

## 2015 NWHI Hawaiian Green Turtle Nesting Activity Survey

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### **INTRODUCTION**

The Northwestern Hawaiian Islands, found in the Papahānaumokuākea Marine National Monument are the breeding ground for nearly 90% of all green sea turtles (*Chelonia mydas*) with the majority of the nesting at French Frigate Shoals. While French Frigate Shoals experiences the bulk of the nesting activity, the other islands in the chain do contain nesting turtles, in much lesser number. Through the joint efforts of the US Fish and Wildlife and NOAA Pacific Islands Fisheries Science Center, nighttime monitoring of nesting green turtles on French Frigate Shoals has been possible for over 40 years, collecting valuable data on nesting and population trends for the species. Because most of the nesting research is focused at French Frigate Shoals, much less data has been collected on the other islands. This report offers a snapshot of daytime turtle activity late in the nesting season in the Northwestern Hawaiian Island Chain.

Modelled after Joe Spring's 2013 *NWHI Hawaiian Green Turtle Nesting Activity Survey* in which brief daytime surveys were conducted at every island in the Northwestern Hawaiian Island Chain, it was possible to conduct a similar survey in 2015. The NOAA research vessel the Hi'ialakai left Pearl Harbor on July 27, 2015 as part of a Reef Assessment and Monitoring Program (RAMP) diving cruise that picked me up from Tern Island, French Frigate Shoals on July 31, 2015. I was able to completely survey Southeast Island at Pearl and Hermes Atoll, Green Island at Kure Atoll, Sand and Eastern Islands at Midway Atoll, Lisianski Island and Laysan Island. Hawaiian Monk Seal Research Program (HMSRP) researchers were able to survey North Island at Pearl and Hermes Atoll and reported the number and locations of all current dig sites.

This report encompasses daytime turtle surveys done late in the nesting season at seven survey sites, conducted at five locations and seven islands over a period of 14 days. Nihoa, Mokumanamana, and French Frigate Shoals are not included in this report; however, a more in depth summary on green turtle nesting activity on East Island at French Frigate Shoals is available (Gosliner 2015).

### **METHODS**

The methods used for surveying the islands are based off of Joe Spring's 2013 report. Teaming up with the RAMP cruise's benthic coral and maritime heritage teams, I was dropped off by one

of the Hi‘ialakai’s small boats either swimming in or landing on the island. It was possible to completely survey all islands, walking around the shoreline and up into the vegetation line looking for nesting and basking activity. Additionally, turtles seen in the water were recorded, as well as any pits and tracks.

Before conducting each survey I conferred with the monk seal field campers and Fish and Wildlife biologists currently stationed at the islands about any trends or turtle nesting activity observed throughout the season.

The same field notebook activity codes were used from the 2013 report. These codes are also used herein showing the total number of nesting turtles, sets of nesting and basking tracks, nests, swimming, and basking turtles observed at each island.

Signs of nesting activity were classified as Nesting Tracks (NT), or Nests (N). Nesting tracks were counted as tracks that continued above the beach’s berm. The number of pits were recorded and classified by approximate age of the dig: new (less than or equal to one day), intermediate (1-3 days), or old (more than three days).

Signs of basking activity were classified as Basking Tracks (BT). These were counted as tracks that did not go beyond the beach berm, and showed no evidence of digging. Turtles hauled out of the water at the edge of the beach were recorded as Basking Turtles (B), and turtles seen in the water swimming were marked as (H<sub>2</sub>O). Each basking and swimming turtle was classified by size: juvenile, subadult, or adult, as well as by gender: male, female, or unidentified.

The abbreviations used based on Joe Spring’s methods are the following:

#### ACTIVITY

E=Nesting turtle laying eggs

X=Nesting turtle digging

C=Nesting turtle crawling

BT=Basking tracks

NT=Nesting tracks

#### AGE OF DIG

New= nesting tracks, basking tracks, nest, or dig is less than or equal to 1 day old

Int (intermediate) = nesting tracks, basking tracks, nest, or dig is between 1-3 days old

Old= nesting tracks, basking tracks, nest, or dig is more than 3 days old

M=Male

F=Female

U=Unidentified

## SIZE

Juv=Juvenile

Sub=Subadult

Adult=Adult

## RESULTS

### NESTING ACTIVITY

There were 12 potential nests identified during the 14-day survey. Of the potential nests observed, one was considered new, three were intermediate, and eight were classified as old (but made during the 2015 nesting season). Six of the potential nests were found at Laysan Island, three were found at Pearl and Hermes Atoll, two were found at Lisianski, and one was found at Kure Atoll.

Laysan had the highest number of potential nests, perhaps due to its larger size in comparison to the other surveyed islands.

There were 191 pits identified on six different islands. Nine were classified as new, 23 were intermediate, and 157 were old. Thirty-two additional pits were counted by HMSRP's Megan Roberts on North Island, Pearl and Hermes Atoll, but not categorized by age.

There were 15 sets of nesting tracks. Twelve were found on Southeast Island at Pearl and Hermes Atoll, and three were observed at Laysan Island. Of the 15 sets, two were classified as new, eight were intermediate, and five were old.

### NESTING TURTLES

No nesting turtles were observed during any of the daytime surveys conducted. Nesting turtles were not expected to be recorded due to the lateness in the nesting season, as well as wrong time of day for typical nesting to occur.

### BASKING TURTLES

There were a total of seven basking turtles observed over six surveys. Four were categorized as subadult, and three were classified as adult. There were two males, four females, and one unidentified gender. Sand Island on Midway Atoll had three baskers, Southeast Island at Pearl and Hermes Atoll had two baskers, and Lisianski and Eastern Island at Midway each had one basker observed while surveyed. Kure and Laysan did not have any observed basking turtles while the surveys were conducted. None of the turtles were scanned for PIT tags due to limited space on the small boats to bring a PIT tag reader, especially when swimming onto the island was the only means of surveying.

