent letter regarding the green sea turtle captured in Truk Lagoon. I was informed by George Balazs, University of Hawaii biologist who has been conducting sea turtle research in the Pacific for many years, that the turtle found in Truk was released on September 10, 1981, from Waimanalo Bay, Oahu, Hawaii. At that time it measured about 28 cm. and weighed 3.8 kg. Your letter indicated that the turtle measured 14.5 cm. carapace length. Could that have been 14.5 inches?

George also inquired as to whether any photographs were taken. How was the turtle captured and what condition was it in? Were the tags left on? There is no monetary reward for recaptured tags, however, you are likely to hear from George when he returns from his summer fieldwork within the next 2 months.

Thanks again for the information and let us know how the 88-309 project is progressing.

Sincerely yours,

Peter A. Milone
Fishery Development Specialist

cc: George Balazs

FEDERATED STATES OF MICRONESIA
OFFICE OF THE GOVERNOR
TRUK STATE
TRUK, EASTERN CAROLINE ISLANDS 96942

5/31/83
1. ~~Boyle~~ R
2. Gene N. G. N.
3. Peter
CABLE ADDRESS
GOVTRUK
cc. to G. Balazs

May 26, 1983

Peter Milone
National Marine Fisheries Services
Southwest Region
Western Pacific Program Office
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Peter:

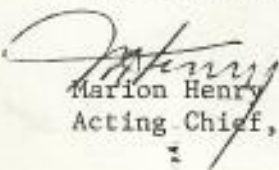
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Sincerely yours,


Marion Henry
Acting Chief, MRD, Truk

FEDERATED STATES OF MICRONESIA
Office of the Governor
Truk State
Truk, Eastern Caroline Islands 96942

6/24/83 PM

1. *[Signature]*
2. File: Truk
88-309

cy to Jim Morgan
George Salas

June 21, 1983

Peter Milone
Fishery Development Specialist
Southwest Region
Western Pacific Program Office
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Peter:

I am forwarding second copy of ammendment application for extension of project to next summer. Another copy is sent to High Commissioner Office, Saipan where it will be processed and transmitted to NMFS.

The turtle found was very healthy and all tags were left on it. It was released again in good condition. The turtle was caught by hand off shore by the crew of one of the local pole and line boats as they were baiting in the Tol Island vicinity. Thank for the information.

I sent Gene Avey's ticket about three weeks ago. Please contact him and let me know his travel plan. Does he know tentative shipping schedule of net material from U.S. to Truk?

Thank you for your continuing help.

Sincerely yours,

[Signature]
Marion Henry

Acting Chief, Marine Resources Division, Truk

Attachment

cc: Director, Dept. of Resources & Development, Truk

AMENDMENT TO GRANT-IN-AID AWARD

3. GRANTEE - NAME

4. PROJECT NUMBER

STREET ADDRESS

5. SEGMENT NUMBER

CITY

STATE

ZIP CODE

6. AMENDMENT NUMBER

7. PURPOSE OF AMENDMENT (Check Appropriate Box(es))

EXTEND WORK COMPLETION TIME TO: August 31, 1984

REVISE ESTIMATED AWARD COST AS INDICATED BELOW

ITEM	TOTAL COST PRIOR TO THIS AMENDMENT	ADD	DEDUCT	REVISED TOTAL COST ESTIMATE
TOTAL ESTIMATED COST	\$	\$	\$	\$
GRANTEE'S SHARE OF COST	\$			\$
UNITED STATES SHARE OF COST	\$	\$	\$	\$

OTHER (Specify)

8. REASON FOR AMENDMENT (Continue on reverse if necessary)

Project was delayed due to personal health problems of previous project coordinator. Project re-started in May carrying through second quarter work. Second quarter ending in July thus need two more quarters to complete project. However, due to delay the mackerel season will be missed this year. Request extension to August 31, 1984, so that experimental fishing using nets can coincide with abundance of target species.

9. SPECIAL AWARD CONDITIONS

10. SIGNATURE (Authorized Grantee Official)

TITLE

DATE

11. APPROVED FOR THE SECRETARY OF COMMERCE

SIGNATURE

TITLE

DATE

SIGNATURE

TITLE

DATE

June 21, 1983

Mr. Kevin N. Kirk
Assistant Attorney General
Office of the High Commissioner
Saipan, Mariana Islands CM96950

Dear Mr. Kirk:

Enclosed is amendment application specifying reason for extension. I have not heard from Gene Avey although I sent his ticket to him about three weeks ago.

