

NIHOA-NECKER-MARO-LAYSAN-GARDNER

NIHOA

EASY RIDER TRIP-77

15 AUGUST - 7 SEPTEMBER

NECKER II

10-19 NOVEMBER 1977

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NARRATIVE - START ON - Page 3
 PHOTO LOG - Pages 5-7
 BASKING TURTLE OBSERVATIONS - (NECKER) page 60-
 OBSERVATIONS OF TURTLES FEEDING - (NECKER) page 80- LAYSAN, 82
 OBSERVATIONS OF MONK SEALS - (NECKER) page 90-
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 Adult turtle taggings - page 22, 29, (62 LAYSAN)

Turtle census from FFS by Rauzon - page 104
 15 FEB - 27 MAY 1977

TIDE CHART - Pages 50-51

Lisianski chart drawn by NAFTEL - page 113

CHART OF LAYSAN - Page 53
 CHARTS OF NIHOA - page 54 and 55
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COMPOSITION BOOK • 9 1/2 IN. x 7 1/2 IN.

AVAILABLE AS:
 No. 1130 (09-9130) 60 SHEETS COLLEGE RULED & MARGIN
 No. 1130-P (09-9132) 60 SHEETS COLLEGE RULED & MARGIN
 No. 1143-X (09-9134) 100 SHEETS COLLEGE RULED & MARGIN
 No. 1130-P (09-9132) NUMBERED PAGES, No. 1143-X (09-9134) SECTION SEWED

George H. Balazs
 Hawaii Institute of Marine Biology
 VERNON ROYAL, INC. Elizabeth, N. J. 07208
 Made in U. S. A.

ON NIHOA - August 17, 1977
 ON NECKER - August 19-26, 1977
 ON MARO - August 28-30

ON LAYSAN - Aug 30 - SEPT 3
 GARDNER - SEPT 4
 NIHOA circle - SEPT 6

Pages 45-48 - Review of Tanager Exp. photos
at BISHOP MUSEUM

- RADIO'S CASE
- Tennis shoes, socks
- Slippers - Tabbies
- Boots
- TAGS, TAPE, CALIPERS, SCALE
- FORMALIN, JARS, PLASTIC BAGS
- large masking tape, NITRO?
- CHARTS - (Kerox Necker, Laysan) MARO
- MASK, FINS, BANG STICK - SHELLS,
- Hood, wet suit, weights, booties, REG.
- SUNGLASSES
- HAT - AIR MATTRESS
- LAYSAN BOOK (1)
- NECKER BOOKS (2)
- CUP - water container (?) LAB
- SPACE AGE BLANKET
- REG BLANKET
- PHOTOS CASE
- BINOCULARS *
- SUNBLOCK - CHAPSTICK -
- FIRST AID KIT - Aspirin
- YELLOW PAD
- MATCHES
- KNIFE
- TOOTH BRUSH - *
- SHAVING
- 2 long shirts - light rain jacket
- SWEATSHIRT - LONG PANTS
- SHORTS
- TOILET PAPER *
- can opener
- SHOVEL (?) *
- SCOOP NET
- THROW NET
- MATCHES
- lens paper *
- canvas gloves *
- AA BATTERIES *
- SOCKS
- SHORTS
- FILM (some high speed)
- water containers
- FLARE *
- Tent

Planned itinerary - NIHOA; NECKER; FFS; MARO;
LAYSAN AND RETURN SEPT 8.

10/13/77 check to Naftel #9 x 15 days = \$135. + \$8 telephone call total \$43.
#257

8/15/77 DEPART KEWAEO BASIN ~ 3:40 PM EASY RIDER
MONDAY CREW - Jimmy, Gino, Ron, ^{Russ} GEORGE, NMFS - Tom Bob Humphreys

SMOOTH SEAS - Light. Southerly - low barometer; GS-4

8/16/77 5AM, between Kawai and Nihoa - saw two Navy Tuesday ships on radar; AM daylight - Swell from South - overcast; (lightning storm over Kawai during previous night (9-10 PM)).

Sighted Nihoa at ~ 18 miles distance at ~ 2:30-3 PM - still South wind and swell - but calmer.

6 PM to Sunset - approached Nihoa from Southeast - WA ^{photos} w/ sun in cloud - into Adam's Bay - around W end and close along N cliffs - many caves. TO North of Island to set two strings of lobster traps -

Need for day ashore on Nihoa -

- BACKPACK
- BOOTS - SOCKS
- FOOD
- MASK - FINS
- Measuring tape
- Gloves - HAT
- FILM
- 2 1/2 gal H₂O
- Piece of line
- White Bucket
- Radio
- Camera - WA - TELE - X2
- LENS TISSUE
- NIHOA BOOK
- MASK SHIRT
- PL

anchored in Lee of N side of Nihoa

8/17 Nihoa Sojourn

Wednesday Made landing about 9 AM on beach (Derby's landing) in 14' Zodiac with Skip and Jimmy. Counted 7 adult, 15A seals (1 new molt, one in-molt). Little fear. Rain showers set in for two hours -

8/17/77
WEDNESDAY

Easy Rider departed to retrieve traps and set new ones about 16 miles West of island. Stayed in crevice cave for 2 hours (9AM-11AM) - observed Derby's Landing; hiked up West Palm Valley, found brass slug, observed endemic palms, saw Miller birds, hiked to top, to the right of Pinnacle Peak; hiked along edge to Miller's Peak, noted grass hoppers, locusts, difficult to observe near shore from cliffs due to "benches" and angle. Photos from top Marae of Miller's Peak - Panorama; Photo of Devil's Slide - across to Miller's Plateau - observed old turnbuckles, several stakes, rotting canvas - apparently left over from HIRAN I and II (early 1960's). Under canvas I observed two large lizards - stocky body - many eggs already hatched - obviously reestablished after introduction by HIRAN. Observed many Finches on summits - Saw many eggs broken open, apparently by Finches - Made a direct observation of this happen - but did not seem to eat embryos - possibly just liquid; Also saw many Miller Birds - one feeding on frigate carcass at peak. Walked out to second Miller area Marae with coral pieces. Finches are two main colors - brown and brown w/ yellow.

8/16
 ✓ Roll 1
 ASA 25
 EL
 ✓ Roll 2
 ASA 64
 EL
 ✓ Roll 3
 ASA 64
 EL
 ✓ Roll 4
 ELW
 ASA 25
 8/18
 ✓ Roll 5
 EL
 ASA 64
 ✓ Roll 6
 EL
 ASA 25
 ✓ Roll 8
 EL
 ASA 25 8/21
 ✓ Roll 9
 EL
 8/22
 ✓ Roll 11
 8/23-8/24
 ✓ Roll 12
 64 8/24
 ✓ Roll 13
 64 8/24
 14
 ASA 25
 ✓ 159
 ASA 64
 16
 ASA 25

8/16-8/17/77 - PHOTO LOG

✓ Roll 1 KM ASA 25 EL Previous photos of KAWAIILOA BLACK TURTLES; WA of N. HOA and SUNSET; PHOTOS of CLIFFS

✓ Roll 2 KR ASA 64 8/17 EL Cliffs of Nihoa; Ashore on Nihoa - DOG'S HEAD; PINNACLE PEAKS; W Valley and Palms; Derby LANDING (w/seals); CHRISTMAS SHEARWATER; PANORAMA from Miller's Peak.

✓ Roll 3 KR ASA 64 8/17-8/19 EL ~~Roll 2~~ TO #20 ASHORE ON NIHOA (FINCHES); 2 photos of hauling in lobster traps; Skip and Jimmy in Zodiac Neckers; Seal on rock ledge; Turtle and Seal together.

✓ Roll 4 KM ELW ASA 25 8/18 - Approx #1-20 WA going from anchorage around S of Nihoa - BROWN BOOBIES - ; 8/26 PACIFIC TROGAN; SKIP AT WORK; Jimmy at work; 9/1 Gardner's finch BACK OPENED - SOME EXPOSURE

✓ Roll 5 EL ASA 64 8/19-8/20 WA of SHARKS BAY; BOOBIES on ROCKS; BOOBIES against sunset; 8/25 JUV turtle feeding - teleph; Seals in pool - face close up; seals hauled out on rock ledge

✓ Roll 6 KM EL ASA 25 8/20 Seal faces up close in pools; young gray shear water; young terns on ledges; WA of Main part of island. Blue-GRAY NODDIES; MARAE on top of West Cape; Bomb on West Cape up close

✓ Roll 8 EL ASA 25 8/21 NW SELF PHOTO BY CAVE; JUVENILE turtle #2390; WHITE tern chick; ANNEXATION seal by rocks; long end of island WA; BFB up close WA; #32 of MARAE (31) same view as in book; bomb crater; MARAE 12; Bird in sunset

✓ Roll 9 EL ASA 64 8/22-8/23 Tele of BASKING turtle (slow speed but sitting on rocks); EASY RIDER visit PL; SEAL blowing bubbles; WA of seals and turtle on ledge. SHARK BAY framed out of my cave Turtle #2384; Seal head in pool; Bird on marae stones; Marae facing S on Flagpole hill

✓ Roll 10 ASA 64 8/23-8/24 NW cove of island from Summit Hill (note bombed slide area of Annex Hill); Boobie w/ NW Cape in background; Mortal bomb/shell. WA red tail in bluff shelter; Blue-GRAY NODDIES; MARAE on Annex Hill. PL of long part of island; 55mm lens. Crab molt. SA small on carcass; 2 seals in pool. Bomb crater, marae, Noddy, tern young; Birds in flight from Sieves

✓ Roll 11 ASA 25 8/24 Peak; Cove shelter at Silver Peak; Gray-back Tern fledgling

✓ Roll 12 64 8/25 Birds in flight from Sieves Peak; Screaming Boobies on Annex Hill - Sun thru clouds; Gray-back Tern fledgling; mpeg reef from top of Easy Rider, Tom measuring lobsters, Jimmy at aft helm,

✓ Roll 14 ASA 25 LAYSAN? Turtle nests.

✓ Roll 15 9/2 ASA 64 Tel Laysan ducks w/ Monk seal - Masked Boobie and chick; Laysan duck (poss 5.6 F instead of 4.8)

✓ Roll 16 ASA 25 9/2-9/3 Tel Laysan ducks -

Photo log

Roll 9/3/77 MORNING LAYSAN
17 ASA 64

Brown boobies, TEL

Roll 9/4
EL 18 64

Gardner Pinacles and sunset
skip at wheel

Roll 9/6
ELW 19 25

NITOA Island - WA

NECKER II

1/2 Roll 11 Approach to Necker 930-1030 AM
ASA 25 SATURDAY ELW

1/2 Roll 12 STARTING at ~ #26 (Previous was Waikiki Aquarium 2 adult releases) Necker from the South -; 1/13 Telephoto of basking turtle on ledge.

1/13 SUNDAY 11/13/77 Roll 3 ASA 64 EL
Turtle and seal laying on ledge; seals on ledge; Both views with 55mm and 28mm

1/13 SUNDAY 11/13-11/14 ASA 64 Roll 4
JUV capture 2412, 2413; 1 photos ~ 8-10 MARAE 3 from W-NW; settings sun photos ~ 1-14 MARAE 2 from west; Birds against sunset; bird in flight - Annex Hill; 1/14 - photo nos. 23-24 "HEAD" w/white tern WA JUST below MARAE 9; photos 27-28 MARAE 9 (Red Bricks ABOVE, wood lengths to LEFT; photos 29-31 MARAE 7 from NE, photo 32-33 from South (NW Cape in BACKGROUND); photo 34 from NE, photo 35 from NE; photo 36 MARAE 6 turtle face upright.

1/14 ASA 64 MONDAY Roll 5
photos 1 MARAE 6 from South; photos 2-3 from North (photos 4-5-6 SEPARATED PLATFORM of MARAE 6; photos 7-8 ALBATROSS; photos 9-11 MARAE 8 from E-NE (wood in BACKGROUND); photos 12-14 NW CAPE from MARAE 8; photos 15-16 MARAE 6, p15 from South p16 TURTLE FACE UPRIGHT; photos 17-19 MARAE 5, photos 20-21 seven waterworn STONES OF MARAE 5 front VIEW; photo 22 MARAE 3 side upright, West CAPE IN BACKGROUND, photo 23 MARAE 3 NW CAPE IN BACKGROUND, photos 24-26 ALBATROSS BY SIDE UPRIGHT MARAE 3; photos 27-28 BOMB CRATER by MARAE 3 (BFA inside); photo 29-30 MARAE 1 AND ME

ROLL 11/14/77 MONDAY

ROLL 11/14 MONDAY BLACK & W

ASA 64 ROLL 11/15 Tuesday weo ASA 64

ROLL 6 ✓ photo 1^v old batteries by 1928 Cairn; photo 2 MARAE I; photos 3⁴-
 11/14/77 18 - My FLAGPOLE RAISING CEREMONY - up at 1:19 PM; photo 19 Flagpole
 MONDAY ASA 64 Hill; photo 20 Scep to south; photos 21^v-24 MARAE 12; photo 25 MARAE 19;
 " photo 26 MARAE 18 (Flagpole MARAE); photo 27 CRATER by MARAE 18;
 " photo 28 CRATER where MARAE 20 should be; photo 29 MARAE
 " 21 from West; photos 30-31 MARAE 21 (30 from EAST, 31-3 EMBEDDED STONES);
 " photo 32 MARAE 18; photo 33 MARAE 23 (note hole in black stone to left);
 " photo 34 MARAE 13; photo 35 LIZARD; photo 36 MARAE 2; photo 37 FLAG;
 " ME by FLAGPOLE; MARAE I; NW CAPE; LONG PART OF NECKER; SEALS
 11/14 MONDAY BLACK & WHITE ON LEDGE; BELLY BITE SEAL; BASKING TURTLE. 11/15 MARAE on Annex HILL

see other book for rolls 8-9.

ASA 64

ROLL 10 ✓ Turtles hauled out on Boulder beach; Sunrise from top
 11/15 - of Annexation Hill; NE point of NW Cope from Easy Rider; Cervo
 Tuesday - on ER; West Cove from ER; series of West end of island
 Wednesday ASA 64 Passage; Necker from South at ~ 2 miles 55 mm lens.

8/17/77

WEDNESDAY

P.M.
ALSO
AT 12:00

Believe I observed Red Billed tropic Bird - white and black body - Hiked down Miller's Valley - observed two places where cores of rock had been taken - tasted water in seeps - strong-acid; observed Refuge signs - old ones on ground; hiked along edge towards beach - observed two Matae on edge built with dyke material - some coral; also went in same direction on lava bench - able to make point of bench where surge was less violent. observed one juvenile turtle (growth on shell) apparently feeding on these rocks. Also earlier observed 18 monk seals on Derby Landing beach. saw one depart and come in by Refuge sign, (feeding by rocks?).

BIRDS NOTED IN RELATIVE ABUNDANCE -

SHEARWATER - w/very young chicks
 GRAYBACK TERN - Chicks about half grown
 CHRISTMAS SHEARWATERS -
 FRIGATES - VARIABLE CHICKS - some half grown
 MASKED BOOBIES - MILLER'S PLATEAU - half grown
 NOODIE TERNS - half grown - prominent ^{with} cap

Consider Pritchardii ^{Remota?} palm seeds moving down hill - young sprouts noted - also yellow/orange blossoms on trees.

Opiti along bench - Taken off island

8/17/77
WED8/18/77
Thursd
dga8/19/77
FRIDAY

~9A

JANITA
Fished
Washed

9

8/17/77 in Zodiac about 645 - 7 PM.
WED EASY RIDER for night in North
side Lee.

8/18/77 Departed after breakfast for West Nihoa Bank to
Thursday full lobster traps 1-2 sets - 50 each. First set at
alga → West end of Bank resulted in *Codium* sp. brought up
caught on trap. Jimmy indicated that several species
are fairly regularly brought up at Necker
Bank - Note that Nihoa West Bank is
approximately 24 F. Got total of approx. 100
lobsters, and proceeded to Necker across
Twin Banks - very calm seas, some
overcast and sun, light wind from South.
Report from SeaFlite that 25-30 kt trades are
blowing in major islands.

Note that SKP reports concentrations of turtles
off Spencer Park at Kawaihae, and near
shipman's property near Hilo.
Get details -

8/19/77 At ~3 AM arrived at Necker - anchored
FRIDAY as mooning was missing - belt of Orion
near horizon.

~9 AM Reached gear for landing - glassy seas -
Ship - Jimmy motored me ashore in Zodiac -
landing made in Shark Bay - Remainder of
gear handed ashore on West side of
NW Cape - assembled gear near
Seal - Turtle basking site - dead seal
still there - Noted 4 larger basking
turtles on ledge - 2-3 smaller turtles

8/19/77
FRIDAY8/19/
FRID

feeding(?) in adjacent shallow water
inside barrier reef / rock. Rocks
are rich with algae - must collect
sample. Saw small turtle that looks
like a captive release swim/crawl right
upon smooth rocks in shallow water -
then crawl off. Skip and Jimmy stayed
on island until ~11:00 AM - investigated
two contact bombs. Photo of Zodiac
when they left and then returned
briefly to bring me calipers and igel
leopard. ^{possible predators} Gray sharks were noted
by Zodiac when anchored in Sharks
Bay. ^{Post note that one came up and TRIED TO "bite" Jimmy's hand.}

During early afternoon I hauled gear
to "Half-way Cave" to establish
campsite. Took photos of seal and
turtle together and seal in tide pools.
Long tapeworm noted around tail. These
pools look very dirty - fecal matter -
rapid algal blooms - Many hauled out
seals use these pools -
Basking turtles left during early afternoon -
Noted Manini and Anumua feeding on
algal mat on carapace as big turtles
departed - after early afternoon, no small
turtle seen either - Consider that for
Sharks Bay side of island, the sun sets
early; also noted crabs (rock) crawling
on turtles and seals.

8/19/77 ^{-4pm} Hiked to top of ANNEXATION Hill and down and up
 FRIDAY Flaggpole Hill. Observed bomb craters and
 what appears to be entire west side of
 Flaggpole Hill subjected to bombing. Manae
 No. 11 appears destroyed. No. 12 - large crater in
 front; adjacent ones partially destroyed; some
 possibly completely gone. Collected casing fragments
 and bullet slug.

Need to write ARB article describing this
 occurrence - possibly call Dave ~~plehn~~ to see
 what he remembers. Also, note that stones
 were piled to put in Refuge Sign.

Photo needs already IDed

- | | |
|--|--|
| x 1. Intact bombs | 13. UW INSIDE REEF ^{w/ birds} |
| 2. Fish feeding on Turtle Carapace | x 14. Close up of stones |
| 3. Cubs crawling on turtles/seals | 15. Black and whites |
| x 4. "Between" rocks looking West | 16. Bowl Cave |
| x 5. My campsite w/me | |
| 6. Close up of algae | |
| 7. Sharks seen while up on Peaks | |
| x 8. Blue-Gray Noddie | |
| x 9. Bomb craters | |
| x 10. Manae by Emory numbers | |
| x 11. Panoramas of island w/ both 55 Ph and WA | |
| 12. Motor around island in Zodiac | |

Radio check with Easy Rider at 8PM - they
 are close to Pacific Trogian about 5 miles off.

Sunset about 7:30-7:45 estimate

8/19
FRIDAY

only saw one albatross young (Laysan).
Note: Write short report on Nihoa
Lizard establishment.

8/19-8/20
SATUR
DAY

(Piece of coral noted on one of Marae on
Flagpole Hill. Also green gemstone
in structure of bombed Marae

Good night in Half-way Cave -
Necker rises (the contour of) abruptly
on both sides of the gap - affording
an excellent (providing) observatory (obser-
vation platform where turtles and
seal basking on the lava rock shelf
can be viewed totally without disturbance

Consider coarseness of lava on plastron -
Some areas worn water-smooth - ^{slick with} ALGAE -

Night basking? Rocks are black -

Heat up, quick?

Observations of turtles/seals biased
to Central and left shelves of Shark
Bay.

Use personal pronoun - sounds good.

8/20 SUNSET - 7:26 PM

For 8/20 Woke up about sunrise - Made
observations from cliff for 1-1/2 hours -
descended cliff and watched turtle
feeding for two hours - Talked to skip
at 12 noon - they were measuring lobsters

8/20
Saturday Gentle trades, partly cloudy, some swell in Shark Bay. Stood in water with scoop nets but no luck - didn't attempt to scoop. Took photos around ledge. Assembled "bomb" peak, observed two turtles off end of west cape; ascended West Cape peak - inspected Narai and two bluff shelters.

Note that dyke by Halfway Cave extends down to Seal-Turtle Basking ledge. Undoubtedly the dyke serves to give a slope for easier haulout.

- Necker deserves special consideration because -
① Basking on ledge ② close to FFS ③ stopover(?)

Do breeders from FFS stopover at Necker on return to major islands?

Basking at Necker not related breeding - unless breeding does take place here (but consider that this is mid-August).

- Consider effects of bombing/gunnery on birds, turtles and seals.
 - Fecal matter from seabirds (and also turtles and seals) fertilizes Shark Bay. Particularly close to edges, inside rock reef. This must be a contributive factor in the lush, abundant Caulerpa growth present. Consider Necker a Giant Cathedral.
- Objectives of this expedition -
① Observations - behavior of land basking on

8/20

as per National Geographic Grant
 rock ledge (interactions with seals -
 crabs (scientific name _____)).

- ② Necker provides a nice observation post
- ③ Survey near shore waters, from island to detect feeding sites - feeding turtles -
Census

④ Tag

⑤ What they're eating?

⑥ As an aside - came across bombs - bombing
 as a secondary activity, take notes on
 seals for seal researchers.
 Note that bombing, bombs not mentioned
 in recent ARB.

Barking by seals on ledge reverberates in
 Shark Bay - walls of island.

8/21/77
SUNDAY

Sunrise -

Saw turtles, feeding inside reef -
 descended and caught one with
 scoop net - Watched for another one
 to come close -

Measured and tagged turtle - Went
 back to cave for camera, ^{PHOTO OF F.M.F.} released
 turtle about 11:00 - walked out
 to end and slightly around Westape -
 back up to cave for 12 noon radio -
 (made at 12:30 - pulling traps).

8/21/77
 Shortly after Sunrise -

Inside rock Reef - scoop net (jumped into water)

S - $16\frac{5}{8} \times 14\frac{1}{4}$

C - $17\frac{5}{8} \times 16\frac{3}{4}$

PL - $13\frac{1}{2}$

Head - $2\frac{3}{4}$

TAIL - $3\frac{3}{4}$

2380 R

2381 L

WEIGHT - 28 lbs

photos -

Stomach sample attempted 2x -

only resulted in light green paste -

Caulerpa? If so, why are they diving
down to feed.

Pink coralline alga on 5th Central.

Some algal growth on shell - particularly
 in seams.

8/2

8/21/77
Sunday

Spent remainder of afternoon hiking to Annexation, Flagpole, Summit and Bowl Hills - looked for bowl cave. ^{possibly} Noted Tribulus in woody shrub form; possibly ONE ON ANNEXATION HILL

Attempted to record bomb craters -
noted 1 coming down Bowl Hill (to west)
probably 5 on Summit Hill
3 going up Flagpole Hill (to west)
5 on top of Flagpole Hill - around Marae
Complete slope - going down Flagpole Hill
(to west).

While searching for Bowl Cave, I extracted a bullet from a 8" in cliff face.

8/22/77
Monday

Air mattress punctured - hard night!
Up at ^(ends pretty before) sunrise; descended hill with
airmattress; some wind and rain
showers; observed basking turtle -
EASY RIDER came by ~1245; previously
I climbed Annexation Hill from bench
on west side - not difficult; found bullet
in cliff - unable to extract; came down
via regular route to runway cave;
walked out on bench around Shark
Bay almost to smooth rock beach
at base of Annexation Hill; returned
same way. Found steel bullet.

Seal Notes - Important points for Necker

- ① Presence of tags
- ② Shark Scars - Shark observations

8/22/77
Monday8/2
Su

FEEL/MATTER

8/22/77
MONDAY

- ③ Tape worms/Parasites in Tide Pools
- ④ Fat layer, retained for basking on rocks and coral - laying on lava rock
- ⑤ Bryan and Patty put Dye on pups - ^{some row missing}
- ⑥ Hauling Space in Demand - some seals (of 2 pair) keep incorporating seals off central ledge. This limited space affords good observation of seals present.

Exploratory trip - earlier, 2 hours on Necker, this time on Nihoa. "Conclusions drawn from earlier visit to Necker..."

Togs of Monel hold up better on seals than Turtles (?).

Need to dive down inside rock reef to look for algae/sleeping turtles. Does ledge have a limit to the number of basking turtles it can support?

consider what you did?
what you found out?

Concerning archaeological sites - Hawk shell too good to throw away? Green shell deteriorates (doubtful?) Do human finger nails deteriorate? Turtle bones are light; Do you find fish, seal and bird, dog bones in archaeological sites?

Check ARB for mention of basking.
my BASKING paper to class.

8/22/77
Monday

Consider strob of vessels when anchored -
effects on seals - Critical Habitat -
also on Finches (endangered species?)

Spring day -
When seals get hot, they roll in
tide pools - move to splash zone.

7:30 PM

Scoop net capture inside rock reef - near low tide

S - $17\frac{3}{16}$ x $14\frac{1}{4}$ C - $18\frac{1}{2}$ x 17PL - $13\frac{3}{4}$ TAIL - $3\frac{3}{8}$ HEAD - $2\frac{7}{8}$

2382 R

2383 L

30/65

3rd central has pink coralline.

Dark green stains on lower jaw -

Stomach sample gave ^{only} very small
green particle.

Predominantly black shell.

9-10-11th gray - right caved down - fractured."V" in 8th-9th and 11th-PC.

PC's short.