I think that net construction, boat modification, and gear assessment can be completed this year. If extension is granted, then actual fishing trying out both nets can commence next summer when target species are most abundant.

Thank you for your continuing help.

Sincerely yours,

Marion Henry
Acting Chief, Marine Resources Division, Truk

Encl:

cc: Peter Milone

MH/aa

Marine Turtle Newsletter

No. 20 FEBRUARY 1982

Editor: N. Mrosovsky

Editorial Advisors:

Departments of Zoology
and Psychology
University of Toronto
Toronto, Ontario
M5S 1A1 Canada

P.C.H. Pritchard
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FACTORS AFFECTING THE RETENTION OF METAL TAGS ON SEA TURTLES

The identification of individuals with easy-to-read tags that remain in place for many years is the most fundamental tool that can be utilized to study sea turtles in the wild. Self-piercing Monel alloy flipper tags manufactured by the National Band and Tag Company (NBTC) of Newport, Kentucky USA have been extensively used for this purpose over the past 25 years. Although tag loss is known to occur, some impressive successes have been achieved in gathering data for certain populations. A reliance on these tags can therefore be expected to continue during the coming years. In view of this anticipated usage, it will be helpful to summarize the various interrelated problems, and offer suggestions for enhancing tag retention.

Locking-Mechanism Failure. There are two styles of locking mechanisms in the tags produced by NBTC. One consists of a "tamper-proof" design in which the piercing point bends over a bridge on the inside surface of the tag. In the other, the piercing point passes directly through a hole in the tag and bends over on the outside surface. The tamper-proof lock was originally designed for domestic livestock and is sold in NBTC tag sizes 49, 62, and 4 (Table 1). Size 49 has been the most popular tag for adult sea turtles.

Table 1. Specifications of NBTC's self-piercing Monel flipper tags

Style 4-1005 size No.	Length (mm)	Width (mm)	Mean width of gap (mm)	Locking mechanism
49	40	10	11	Bridge
19	40	10	11	Hole
62	35	10	10	Bridge
681	25	8	9	Hole
4	18	5	5	Semi-bridge
3	13	4	4	Hole
1	8	2.5	2.5	Hole

Until this past year, the through-the-hole lock has only been available in size 681 and the very small sizes 3 and 1. However, due to the greater strength of this lock, and periodic breakage of the bridge of the tamper-proof design, NBTC now manufactures size 49 tags with an optional through-the-hole lock. This improved version has been designated as size 19.

A disadvantage of the through-the-hole lock is that when the piercing point is not fully bent over, the tag may be more prone to snagging and loss should the turtle encounter nets. This problem can be avoided by making certain that the point has locked fully into place with the special applicators. If a complete bend of the point has not occurred, this should be carried out using standard pliers. Even if entanglement is not a concern to the researcher, tags with the through-the-hole lock should still be routinely inspected and the lock corrected as needed. In contrast, it is impossible to correct an improperly locked tag with the tamper-proof design. In such cases, the tag should be removed and replaced with a new one.

A spring-action effect that exists in the tag after attachment places stress on the locking mechanism. Tags that have been on for many years may still retain this property and pop open 5 mm or more if the lock fails. Such tension contributes to the failure of the lock, particularly when corrosion of the metal develops in this region. The spring action can be easily eliminated after attachment by using pliers to squeeze the two sides of the tag slightly together at a point about one-third from the folding end. Only a minimum of pressure is needed. When carried out properly, there will be no visible evidence that the tag sides were momentarily bent inward. It should be noted that even if the lock fails and the tag springs open, tag loss will not always result.

Tissue Necrosis. Attachment of the tag in a manner that compresses tissue to the point of blocking vascular circulation can result in necrosis. To avoid this situation, the distance from the piercing site to the trailing edge of the flipper should be the same, or slightly less, than the length, of the tag when locked. If the distance on the flipper exceeds the tag length, the tissue will be gathered together and constricted after the tag is attached. Necrosis can also develop when the two sides of the tag are crushed together after being attached to the turtle. Tags damaged in this manner have been seen in Hawaii, Australia and Nancite, Costa Rica. This problem is almost certainly the result of turtles nipping at each other, or at their own tags. It may also be caused by certain fish, such as common and spiny puffers (Tetradontidae and Diodontidae) biting at tags while the turtles are resting underwater. The shiny appearance of Monel tags may stimulate biting. However, certain algae and invertebrates often grow on the tag and mask this brilliance. Tags that corrode are less apt to host encrusting growth due to the antifouling toxic properties of copper and nickel released in the corrosion process. A method for possibly reducing biting would be to render the tag less noticeable by using the smallest tag practical. For example, the size 681 tag is less conspicuous and more appropriate for adults of several if not all sea turtle species. A further disadvantage of larger tags is that when they are applied to their full length, piercing can take place through thick and potentially important musculature. This is more likely to occur in the smaller species. For researchers contemplating a change to the 681 tag, it should be noted that an inscription of up to 35 letters can be accommodated. This is less than the 55 letters possible on the size 49 and 19 tag,

but is adequate for most addresses. Necrosis can also be caused by the release of chemicals that result from Monel corroding in contact with the piercing site.