8/23
Tuesday

2384

2385

8/23/77 ~ 7:30AM Juv. scoop net capture -
 Tuesday inside rock reef -

S - $17\frac{1}{8}$ x $14\frac{3}{8}$

C - $18\frac{1}{4}$ x $16\frac{3}{4}$

PL - $14\frac{1}{8}$

TAIL - 3

HEAD - $2\frac{3}{4}$

2384R

2385L

28 lbs

Polysiphonia - on skin.
 coralline algae on shell.
 Stomach sample obtained.
 photo

8/23/77
TUESDAY

Slept down low last night to better
note/observe night basking turtles -
Three total, came in after dark and
left shortly after sunrise - Caught a
juvenile ^{in the morning}.
Rain started about 5:30 - Several
hard showers, then wind - Shark
Bay rough.

Note - Gratefully acknowledge Naftel-Easyfider in
any report

Seal Note - Small SA, and now adult seen using
seal carcass as a pillow.

Necker may be excellent site for telemetry study.

Note that old ^{BIK} cylinders - decomposing -
are present on top of Annexation Hill -
also wood debris on N slope of same -
debris also on South slope of Bowl Hill -
Small wood tower still standing - HIRAN?

Note that Seals ^{Handled out} are not easily disturbed -
Lack of contact with people?
Also, juvenile turtles, through #3, have
been very easy to catch - look right at
me when breathing - but show no fear.
About 11 AM departed for Summit Hill
to take photos of NW Cape end of

8/23
TUES

8/23/77 island with overhead light - Made 12 noon
 TUESDAY radio check from peak. Descended N
 side of Summit Hill to Bluff Shelter
 containing a few pieces of wood and
 RT. tropicbird. Dug around in floor. Before
 this site, I passed 2-3 shelters - some
 caved in - that had beach worn steps
 in them. Walked down to bench that
 has huge lava chunk boulder - observed
 tide pools - rounded - one may have a
 bomb in it - noted iron stakes (?)
 and a pipe founded in lava -
 Hiked up cliff face ^{at Bowl Hill} to long narrow
 shelter - partial stone wall in front -
 beach stones inside - small seep -
 water not as bad as others I have
 tasted - but still not good. From this
 shelter it appears to be an easy
 walk to Bowl Cave.

Crabs on seals eat algae? ^{observed} - none scratched at
 crab.

Scientific name of crabs - Grapsus grapsus

8/23/77
Tuesday

8 PM capture with Scoop Net

PL - $23\frac{5}{8}$ "

TAIL - 11"

HEAD - $4\frac{1}{8}$ "

2386R

2387L

Straight width - $23\frac{5}{8}$ (measured white on back)

RFL 

Very difficult to get up on rock ledge -

Stomach sample collected

8/24/77

0740

Topped an adult female that had been basking on ledge - presumably all night.

2388R

Full size - looks flat -
Trailing edge of right front limb is rounded -
scar tissue - not tapered and streamline.

8/23

Tuesday

Consider having Necker Island Expedition emblem patches made. - INCORPORATE EBY RIDGE

Check on times of refuge visits over the years, e.g. early morning, etc.

Check on night basking at Pearl and Hermes Reef.

- Consider:
1. Night basking is a resting place, only out of the water. This may possibly be due to shortage of adequate underwater sites, or to dangers in water.
 2. Night baskers have been in splash zone - consider evaporative cooling.
 3. Stage of tide ~~and~~ may influence night basking - at different times of the month, basking may shift to daytime hours.

What influences time of feeding (inside rock reef)?
TIDE or LIGHT or ?

8/24/77
WEDNESDAY

Disproportionate number of adult seals at Necker?

~~last~~ ^{2nd} night (lost night) ^{bottom} on ledge - Thermal Blankets are no good in the wind. During low tide of the morning, I walked out on patch ^{rock} reef flat and inspected algae - consists mostly of: (in order of abundance) -

1. Caulerpa - small berries on top - big at other places
2. Yellow weed-like (a form of bryosum?)
3. Laurencia
4. Turbinaria
5. Asparagopsis (limu koha)

About 1 PM departed for East end of island - photos along the way of Maraps - birds.

Small Marape noted lower on ridge between Annet - Flag (Flag side). Siever Hill has a small rock cave shelter at summit. Two shearwater chicks inside. Walked down to East end of island - rock awash at East end.

Seal note - SA's may not be discriminated against (like at FFS) due possibly to limits of hauling space. What about space requirements for mother with pups?

Discrete seal/turtle hauling spaces provide good conditions for study.

Turtle not feeding inside rock reef when water surges
Too rough.

8/24/77
WEDNESDAY

8/24/77
WEDNES-
DAY

Bomb

Note - Two craters are present in NW face of Summit Hill, about 75-100' from top.

Consider extent of each turtles posturing range - one area, one chain of areas, or?
Consider apparent good vision of turtles under low light conditions. Or are they finding algae by smell?.

8/24/77
WEDNESDAY

Scoop net capture inside rock reef - about 7:40 PM -

8/25
THU

S-19 x 15 1/8

C-20 1/2 x 18 1/4

2389R

PL-14 5/8

2390L

2391^{RPL}

HEAD-3

37 lbs

~ 110

Recaptured
NECKER III

4/27/79

see p 22
other DATA
BOOK

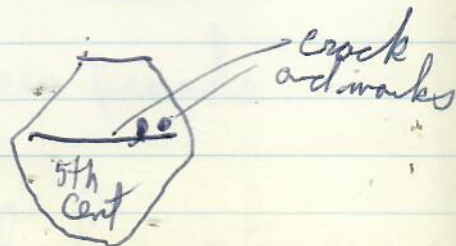
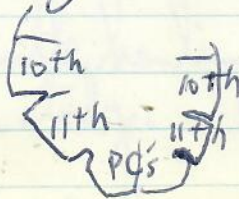
TAIL-3 7/8

Stomach sample obtained - probe did not go all the way down - sample came out a "plug" in plastic tubing.

Shell mostly dark w/ streaks - much like Coconut Island captive.

Right front limb short - large scale at tip
1/2 - 2/3 missing.

Distinguishing marks, as indicated in drawing:



~ 180

8/26
FRID

8/25

THURSDAY

Considers night counts of seals.

Only male with females seem to bark at newcomers.

Note that there is a deep tide pool at NW cove, facing approx. West.

Some seal come, some go and some stay for awhile.

Hauling takes place on rock ledge @ Smooth Boulder beaches.

~ 1100

Depart for East end of island - took photo (TEL) of birds in flight - returned to saddle between Bowland Summit Hills, descended to ^{Tide} pools ledge, ascended to bluff cave - followed ledge to large cave on Siever Hill. Bow cave is probably smaller one on way.

Returned to ~~Mountain~~ ^{Flagpole} Hill and located Maroes, as per Emory, 1928. Returned to Apperstation Hill - took photos boobies in flight again sun rays coming out from behind clouds. Easy Rider came to anchor in lee of island. Removed lost gear from Half-Way Cave - listen to Greenpeace. argument rebroadcast by Skip.

~ 1800

8/26

FRIDAY

Another night (4th?) on rock ledge - woke up about 1 AM - no barkers - however at 3:15 bask (3) ers present. Moon set shortly before this and may be the

8/26/77 responsible factor.
 FRIDAY Woke up early to prepare for departure -
 (0530) - Watched feeding turtles for awhile, but
 they were too far out, and beating too
 fast, to make scoop net capture.
 Put traps on two basking turtles - third
 one was young SA male previously caught
 with scoop net and tagged.
 Cut off head and first vertebra of adult
 monk seal and put it in crevice at
 ~50 about ledge -
 Moved gear to landing site on West -
 Skip and Jimmy came in zodiac about
 0815 - easy departure, even though
 general conditions are rough seas and
 strong wind.
 Pulled three strings of traps - Pacific Trojan nearby
 and departed for MARO REEF.

8/26/77
07

2393

2395

8/26 FR
0730

11/13

4/28/79

NECKER

see p. 87

other data

2392

2394

8/26 FRIDAY: ADULT MALE BASKER TAGGED
0730 (appears flat) - BIG.

Flaps a little tattered, but healed.

2393

2395

Departed only after application of second tag - not easily disturbed - (tired?)

8/26 Friday Adult female Basker tagged

0730

11/13/77 NECKER III
recovered Basking

4/28/79

NECKER III

See p 82
other data book

2392

2394

Put two tags on right away - she departed slowly.

(Small TMR left eye 11/13)

COPULATION

8/24 BACKNOTE

~ 7:15 PM

observed copulating pair, close to basking ramp in deep portion of tide pool. They seemed to rise from bottom. Female waved both flippers several times. They stayed together for about 3-5 minutes, then swam down into pool. Believe I noted female's hind limbs "closed" together. Female looked small, compared to male.

Naftel stated that in spring of 1976 he observed copulation at ~~the~~ ^{West} ~~side~~ ^{cove} anchorage side of Necker.

8/26
EveningJason
Pant

8/26 enroute to MARO REEF
 Evening - Saw lights of FFS about 10:00 PM -
 7 miles away, from north. All radio contact
 failed.

Skip indicated that while at anchor, or
 while pulling traps, they have seen
 turtles - mostly all juveniles (~18-23"),
 while on various banks.

This includes Necker; Brooks banks
 (THREE SMALL); St. Rogate's Bank; Gardner Pinnacle
 Bank; RAITA Bank (9F spot present);

Note that Southampton Seamount/unsurveyed
 banks, have shallow areas, 17-50F.
 They have dove at some of these sites.

For Main Islands:

Jerry's
 Bank

Skip reports he has seen many
 turtles directly off Maura Kea Beach
 Hotel - in "sard channels" that
 drop down 10-15'. Turtles at this
 site are hard to approach while
 diving - move off quickly. Also, he
 mentioned that shark lines had been
 set in this area, and a hook
 brought up with part of a shell or beak.

Another turtle concentration site is off
 Jerry's property.

8/27 on the way to Maro - during the
SATURDAY night, crossed over all three of St. Rogatien
Banks. Between 10 - ~ 11 AM crossed
over Gardner Linnale Bank.

BACKNOTE

algae

6 specimen
TO Doty
9/24/77

9/10/77
TO
JOKIEL
ID

Between Nihoa and several hours out of
Necker, much material sighted on surface
by Spip. Later he collected what was
thought to be same material - now
preserved (Halimeda material).
also preserved was algae brought
up on trap at Necker Bank.

1. Long brown strands
2. Green round ball
Encrusted coral sample also obtained at
Necker Bank

Attached to it was found two algal
specimens -

1. Small red filamentous (Lamencia?)
2. Brood, brown leaf (Podira?)

8/28
SUNDAY

0245 arrived at Maro Reef - anchored

During 8/28 daylight hours, bottom
fishing was carried out for Opakopaka,
"K" Alua, Kahala, and Groupers.
Set 2 1/2 strings of lobster traps at Southeast

8/28/
SUND

8/29/
MONDA

IN
MANUISE
9/14/77 UAL
10 SPEC
+ 2
TO DO

8/30/
TUES

8/28/77
SUNDAY

end of edge of Maro Reef. anchored and did more bottom fishing. at about 9:30 PM called KMI Oakland and called Lin #5 for first 3 minutes - \$1 min thereafter.

8/29/77
MONDAY

Pulled lobster traps in morning, early afternoon - Algae samples collected - includes Laurencia and fine green from antennae of lobsters.

IN MARSH
9/14/77 VAP
10 specimens
+ 2 from lobster
TO DOTY

Engaged in more bottom fishing. Reset 2 strings of traps to the South of Maro Reef in approximately 18° of water. 170° 46' W 29° 18' N - 1520F. Motored over for a look at the breaking reef during change of sets.

8/30/77
TUES

Brought up trap strings, departed Maro Reef for Laysan at ~ 1245 PM - smooth seas, 6 Rhoddyturnstones, 1 golden plover hitchhiked on boat. Sighted Laysan at ~ 11 miles (palm trees), 2 tents, wreck ~ 9 miles. Arrived Laysan west anchorage at ~ 815 PM - still some light - sunset ~ 745. Went ashore to Bryan and Patti's campsite. at ~ 10 PM, walked down beach and saw one adult basking turtle; and excavation pits (2) of a few weeks ago. Returned to boat ~ 1145, stayed

8/31
WEDNES
DAY

up until 3AM shooting the shit
with Naftel -

0730

Awake - Ashore on Laysan about 9AM -
with Bryan to NW location of "nests".
June 5, 6, 7 = 2x with excavations, one
with tracks only. First, going around
island, by 2 logs just into vegetation
zone, beach morning glow (June 7) - 2 pits,
1 small, 1 large, fine and almost powdery
sand (sample taken) - Excavated larger
one - nothing.

~ 25 yards East - June 5 or 6 "nest" -
shallow excavation - ~~or~~ nothing

yards further east - May 20

up higher on beach - July 20 -
considerable excavation - nothing -

~ August 20 - Cross point 2 - 1 looks good

May 20 - 1 pit (low on beach)

June 5 or 6 - 1 pit - shallow

June 7 - 2 pits (1 big, 1 small)

July 20 - 1 pit (large) high on beach

Cross point - 2 pits (1 large, 1 small)

Chrono
logical

8/31
Wednesday

9/1
Thursday

8/31
Wednesday Bryan -

Propped clockwise around island
with Skip. Photo of west coast -
also on beach rock ledge, also
at Japanese wreck.

Saw ~20" turtle off beach rock
ledge past wreck - seaward (red?)
growing where waves hit.

Flies bad - returned to boat ~ 4:30 PM.
~ 5:30 PM saw ~ 18" turtle off
stern of Easy Rider.

Patty and Bryan came for dinner at
7 PM. Patty reported seeing
basking turtle at 4:30 PM at
NE Point.

9/1/77
Thursday

at midnight, ashore and walked
to NE point - no baskers
at West point (cross) - but
large, clean male - just past NE
point - tagged 2377 L

Walked to nesting sites - dug further
in July 20 - walked beach to NE site -
slightly past 2377 basking site - saw
~ 1-2 PM 2 small, gold-colored juveniles feeding near shore
in wave break - named beach Entero (wogha)
growing on beach rock. Returned to camp
via Coconut grove and North portion

9/1/77
Thursday

of lagoon -
about 3 PM, walked back out to
NE point of island - Patty and
Skip followed - sat at NE beach
site and watched for same turtles -
- 4:30 PM none seen. Returned to camp
about dark.

Bryan and Patty for dinner; afterwards, about
11 PM, Skip, Brian, Patty and I walked as
far as NE beach - no turtles seen -
talked on beach until 3 AM

9/2
FRIDAY

In to shore about 100 AM - Brian and Patty
out to boat for lunch -

during morning hours Skip, Ron and George
made dive (in West anchorage looking
for lost anchors) - I looked from
Zodiac with face mask while drifting
back forth. Sand bottom in center
with coral ridges - canyons on each side,
dense coral cover - perhaps 70-80% -
considerable encrusting.

Apparently several large caves, as
Skip went right through one and
saw a juvenile turtle asleep.

after looking for anchor, I went ashore
and probed nearshore waters north
of landing to Cross Point.

Notes -

- Lawencia in abundance

9/2
FRIDAY

9/3/77
SATURDAY

9/2
FRIDAY

- colder water under surface
- abundance of fish (kōka, Manini, wrasses, UH)

after 1/2 hour dive, left mask and fins at campsite of Brian and Patty and walked to NE point with net & watched for feeding turtles, but saw none.

Continued around island to Mound on East side - observed Laysan Ducks - took photos near monk seal. Went inland to lagoon - noted larger size ghost crab holes near shore of lagoon - collected one ~~for~~ for preserving. Also tasted water which filtered into crab hole excavation. Dig near edge of lagoon and collected soil sample and earthworms. Took many photos of Laysan Ducks - at sunset, walked to disassembled campsite - Skip picked up me, Brian and Patty near dark.

No nighttime survey this date.

9/3/77
SATURDAY

Awake early - ashore about 8:30 AM via Jimmy with Patty and Bryan.

Walked to South along West coastline - inspected transmitting buoy. Observed beach with many seals. (Propane Beach) - reported that groups of 4 or 5 ~~have~~ have BASKING TURTLES

9/3/77
SATURDAY

been seen here earlier in the summer.
 Proceeded to beach rock cliff area
 at Southern end of island where Skip
 and I saw the juvenile turtle ^{feeding on}
 8/31, Wednesday. Proceeded with Patty
 to rock guano piles where I
 obtained a sample. Earlier we had
 seen wood and rusted rail from
 guano train track.

Proceeded back to West coast where
 I took many photos of Brown boobies.
 Sat on beach for awhile - then
 all departed for Easy Riders -
 up anchor about 1PM - left via South
 end of island - very rough seas
 all afternoon and night

9/4
SUNDAY

Rough seas all day. Approached
 Gardner Pinnacles about 7AM -
 many photos. Observed 3 seals (2A 1SA)
 on smaller Pinnacle.

9/5
Monday
LABOR
DAY

Running all day - ~~passed~~ ^{passed} Necker to
 the South about 10 PM - not visible
 Much calmer seas after Gardner Pinnacles.

9/6
TUESDAY

over Middle Banks in the morning -
 Saw Pacific Bottle nose Dolphins (Tursiops)
 - on way up, saw Hawaiian Spinners (Stenella)

9/6/
Tuesd

2A-7

9/6/77 Tuesday
 Called Frank Goto (^{45 BOATS} K E ^{yocho} ~~Yunke~~) about fish catch.

BACKNOTES -

Skip reports that after war (1946), Buzzy Agard, Shinsato and (Otki?) skinned good metals (bronze, etc.) from FFS - each made about \$85,000. This was used to finance fishing camp at FFS.

Report is that plane which was used to fly out fish tried to raise rates - Agard then bought his own plane. This plane crashed, (on first flight) thereby destroying economic base of endeavor.

Report that Agard once catch seal in large fish trap at FFS. Subsequently bloated and came to surface.

Tom was at FFS and many of the Leewards prior to 1964 - reported that seals got into bait nets, but they just chased them out.

BCF boat sometimes took a turtle to eat.

4-7PM approached and circled Nihoa many photos - talked to Cromwell - gang up chain Richard Ushida Scientific leader - No seals seen at Perls landing.

note - send turtle IDs to Tom
also place report forms on ER + drawings

9/6/77
Tuesday

Tom reports that ~~the~~ turtles have been easy to take off Mokuleia - his favorite fishing place - use spinner or thrownet as grab. Places where freshwater goes into ocean. Also, Tom knows of spot where flight Bay occurs on coastline on the way to Kaepa Point. He saw a turtle there years ago.

Tom reports that Kawela Bay has lots of fresh water seepage - leader of stop-development group lives in area BOB MONCRIEF - knows about turtles.

Spic reports that Kenyon told him of cable buried across SE Island at Pearl and Hermes Reef - showed him depression area. Apparently cable ties need to be made on land.

9/7
WEDNESDAY
Daytime discussion about Barkley Sand Expansion - Rick Gaffney - Lect.

Arrive at Kewalo Basin approximately 11 PM
Drink at Horatio's.

9/11/77

9/16/77

9/19/77

- Measure rock ledge (surface area) 41

BACKNOTE - report that last visit of
Cromwell (several weeks ago), State
Fish and Game personnel caught
(W. LAYMAN) Tiger Shark - stomach contained
only 4 birds (albatross?)
More details needed.

9/10 Bill Cooke I.D.'d purple shells
as Tanithina sp., a mollusk -
floats on surface by secreting
mucus that forms bubbles -
They eat Velella, Physalia and
Porpita, which are all
Coelelerates.

Rock cores taken at Necker same as Nihoa

TOM KAZAMA - NMFS

Iron stakes in ledges

9/11/77 Lee Mottler reports that Dr. Emory indicated
he had knowledge of twin engine bomber
bombing Necker 1942-1943. He was
instrumental in stopping it. Mr. Bryan
indicated that he heard of more
recent bombing. No details.

9/16/77 R. Brock - "Laysan Tube -"
"probably of Calappanassid shrimp"
Burrow that has been fossilized

9/19/77 Presentation on Necker trip to people at
Bishop Museum -
BRYAN - camped on wide ledge - never saw shark
BAY LEDGE

Notes - 2 AM approach to Necker - thoughts
 Landing - scaling hills
 Night - bluff shelter - seals barking - echoes
 Sound of wind - on with waves
 Feelings (seeing bomb craters)
 Finding flag pole -
 armed with P.P. Bishop 1928
 Birds in front of / on uprights
 Bone flut on lava - shoes as per Emory
 White guano on black lava
 Excursion to bowl cave
 Nighttime - setting turtles

11/12
 Saturday

In bunk listening to engines as approaching
 Necker - roll of boat, sound of waves on
 hull.

Darkness on ledge - writing up notes -

IMPRESSIONS of previous VISITORS / INHABITANTS.

Stone Temples

Considers Matariki

Caves poor places for living -

stored goods only - hard access - hide

Very black rock -

Sleeping on ledge close to solid black rock island -

Mother Island -

great Cathedral -

Turtles peaceful on ledge -

- capabilities
- intentions

43

12/13/77 Second talk on Necker to Bishop Museum

9/19

As yet, no explanation for "Floyd" hill and
Cairn. Bryan went in 1923 - Emory 1924.

1/12/78

Volume

Volume

1/12/78

Reviewed Taroger Expedition photo albums
at Bishop Museum - Staff - Lin Davis
and Debby -

Volume 40

Trip "C" Necker Is.

page 6 neg. 9682 9 Baskers (xerox)
page 50 9780 W. Necker (xerox)
page 71 9824 Baskers on East Is.
page 72 9828-9859 Tern Is.
page 80 9853 Skate from whale

note that such names as King Is., etc
appeared in captions for FFs.

Johnston Is. - 1923 Taroger
43' high spot; much beachrock

Wake - 1923^{much} beachrock - Elephant
Rock noted; ^{old} Japanese camp

Volume 41

page 15 May 1923 (Trip B) Lisianski
page 18 " NEG 10082 - BASKING
" " 10083 - Turtles
page 21 10088 Poacher Camp
" " Necker
page 28 11781 Digging in
" " Bowl cave

Caption of bird sitting on Necker Flagpole
(down) - "Where birds are sovereign. The pole
which flew the flag annexing the island."

1/12/78

Volume 41

Necker Is. July 14-16, 1924

Page 95

Page 101

Neg 10439 - "Ken Hanson
with young
turtle brought back
by DRANGA, Nihoa"
(I question Nihoa as
photo site - prob. Necker)

Page 102

22 Mo'i - throwing net

Page 116

Neg 10680 "Sesbania - between
Annex and Flogpole"

Volume 42

Key to Arrangements TANAGER

- Trip A → April 1923 - Laysan, Ocean, Midway, Pih
 " B → May 1923 - Lizaunki, Gardner
 " C → ^{JUNE 23} Nihoa, Necker, FFS, Kaula
 " D → July-Aug 1923 → Johnston, Wake

Page 8

Neg 9358 Laysan - Blow hole
on SW side

Page 40-41

Laysan
"9427 Turtle basking
9428 Turtle "NOT EGG"

LAYING AS WOULD APPEAR"

9429 - Laysan turtle

9430 - "wounded turtle
in shallow water"

1/12/78

Vol 42

4/12/78

Vol 42 (cont.) Page 42

" 42

Ocean-Kure

Page 49

Page 50

Page 71

Page 78-79

Page 159

neg 9431 Laysan Turtle
on West Beach9432 Laysan, two seals
shot by Dr. Wetmore9446 seal and pup on
West spit ^{pages 51}

9447-9448 (9449-9450)

Pearl & Hermes seal and pup -

9485A

seal; PH

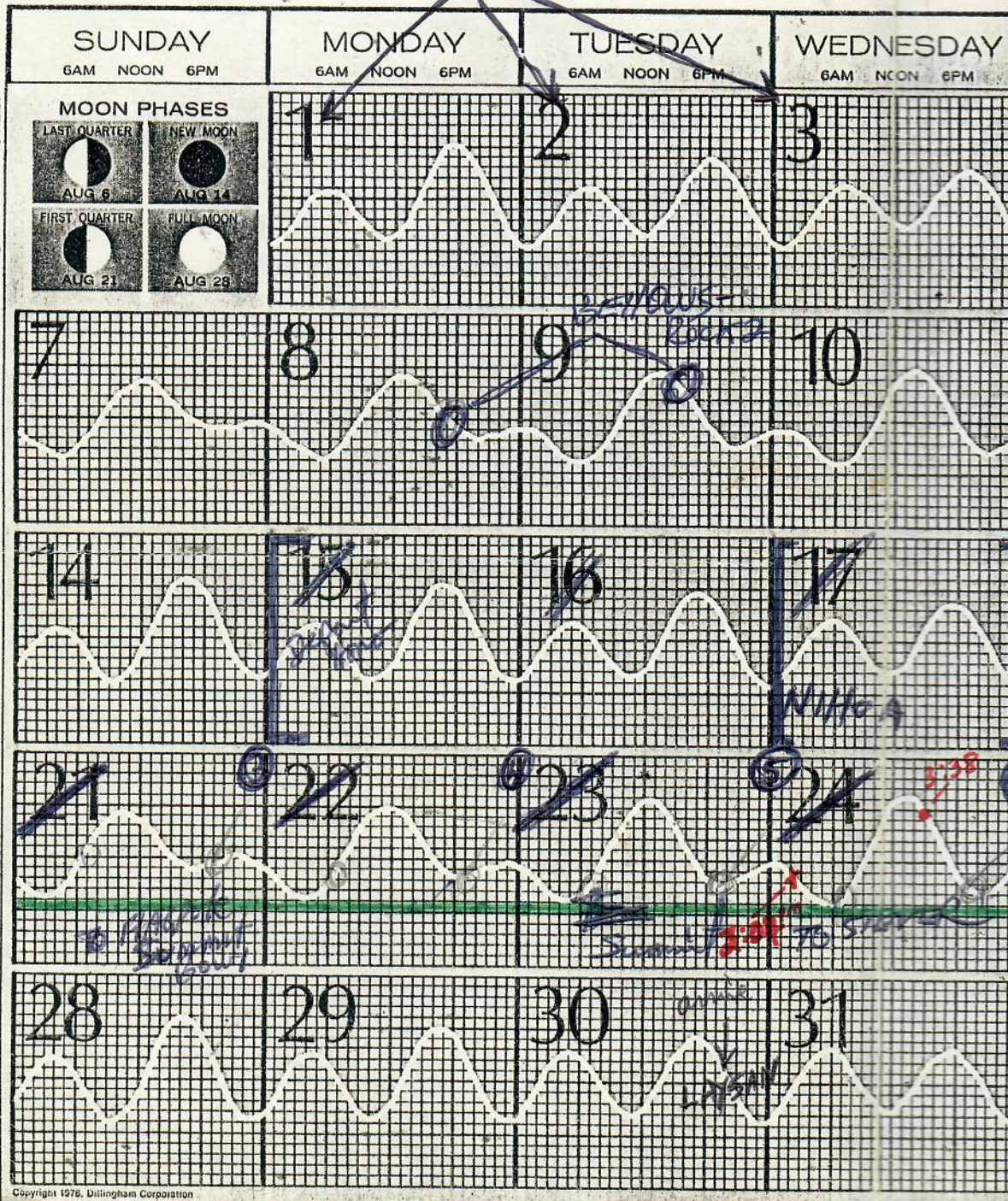
9670 "jaws of 11'6" Tiger"

Considers → seals coming back to SE
islands as response to reduced
pressures. Driven to NW - no
returning to previous normal optimum
habitat. / environment.