Tearing. Tags can be torn out of the flipper by biting, snagging in nets and other objects, or by the slapping against the carapace that occurs during nesting. A tag is more likely to be torn out if it hangs loosely on the flipper. While prevention of tissue necrosis requires that the distance from the piercing site to the flipper's trailing edge be equal to or slightly less than the tag length, too short of a distance will make it liable to tear. For subadult turtles, some risk must be taken in order to ensure adequate space inside the tag to accommodate growth.

The location where the tag is attached can also influence tearing. A survey by the author of the exact location where various researchers attach flipper tags revealed a wide range of sites currently in use. Tags that pierce directly through keratinized scales on the flippers should be more resistant to being torn out than tags placed in the webbing between these scales, or in the flap of soft tissue where the front flipper joins the body. However, working of the tag back and forth due to swimming movements of the flippers, and slapping on the carapace during nesting, increases as the tagging site becomes more distal. Also, in the tagging of adult males, especially green turtles, a greater proportion of the nipping during mating activity is directed at the distal edges of the flipper.

Abrasion. Abrasion of tags can result from contact with substrate when turtles are feeding and resting underwater, and nesting. This action produces scratches on the tag and, over an extended period, may cause loss of metal and contribute to tag loss. However, unlike plastic tags, where the effects of abrasion (and susceptibility to breakage) can be severe, metal tags appear to be very resistant to this form of damage.

Corrosion. Corrosion of Monel tags appears to be common, but its degree varies significantly, even within the same population of turtles. In many instances, corrosion is responsible either directly, or indirectly, for tag loss. The appearance of corroded tags can range from only a greenish surface discoloration to one that is pitted and deteriorated with certain areas paper thin. The rate of corrosion is not always correlated with the time that the tag is attached. No clear reasons exist to account for these differences. Some possible factors may include the composition and temperature of the seawater, diet of the turtle, serum chemistry, and small but conceivably important differences in the composition of the alloy used and the manner in which the tags were manufactured. In captivity, corrosion may be accelerated by electrolysis created between metals present in the facility and the tag. Corrosion is often more severe around the locking mechanism and in the letters stamped on the tag. The metal in these areas is subjected to greater stress during the manufacturing process, a factor that reduces corrosion resistance. Accelerated corrosion is also frequently found in the tag area that passes through the piercing site and rests in direct contact with internal tissue. In such cases, the incision will not heal but rather show necrosis and fluid drainage. The area of the tag in contact with this wound will not necessarily be the piercing end because rotation can occur after attachment.

The basic problem of corrosion in Monel tags is the inability of this particular alloy to withstand extremely corrosive conditions. This was not realized when Monel was selected for tags. Some of the desirable attributes that contributed to the selection of Monel, and are responsible for its continued use, include availability, relative low cost, metallurgical properties that make it easy to fashion into tags, and successful use on some sea turtles.

Investigations undertaken, at the author's request, by NBTC and Huntington Alloys, Inc. (Huntington, West Virginia, USA) have resulted in the special production of size 681 tags made from the highly corrosion-resistant alloy, Inconel 625 (see Marine Turtle Newsletter 1976, 1:3-4 and 1977, 2:7-8). Although attached to Hawaiian green turtles for up to 5 years, tags have shown no evidence of the corrosion previously found in this population with Monel tags. Inconel tags are not commercially available at present, however, their production could be initiated if financial support was made available to NBTC.

Other Tagging Considerations. The use of two or more tags on each turtle is a simple method for promoting longer-term recognition and measuring tag loss. On adult Hawaiian green turtles, two size 681 tags can be attached to each front flipper without appearing to burden the animal. Another worthwhile practice is to replace all old tags that are not adequately attached or show signs of corrosion. The value of a turtle to a research program increases each time it is recovered. Every effort should therefore be made to improve an individual's chances for continued recognition. The cost of tags in most research programs constitutes only a small percentage of the total expenditures. If tag problems are thought to exist, both the researcher and the funding agency should be willing to spend more to rectify this critical deficiency.

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