1/12/78
my numbers
Loose folders from file cabinet -

- 1 "Turtle Point (w. point)" by Cartwright
- 2 "Hill 3" - U.S. Bird Reservation notes
- 3 "The Cut"
- 4 "Necker - the swimming hole" - King and Cartwright
Turtle basking in foreground.
- 5 1894 print of ~~the~~ Annexation
1933 photo of four Biplanes flying
by Necker.

Bel lows Net - Rock 1 AUGUST 1977 TIDE



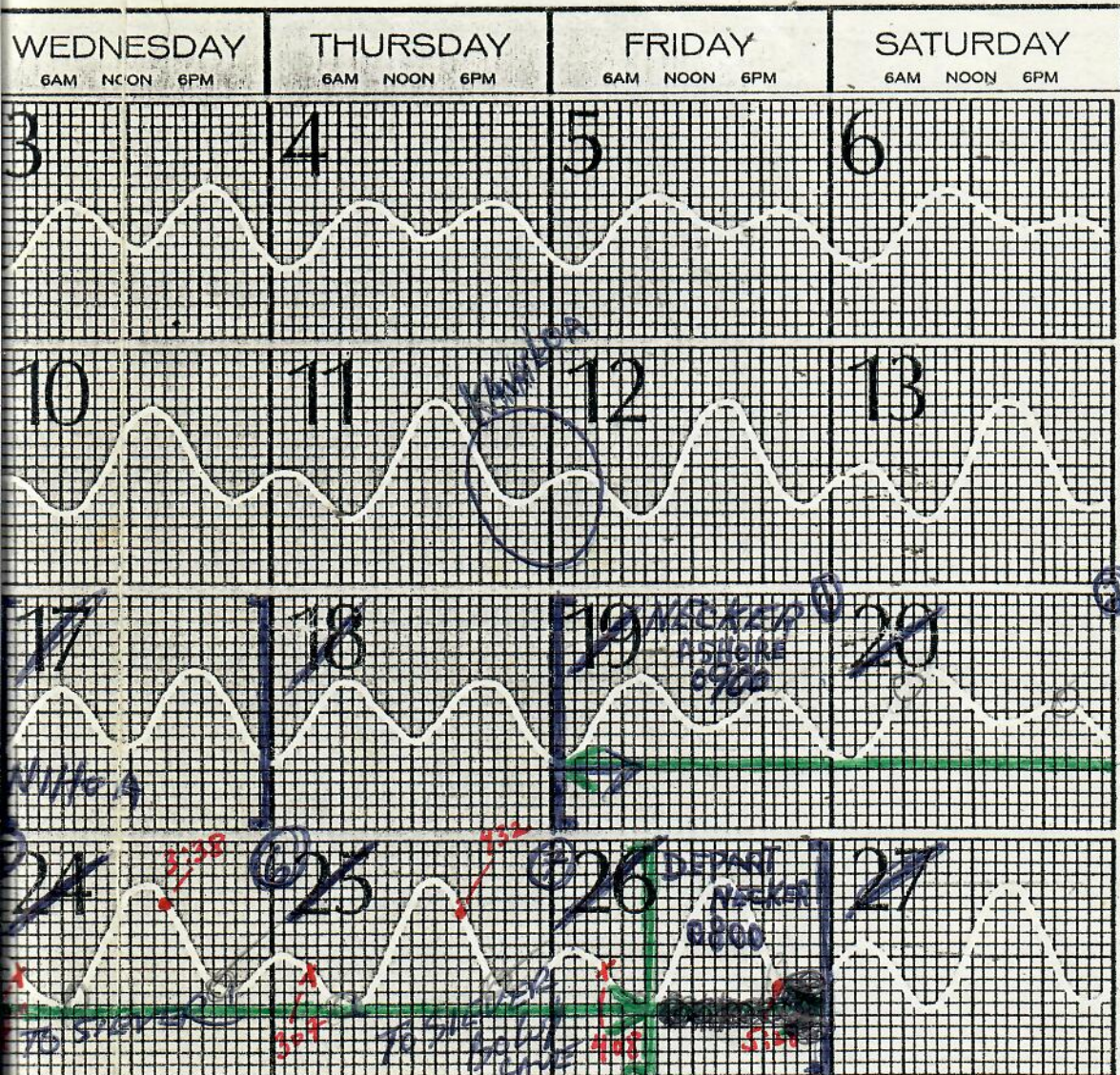
MOONRISE
3:38 PM
4:32
5:28

MOONSET
2:07 AM
3:07 AM
4:08

24 August
25
26

O - MOONRISE
X - MOONSET

1977 TIDE CHART



For tide time at following places, add or subtract from Honolulu time.

PORTS	Hrs.	Mins.	PORTS	Hrs.	Mins.
HANAIEI BAY, KAUAI	-1	40	KAUNAKAKAI, MOLOKAI	-0	09
NAWILIWILI BAY, KAUAI	-0	32			
PORT ALLEN, KAUAI	-0	32	KAHULUI, MAUI	-1	48
			KIHEI, MAALAEA BAY, MAUI	-0	14
HALEIWA, OAHU	-1	36			
HANAUMA BAY, OAHU	-0	55	HILO, HAWAII	-0	59
KANEHOE BAY, OAHU	-1	35	HONUAPO, HAWAII	-0	24
LAIE, OAHU	-1	48	MAHUKONA, HAWAII	-0	24
WAIANAЕ, OAHU	+0	15	KEALAKEKUA BAY, HAWAII	-0	16
WAIMANALO, OAHU	-1	15			



Dillingham

NORTH

53

W



Figure 4. Aerial photograph of Laysan Island, January 1966. Official U.S. Navy photograph.

E

S

Figure 2. Map of Nihoa Island (after Christophersen and Caum, 1931: 5 and Bryan, 1942: 167).

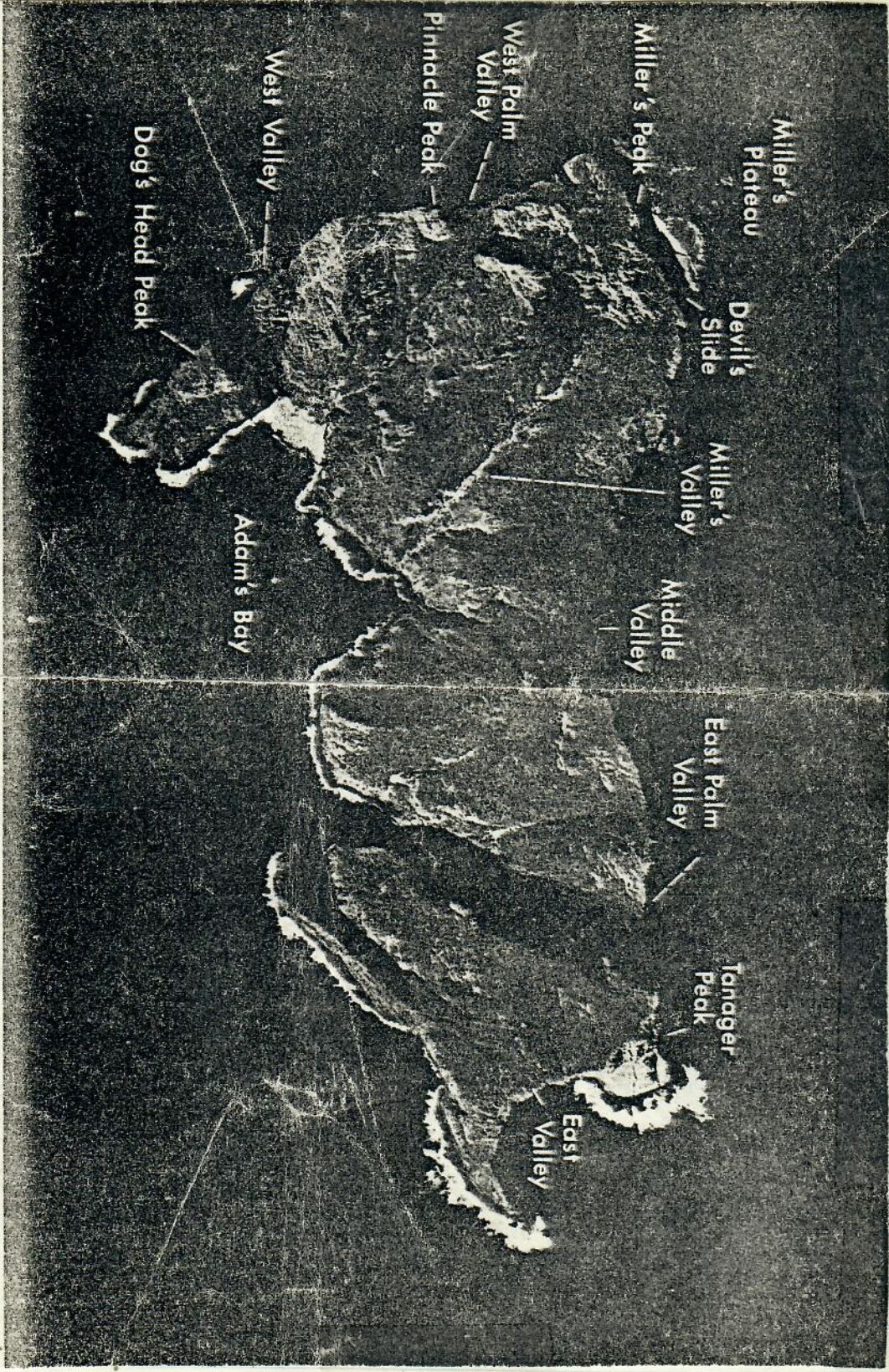


Figure 3. Aerial photograph of Nihoa Island showing prominent features of the island. Official U.S. Navy photograph, January, 1966.

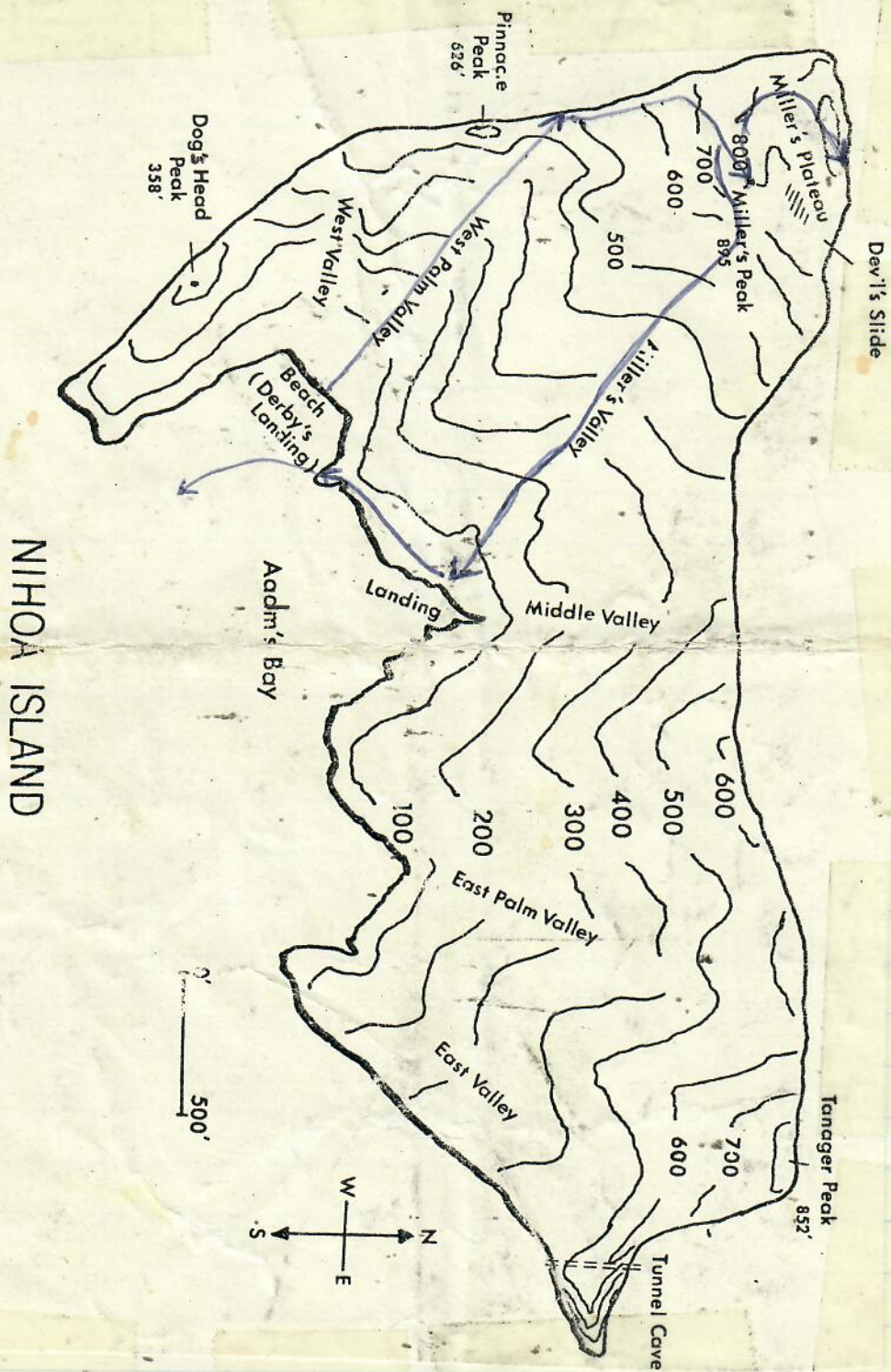


Figure 2. Map of Nihoa Island (after Christophersen and Caum, 1931: 5 and Bryan, 1942: 167).

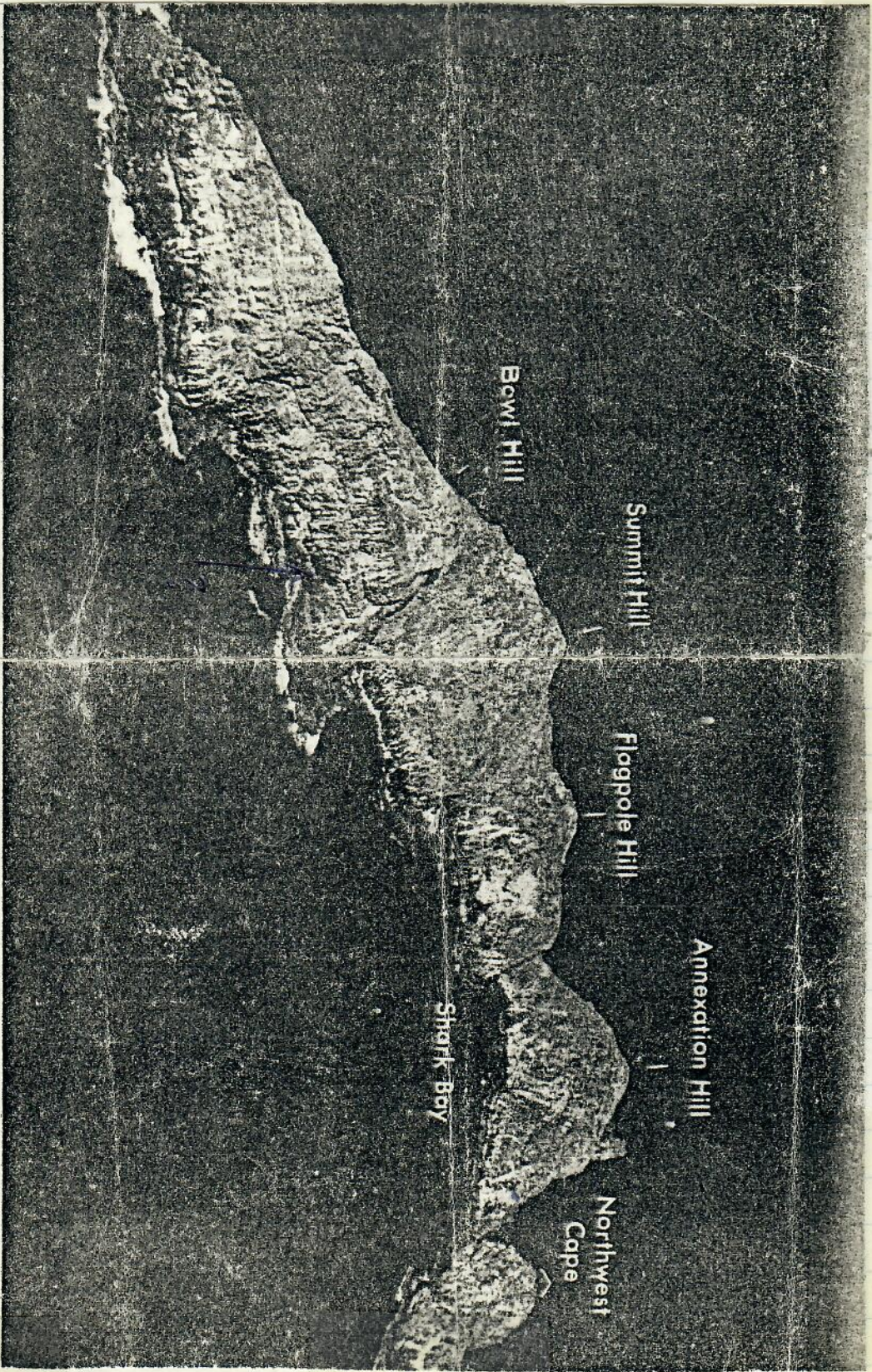


Figure 3 Aerial photograph of Necker Island showing prominent features of island. Official U.S. Navy photograph, January 1966.

8/19

3-4 BASKING APPROX: 0930 - 1330

60 BASKING TURTLE OBSERVATIONS

DATE/TIME NO. TURTLES SIZE/SEX SITE ACTIVITY/COMMENTS

SATURDAY
8/20 0755

1

A

CENT

DRY - BRIGHT SUN

RETURN
0905

1

"

"

HIND LIMBS getting wet

0920

1?

A

"

Went back in water
started to get out,
but didn't

NO OTHER BASKERS 8/20/77 SATURDAY

8/20 2100

1

A

CENT

spot light

8/21 SUN.

observed
NONE during daylight hours

8/21 2200h

3

A

spot light

8/22 0600

5

A

spot light

MON 0645

10

A

Back to water before

0810

10?

A ♀

watched it crawl over coarse
lava rocks - FAT AS per hind quarter

1145

10

"

(PHOTOS) noted that turtle
continuously in splash zone, however

1240

10

"

go moves get bigger, it crawls up.

Turtle turned sideways - head to south -
shortly thereafter, returned to ocean.
A only there 20 minutes

2110-2120

1

A

8/23 0030

1 or 2

Tues First
0530 light

3

half asleep when I looked

0615

2

by 0715

0

all departed

NONE OBSERVED DURING DAYLIGHT HOURS (after 0715)

2135

1

hauled out

8/24

wed 0600

2

Females -

0715

1

1 gone

0740

0

tagged remaining # 2388 R - and she left

~~0800~~

~~1~~

NONE observed during daylight hours

NTS	DATE/TIME	NO. TURTLES	SIZE/SEX	SITE	COMMENTS
SUN et	8/25/77				
	0300	4	A		
	0600	1	A		
	0800	0			lost one departed by 0800
					None observed during daylight hours
	8/26/77				
	~0315	3	A		came in since last obs. at 0130 - possibly DUE TO MOON SETTING AT 1/4 0300.
	0730	3	A		TAGGED TWO - ♂#2393; ♀#2392 THIRD one young male #2386. put marks on shell from my moving him over rocks

NECKER II

quarters however up.	11/13/77	1'	RECOVERED from 8/26/78 A	72392 RFL	
	SUNDAY 1015				seal sneezed at 745 → up about 10ft from water - got hung up on rock, but
	215PM	1'	(turned head out)		no alarm reaction photos w/seal
	sunset ~630PM	1 ²			Small TMR, 2 eye
	~7PM	1 ³			A female hauled out - 11th marg R New injury (yellow); - Genus immediately on carapace for short time.
	-830AM	1 ⁴			A hauled out
		1 ⁵			JUV 075A along side
	~915	1 ⁶ 1 ⁷			A BIG - closer to water
	11/14 MON				As 1 Big ♂ (6 visible)
	~0010				Waves moving in - turtles affected
	0145				only 2 A present
	0200				All departed
	<5:15	1 ^A			Adult female photo w/BW film - TELEPHOTO
	~845	1 ^B + 1 ^C			Adults (1 w/11th R missing)
	~915	1 ^D			Adult

BASKING TURTLES - LAYSAN

DATE/TIME	NO. TURTLES	SIZE/SEX	SITE	COMMENTS
8/30/77 2000	1	A ♀	GRAVE POINT (cross)	left hind limb 1/2 missing - deep scratches in shell - moon full - FAT HIND QUARTER
9/1/77 0005	1	A ♂	#2377	NE point large, clean shell, no tags or injuries

9/16/77
WEEKS

DATE/TIME	NO. TURTLES	SIZE/SEX	SITE	COMMENTS
11/14/77 MON 10:30 AM	1 ^E	Adult		
10/15/77 TUES 01:45 AM	5 present	all adults		
0315	1 present	A		
0500	all gone			
~4 PM	3 + 1 trying to crawl up	A	3 Female at left Boulder Beach / Male	
<p>note - water rushing through gap from NW swell covers basking edge used by turtles - Boulder beach is apparently an alternate site for basking - HAS IT BEEN USED AT TIME, IENIGHT, WHEN NW swell is not up?</p> <p>no tags noted on these 4 turtles, but examination of each flipper not possible.</p> <p>photos taken on Roll 10 using WA lens.</p> <p>NOTE - ANIMALS CLUSTERED TOGETHER - "SOCIALIZATION"</p>				
<p>11/15 night 11/16 AM hours spent up high and observations of Boulder Beach not possible - Big NW swell all night.</p>				

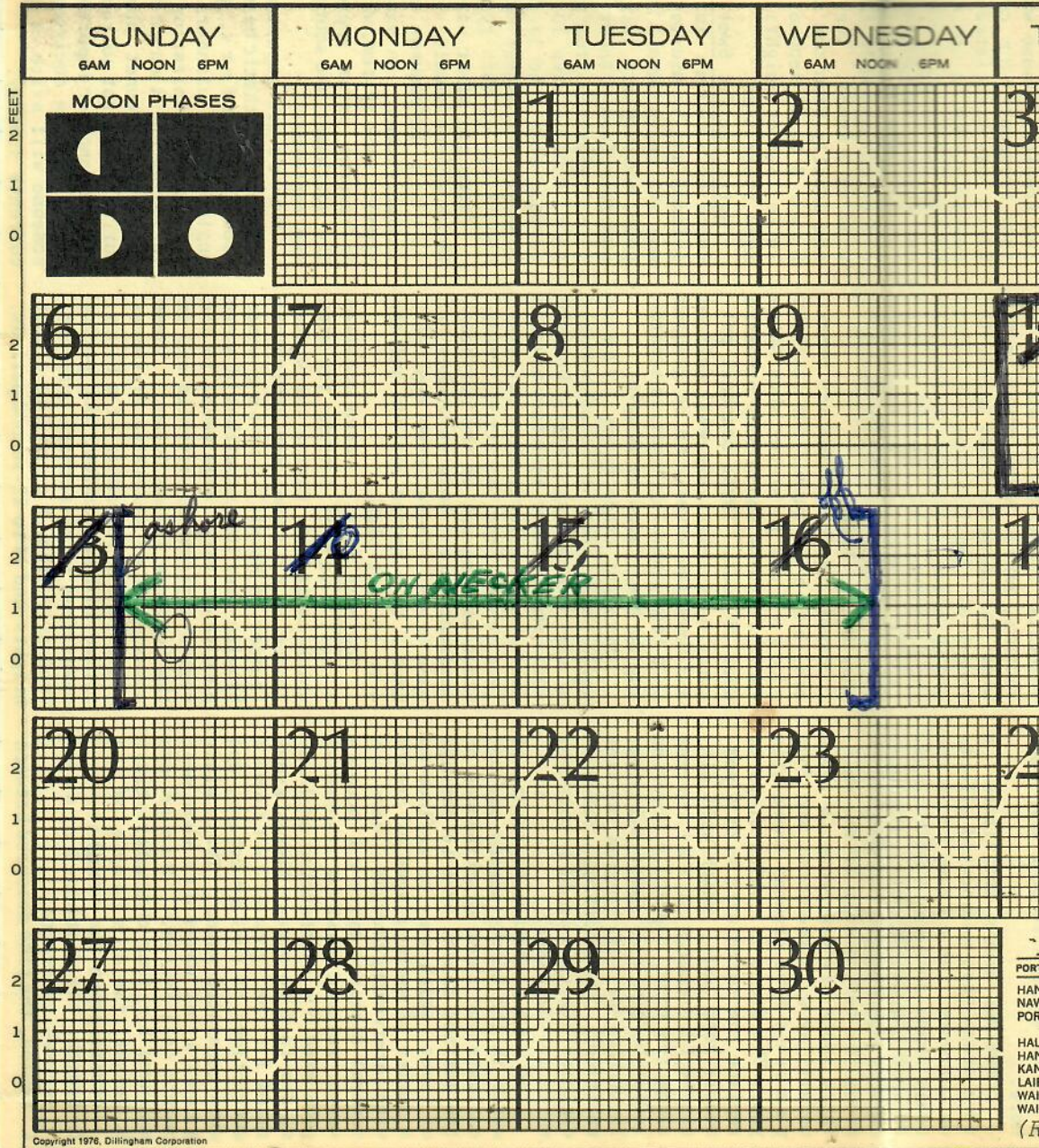
10/16/77

WEDNESDAY

Last observation of Shark Bay area made at 9:30 AM - no baskers present.

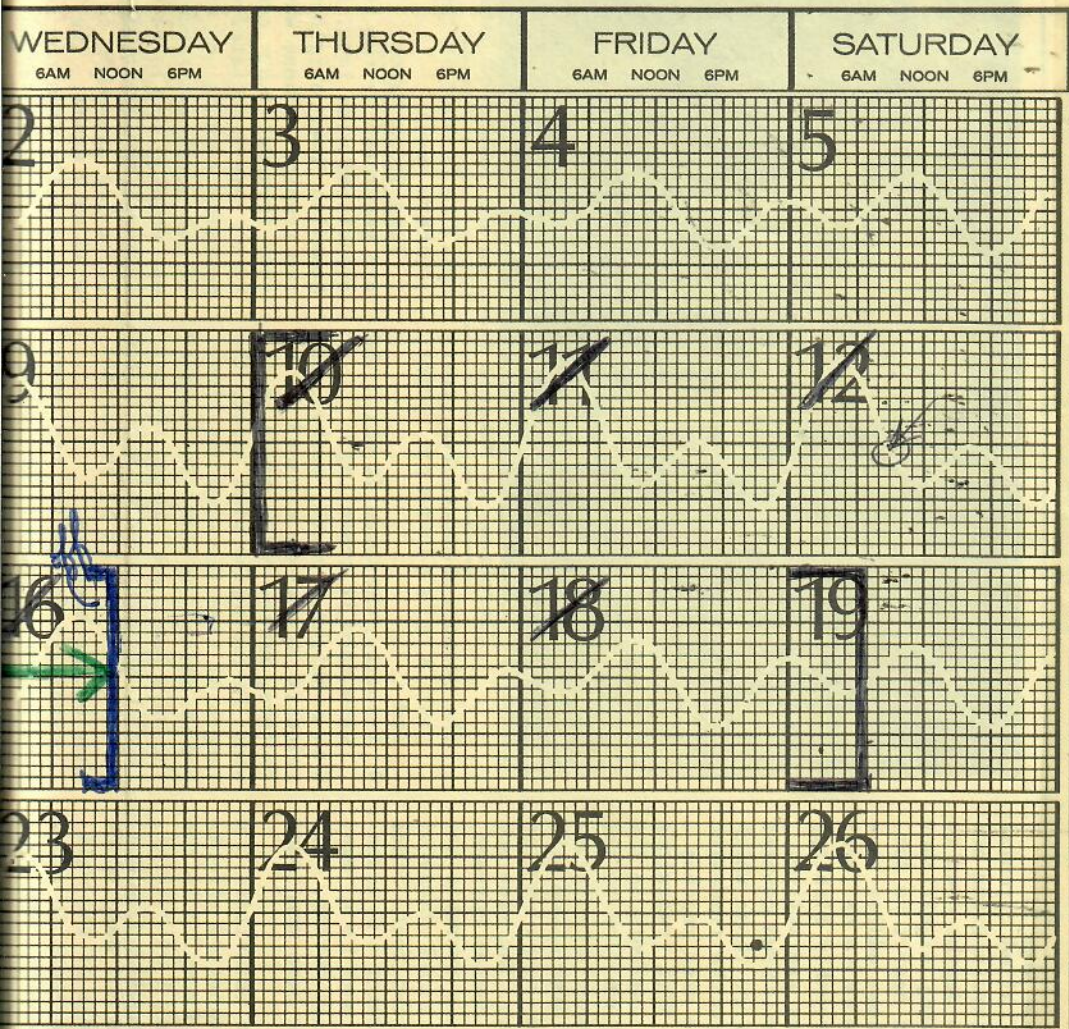
Note one of three females had "notch" areas on right side between marginals - probably same turtle referred to at beginning of previous visit.

NOVEMBER 1977 TIDE



POR
 HAN
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 HAL
 HAN
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 LAI
 WAH
 WAH
 (E

1977 TIDE CHART



For tide time at following places, add or subtract from Honolulu time.

PORTS	Hrs.	Mins.	PORTS	Hrs.	Mins.
HANAIEI BAY, KAUAI	-1	40	KAUNAKAKAI, MOLOKAI	-0	09
NAWILIWILI BAY, KAUAI	-0	32	KAHULUI, MAUI	-1	48
PORT ALLEN, KAUAI	-0	32	KIHEI, MAALAEA BAY, MAUI	-0	14
HALEIWA, OAHU	-1	36	HILO, HAWAII	-0	59
HANAUMA BAY, OAHU	-0	55	HONUAPO, HAWAII	-0	24
KANEOHE BAY, OAHU	-1	35	MAHUKONA, HAWAII	-0	24
LAIIE, OAHU	-1	48	KEALAKEKUA BAY, HAWAII	-0	16
WAIANAIE, OAHU	+0	16			
WAIMANALO, OAHU	-1	15			



Dillingham

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DATE/TIME	NO. TURTLES	SIZE	SITE	REMARKS
FRIDAY			CENT	~1100-0100
8/19	2-3	~17", 21" 26"	INSIDE ROCK REEF	
8/20 START 0815	2		"	
8/20 SAT 1029	1	~21"	"	START OF BREATHING OBS.
1040	6x "			
1054	"			
1109	" 6x			
1123	" 8x			IN ALL OF THESE, FISH FOLLOW Turtle to surface to FEED ON ALGAE
1134	" 5x			
1148	" 8x			
1214	" 7x			90 seconds surface time
8/20 10 ⁰⁰ -11 ³⁰	1	~33" MALE		SWIMMING IN DEEP POOL; FISH FEEDING ON ALGAE
8/20 1430	2	1-ADULT 1-JUV-SUB	END OF WEST CAPE DETACHED ROCK-WCAPE	
8/20 SAT 1700-1800	1	~17"	INSIDE AND OUTSIDE OF ROCK REEF	
8/21 SUN SUNRISE 0625	3	1 BIG (MATURING MALE?) 1-17" 1-21"	INSIDE REEF	caught 17" w/SCOOP NET
8/21 1500	1	1316 seen feeding	through bottom Flagpole hill (South)	
1600	1	Adult (?)	feeding Shank Bay, base, Hill	
1700	1	Adult (?)	feeding at base Sievers - (South)	
2000	1	Adult	Inside Rock Reef	
8/22 MON 0700	1	JUV	Inside Rock Reef	
0945	1	Adult	" " "	
1500	1	JUV	seen from bench of Annex - Base of Flagpole Hill	
1900	-3	Big and small	inside rock reef	
8/23 TUES 0600-0800	3-4	2 small 1 big 1 med	" " "	
1330	1	Adult	at base of Summit Hill - Shank Bay	
1615-1650	5	2A 35A	in Bay between Summit and Annexation Hills - white Ho, wave poor surface conditions responsible for each turtle taking only 1 (sometimes 2) breaths?	

DATE/TIME

8/23 (cont.)

1900-20

8/24 wed

190

13

14

15

15

19

8/250

TUES

19

11

~22

8/26

Wed 0600

07A

090

8/13/77

930

11 A

2 P

630A

~53

8/14 71

MONDAY

DATE/TIME	NO. TURTLES	SIZE	SITE	REMARKS
8/23 (cont.) 1900-2000	2-3	1-JUV (new) 1-SA	inside Rock Reef	caught SA ~ 100 lbs or more
8/24 wed 0700	4	2 SA 2 JUV	" "	
1900	4+1	2 SA 2 JUV 1A	" "	caught 1 JUV
1330	1	A	Annex-Flag BAY	
1400	1	A	Base of Summit- Shoek Bay side	
1525	1	A	Base of Slaves Shoek Bay	
1540	1	JUV	EAST END ISLAND - by rock	
1930	2-3	2 JUV 1 SA	Rock Reef	caught 1 JUV
8/25 0700 Thurs	3	2 JUV 1 SA		
0800	0			all seem to be gone
1915	4	2 A 1 SA 1 JUV		very rough and foamy- fast breathers-
1145	1	JUV		near landing site NW Cape
~ 2200	2 or more	1 JUV 1 A		seen with spot light - MOON out - inside Rock Reef
8/26 Friday 0600	4-5	1A 2-3 JUV 1 SA		inside RR floating on surface, NW Cape
0745	2	A		near landing site
0900	1	JUV		floating on surface in Easy Rider at anchor - ship Touched it with a small scoop and got little response - flippers folded over shell.
NECKER II				
11/13/77 Sunday M ⁵ ashore 930 AM	1	JUV small		
11 AM	2	A		in pool
2 PM	2	JUV		new tagging 2412 2413
630 AM	3	A		by ledge - one w/ TMRS Both shoulders eyes
~ 530 AM	1	A		West Cove
11/14 715 AM MONDAY	1	JUV		pool

OBSERVATIONS OF FEEDING TURTLES
(LAYSAN)

DATE/TIME	NO. TURTLES	SIZE	SITE	REMARKS
8/31	1	~20"	off beach rocky	- post wreck SW side
9/1 2 PM	3	2 small juveniles 1 Adult	NE point	
18/31	1	Juvenile	off stern of ER Reder.	
9/2	1 (sleeping)	Juvenile	in cave in ER anchorage	
9/2	1	Juvenile(?)	as per path - followed for approx 80 yards - NE close to shore.	

TOTAL NO. Turtles observed - 7 (6 JUV 1 A)

NECKER II (CONT)

<u>DATE/TIME</u>	<u>NO. TURTLES</u>	<u>SIZE</u>	<u>SITE</u>	<u>REMARKS</u>
11/14				
Monday 5:45 PM	6	3 JUV 2 SA 1A	Pool	
Afternoon	at least 2	SA-A	Shark Bay	BASE ANNEXATION
"/15 Tues 7 AM	1	JUV		saw head come up once
~ 3 PM	1	SA	Base Annex Hill - Shark Bay	
later in afternoon	1	?		white water of West Cove
"/16 29 AM Wednesday	1	JUV		saw head momentarily in pool - lots of white water -
10 AM	1	?		General ship observed off NE point - something in mouth
10:30 AM	1	Small JUV.		close to departure point at NE point - taking many breaths.

OBSERVATIONS OF MONK SEALS

DATE/TIME	NO. SEALS	STAGE	SITES	COMMENTS
8/20 0645 SUNRISE	10	9A, 1SA	1 West, 6 CENTRAL	All DRY
8/20 1200	5	4A - 1 REG?	3 left	All night? Some in ANNEX COVE
8/20 2100	4	1SA, 3A CENT, 1AW	CENT, CENT (only)	SPOT light
8/20 * 0630				BONES/CARCASS OF SMALL SEAL (new pup) NOTED ON SITE
8/21 1100	12	9A, 1SA Cent, 1AW, 1A left		new green A and small SA
1300	13	10A, 1SA Cent, 1AW, 1A left		most look dry
1415	2	9A, 2SA Cent, 1A West, 1A left		all probably same ones
~1600	3		Adults - hauled out at bottom Flaggale Bay - observed from Bowl Hill - TIDE POOL'S SHARK BAY	
1700	2		In water - Swimming from out of Shark Bay - observed from Bowl Hill	
2300	4	Adult Cent		
8/22 0800	9	6A, 3SA, 10A	Central	
Monday 1115	13	2SA (1 very small)	Cent 1A West	
1500	2		adults Base of Annexation Hill	
			Noted seal w/ glassy left eye - also	
8/23 0800	8	2SA, 6A	Cent. Edge	There seem to be 2-3 "pairs" on ledge - males keep others off
1245	7	A	At base of Bowl Hill in TIDE POOLS	
1800	11	8A, 1SA - Cent, 1A, 1SA - left		(not previously seen)
8/24 0930				Noted adult with "scars (poss. shark) on right side started to haul out - male on shelf "bumped" - new ones retreated.
1900	7	6A, 1SA (small one - showed up ~ 1130)		Consider that this animal may still be with its mother!

Date/Time
 8/20 0730
 0840
 0930
 1900
 1500
 8/26
 0700
 11/13 SUN
 ~ 12 NOON
 "
 "
 8/14
 MONDAY
 6 PM
 8/15
 Tuesday 7:30
 ~ 4 PM

<u>Date/Time</u>	<u>NO. SEALS</u>	<u>STAGE</u>	<u>SITES</u>	<u>COMMENTS</u>
8/25				
0730	11	5A 15A	- left	
0840	2	5A	central	
0930	16	14A	NW Cape	
1900	8	25A	central	
1500	3	7A	central	small fry gone
		15A		
		A	Tide pools at base of bowl hill	

8/26

0700 ~ 8-10 all up quite high - back fish water. small fry back

NECKER II

11/13 SUNDAY

~ 12 noon 19 17A central all closer to cliff face
 " 11 25A central two had tags: one had short straight scar on neck; one had scar on nose, side of head and hind flippers.
 " 1 1A NW Cape
 total 31

11/14

MONDAY
6 PM

17 5 SA (one poss this year pup - from?)
 12 A 1 belly ripped open
 1 adult short scar on neck
 3 under me 2 A - Back scars (Punk)
 5 15A
 all A left boulder beach
 total 25

11/25

Tuesday 7:30 AM

8 central 7A 15A (water on ledge from swell) Belly bite not there!
 7 left
 15

~ 2 PM 2

~ 4 PM ~ 4-5

A up far on ledge base bowl hill
 A3 E one small SA - up high on central ledge and more to Amnesia Hill (south) side - Due to water surging through GAP and washing over ledge
 5-7 Boulder Beach - up dry

<u>DATE / TIME</u>	<u>NO. SEALS</u>	<u>STAGE</u>	<u>SITES</u>	<u>COMMENTS</u>
11/16/77	5-6	mostly A	Central	High out to sight looking out
WEDNESDAY	5-6	" A	Boulder Beach	observed speying of SA that was bright red spiny lobster
9 AM				

Following table from:

Hawaiian Monk Seal Studies
French Frigate Shoals, Leeward Hawaiian
Islands National Wildlife Refuge
15 February to 27 May 1977

Rough Draft by
Mark James Rauzon

Bio-Tech (Research)
Division of Cooperative Research
U.S. Fish and Wildlife Service
4454 Business Park Blvd.
Anchorage, AK 99503

and

Karl W. Kenyon

24 MAY 03

1330-
1415

25 MAY 48

1055-
1115

0/0/1

1135-
1230

2/2/15

1305

0/0/1

1530-1545
[SHARK-0/0/2]

* IS SURVEY FROM BOAT?

TAG RECOVERIES - Recorded as
an * on appropriate sex

107

TR14?

948 ⊗	male	09 March (WS)
*1221 ⊗	Female	28 MARCH (EAST)
*1200 ⊗?	Female?	10 APRIL (EAST)
-74 ⊗	sex?	" " (W-S)
948 ⊗	MALE	" " " "
959	FEMALE?	" " " "
1212	FEMALE	16 APRIL " "
842	FEMALE	11 MAY EAST

notes on Rauzon Report -

1. "non-disturbing studies" page 1
2. Object #4 - "To document basking behavior on a quantitative basis for recognizable individuals"
Objective #9 - To gather data on the relationship of seals to man-made structures and fishing gear in their environment.
3. Page 2 - "Position relative to the sea; facing inland or seaward, belly up or down and behavior was noted. This information will demonstrate thermoregulatory behavior especially for the several recognizable seals that frequented Tern Is. during this study period."
4. "In this same area, the Coast Guard had a shark line set on a permanent basis. Rauzon, in his paper on the earlier part of this study, details seal reactions"
5. See (RUEHLE, 1977)
6. MARKO I.
7. "All these factors contribute to make H.S. crucial to shark seals as well as seal biologists. The only foreseeable problem and one that I experienced was the difficulties in logistics. The USCG, operating a H/C

Loran station here was invaluable in helping this study. Unfortunately the eighty 'red-tape' hours also created by the CG. Launching the boat for surveys was a 3 or 4 man job due to the method of operation. A unique situation exists here for the researcher who spends some time. One must become a functioning member of the crew yet there are distances that cannot be overcome. Since the restriction of the men to term IS, FW has had PR here. This situation is confounded by the term problems. We must rely on their support yet function as a constant reminder of their isolation, a situation that can only be appreciated by one who has spent time here. One can only hope that the U.S. CG follows them with their planned automation on frigate in 1979. Certainly this would benefit the seals as much as the men due to be stationed here." WOULD IT?

8. Predation: "sharks are the primary predators of monk seals. Many individuals carry unique sets of scars from encounters with sharks"

" Perhaps the second factor of seal mortality is fishing gear. Kenyon (1977) has reexamined the data gathered from this study."

9. Summary - (4.) Bi-monthly surveys were taken to determine number of individuals and number of pups at FFS. The maximum number of animals counted was 227. This is the only survey in which all the islands were visited. By 25 May, 48 pups were still alive, 2 were dead and consequently collected. By this date, half web weaned. About 3 pregnant females were seen to remain. Population increased by 25%.

(8) Shark predation appears to be the primary factor in seal mortality follows by disease and contact with fishing gear. Extent is unknown."

mid-113
MAY 1977



LISIANSKI Turtle Information

Credit to Gary ^{lee} (Skip) Mattel
EASY RIDER CORPORATION

WEATHER DATA - NECKER

ashore 10700 ²⁰⁰

SEA WATER GENERAL

Glassy seas, hot, NO WIND

8/19/77

FRIDAY

8/20

SATURDAY

8/21

Sunday

8/22

Monday

8/23

Tuesday

8/24

WEDNESDAY

8/25

Thursday

8/26

FRIDAY

8/28

SUNDAY

8/29

MONDAY

NO RAIN ON ISLAND - EVENING - SOME RAIN OFFSHORE

Sunset 7:26 AM

Light Trades - some wind ripples

on sea - more swell in Shark Bay - NOT AS NOT

1200 Tide Pools - 34°, 35°C

Sunrise - 6:36 Sunset - 7:25

Gentle trades all day - sunny

Moderate trades; Rain shower(s) in morning; partly overcast but some sun

Rain showers - stronger wind from before sunrise to about 9 AM - Shark Bay very rough - remains of day sunny with moderate trades - nice.

27°C

Tide pool at 0800 - 25°C; stronger trades

during day; 1-2 brief showers - mostly sunny - gale wind - major 5 ft

Strong trades all day - very rough in Shark Bay

Sunny - no rain

Strong island - Shark Bay rough -

Made easy departure from protected landing site

MARO Reef - Fairly calm seas -

partly cloudy

Some rain showers, wind up, partly

cloudy

NECKER II

11/12/77

SAT

Necker Bank - Moderate - strong trade; Rain

Some NW Swell

11/13

SUN

ashore Necker NO TC - SUN ANNEALATION sets behind SHADES LEDGE Hill ~ 3 PM 3:30 PM

NECKER ISLAND Bristle trades, but sunshine warm air - few passing

Small sliver of Moon going down after sunset

11/14

MONDAY

First light ~ 6:45 AM - SUNRISE ~ 7:20

Trades decreasing - some high clouds in morning NO rain

11/15

Tuesday

NW Swell starting to come up at sunrise -

increased throughout the day - (10-15' ocean swell)

Hot - Little wind - calm seas

11/16/77
WEDNESDAY

Very calm seas but NW swell still up -
Some S-SE wind during afternoon noted
offshore while aboard ER.

11/17/77
Thursday

calm seas - slight south wind at
Necker -
Depart Bay \sim 10 AM

11/18/77
FRIDAY

Very calm all day - Glossy near
Lehua - Kaula

11/19/77
SATURDAY

Kawai channel very calm - no wind -
arrive Honolulu - Kewalo Basin \sim 6 AM

Necker Outcrop

First Person - like Emory

Back ground - ① my Necker report ② other references to Necker trip - growth
② Syn ③ B.P. Museum lecture
Visit by Apple - ? was report? did not report bombing?

Took Emory ¹⁹²⁸ ashore - tried locating -
give results - slides taken - use lots of photos;

Newspaper photo ^{COPIES} article; State reports sent to me by Dodd;

REVISED DRAFT TABLES
12-10-82

Number of dives by ⁸adult green turtles telemetered
during three 24-h periods

Diel components	Monitoring period (24-h)			Total
	June 10-11, 1980 (new moon)	June 21-22, 1980 (first quarter)	June 29-30, 1980 (full moon)	
Daylight	474	260	277	1,011
Evening twilight	15	24	23	62
Dark, before moonrise	168	14	9	191
Dark, after moonset	0	49	0	49
Morning twilight	39	31	19	89
Total	697	466	490	1,653

(2)

Number of dives by ⁴adult male and ⁴female green turtles
telemetered during the diel components of three 24-h periods

Diel component	Males	Females	Total
Daylight	466	545	1,011
Evening twilight	19	43	62
Dark, before moonrise	89	102	191
Moonlight	64	187	251
Dark, after moonset	17	32	49
Morning twilight	39	50	89
Total	694	959	1,653

3

Diving durations of eight adult green turtles telemetered
during three 24-h periods

Turtle ID No.	Carapace length (cm)	Sex	Mean dive times in minutes*	Standard deviation	Range	N
490	91.4	F	26.8 ^a	19.9	1-112	134
360	94.0	M	24.4 ^b	24.3	1-121	102
530	83.8	F	20.4 ^b	13.4	1-96	210
450	85.3	F	20.2 ^b	17.6	1-148	219
350	81.3	M	19.6 ^b	17.6	1-115	205
540	82.5	M	14.5 ^c	14.5	1-94	268
510	88.9	M	13.1 ^c	15.0	1-75	119
200	89.4	F	8.9 ^d	8.0	1-42	396

*Mean dive times bearing the same superscript are not significantly different ($P > 0.05$) (Duncan 1955).

~~R. Duncan's Multiple Range Test~~
(Duncan's Multiple Range Test, Doncrass)

Diving durations of male and female green turtles telemetered during the diel components of three 24-h periods

Sex	Diel components (mean dive times in minutes*)						
	Daylight	Evening twilight	Dark before moonrise	Moonlight	Dark after moonset	Morning twilight	Mean
Male	13.5	23.3	25.6	30.2	33.9	10.8	17.2 ^a
Female	15.8	11.2	22.3	16.7	22.6	12.3	16.5 ^a
Mean	14.7 ^{c,d}	14.9 ^b	23.8 ^b	20.2 ^c	26.5 ^a	11.7 ^d	--

*Mean dive times bearing the same superscript are not significantly different (P > 0.05) (Duncan 1955).

D M R T

Diving durations of eight adult green turtles
telemetered during three 24-h periods

Monitoring period 24-h	Mean dive times in minutes*	Standard deviation	Range	n
10-11 June 1980 (new moon)	16.0 ^a	16.6	1-112	697
21-22 June 1980 (first quarter)	19.0 ^b	17.3	1-121	466
29-30 June 1980 (full moon)	15.8 ^a	14.8	1-148	490

*Mean dive times bearing the same superscript are not significantly different ($P > 0.05$) (Duncan 1955).

D.M.R.T

Diving durations of eight adult green turtles telemetered during the diel components of three 24-h periods

Diel components	Mean dive times in minutes*	Standard deviation	Range	N
Daylight	14.7 ^{c,d}	13.4	1-115	1,011
Evening twilight	14.9 ^c	16.3	1-59	62
Dark, before moonrise	23.8 ^b	23.3	1-112	191
Moonlight	20.1 ^b	19.3	1-148	251
Dark, after moonset	26.5 ^a	17.1	4-71	49
Morning twilight	11.7 ^d	11.2	1-50	69

*Mean dive times bearing the same superscript are not significantly different (P > 0.05) (Duncan 1955).

DMAT

Three-way analysis of variance of diving durations

Source of variation	df	F-value	(P < 0.05)
Individual turtle	7	42.51	0.0001**
24-h monitoring period	2	3.85	0.0214*
Diel component	5	27.39	0.0001**
Individual x 24-h period	11	3.05	0.005**
Individual x diel component	34	6.17	0.0001**
24-h period x diel component	7	1.61	0.1260

Differences in diving durations due to sex were not significant (P=0.967)

Differences in diving durations due to size (carapace length) were not significant (P=0.591)

Diving durations of eight adult green turtles telemetered during the diel components of three 24-h periods.

Diel components
(mean dive times in minutes*)

Monitoring period 24-h	Daylight	Evening twilight	Dark, before moonrise	Moonlight	Dark, after moonset	Morning twilight	Mean
June 10-11, 1980 (new moon)	14.0	21.3	22.7	4.0	--	10.7	16.0 ^a
June 21-22, 1980 (first quarter)	15.9	14.0	40.9	24.3	26.5	12.5	19.0 ^b
June 29-30, 1980 (full moon)	14.9	11.6	18.9	18.0	--	12.3	15.8 ^a
Mean	14.7 ^a	14.9 ^c	23.8 ^b	20.2 ^b	26.5 ^a	11.7 ^d	--

*Mean dive times bearing the same superscript are not significantly different ($P > 0.05$) (Duncan 1955).

DMT