In total, 20 sets of basking tracks were observed throughout the six surveys. Six sets of tracks were new, nine were intermediate, and five were old. The majority of the basking tracks were recorded at Pearl and Hermes Atoll with 15 sets, four sets of tracks were observed at Sand Island at Midway Atoll, and one set on Eastern Island at Midway Atoll.

## SWIMMING TURTLES

There were a total of seven swimming turtles, all of unidentified gender documented during the six surveys. Of the seven turtles, two were juvenile, three were subadult, and two were adult. Three of the turtles were observed on Sand Island at Midway Atoll, two at Lisianski, one on Eastern Island at Midway Atoll, and one on Southeast Island at Pearl and Hermes Atoll.

## ISLAND RESULTS

### PEARL AND HERMES ATOLL

*Southeast Island*-August 7, 2015

#### *Field Report*

I surveyed Southeast Island beginning at 09:44 and ending at 10:58. Before beginning, HMSRP field campers Darren Roberts, Megan Roberts, and Jacob Harris pointed out areas with the most digging and pit activity throughout the season. They kindly offered to bring me to North Island where most of the turtle activity in the atoll occurs, but I was not able to due to time restraints. However, Megan was able to collect pit data on the same day.

The survey began at the monk seal field camp, heading north in a clockwise direction around the island. Immediately outside of camp there were basking tracks that led from the water line and into the lagoon. There were two main crescent stretches of beach where turtle activity was prominent directly north of camp. These stretches of beach contained all three of the potential nests, as well as both basking turtles. There was a new potential nest due to the freshness of the dirt and sand, that none of the HMSRP field campers remembered from the previous day. The first of the basking turtles was a subadult female that had minor scratches on the right side of her carapace. The second was an adult male basker that had no markings or injuries on its carapace or flippers, basking next to a monk seal.

Most of the nesting tracks led up the berm and into the vegetation, past the high tide line. There was little turtle activity on the eastern side of the island near the lagoon due to the rocky substrate. I was told that turtles are seen swimming in the little bays on the southwestern point of the island, but only saw one adult swimming turtle of unidentified gender observed on the first stretch of beach directly east from the field camp.

There were a total of 20 pits, many found in sets of three and four appearing to be from the same turtle. Of the 20 pits, five were new, ten were intermediate, and five were classified as old. There were 12 sets of nesting tracks, two new, five intermediate, and five old, all leading into the vegetation. At times it was difficult to follow the tracks in the coral substrate. There were 15 sets

of basking tracks that I was able to track both the arrival and departures with four new, eight intermediate, and three old sets of tracks. Only one nesting track was observed on the southwestern part of the island, approximately 50 meters in length, with two old pits, that did not appear to be potential nests.

### *Key Findings*

Most of the nesting activity took place closer to the vegetation, farther up from the high tide line. Most of the turtle activity took place on the sandy stretch east of camp where both monk seal and turtle basking appeared to be popular. My findings from this survey were consistent with Joe Spring's 2013 observations.

### *Summary Counts*

Potential Nests: 3

Pits: 20

Nesting Tracks: 12

Nesting Turtles: 0

Basking Turtles: 2

Basking Tracks: 15

Swimming Turtles: 1

### *North Island*-August 7, 2014

#### *Field Report*

HMSRP Megan Roberts was able to count the number of pits observed on August 7 at the same time Southeast Island was being surveyed. There were a total of 32 pits counted on North Island, with 18 concentrated on the northwest corner of the island. A hand drawn map of the number and locations of pits is included at the end of the report.

Pits: 32

### KURE ATOLL

### *Green Island*-August 10, 2015

#### *Field Report*

I conducted a full island survey in two parts, starting with the southern half of the island with HMSRP volunteer Lauri Leach beginning at 09:19 and ending at 11:58. Then I began the north section with HMSRP researcher Ilana Nimz at 12:20 and finished by 13:20.

There was one old pit, found on June 20, 2015 and pointed out to me by HMSRP's Lauri Leach. George Balazs had already been contacted by Cynthia Vanderlip before the August 10 survey. We put pink flagging tape near it, located on the southwestern part of the island, southwest of the pier. This pit, marked as a potential nest, was hard to distinguish as a turtle pit as opposed to one of the monk seal pits that were prevalent around the island. GPS coordinates were taken for the pit, located at: N 28° 23' 25.9" W 178°17.38.1. One other pit was observed on the northwestern side of the island.

### *Key Findings*

In the 2013 report Joe Spring mentioned an increase in algae within the lagoon. The same was true this summer, where the water close to the pier was tinted a green color. However, the HMSRP field crew did not notice any increase in feeding turtles due to the algae bloom.

I was not able to conduct a survey on Sand Island, although I could see from a distance that there were a few monk seals hauled out, but no turtles. Both Ilana and Lauri say they occasionally see swimming turtles, and basking turtles every once in a while, but that nesting activity is rare.

### *Summary Counts*

Potential Nests: 1

Pits: 1

Nesting Tracks: 0

Nesting Turtles: 0

Basking Turtles: 0

Basking Tracks:

Swimming Turtles: 0

## MIDWAY ATOLL

*Sand Island*-August 13, 2015

### *Field Report*

I was able to devote two days surveying Midway Atoll, spending August 13 surveying Sand Island and the next morning at Eastern Island thanks to coordination with Deputy Refuge Manager Bret Wolfe and Biologist Meg Dur-Schultz. The Sand Island survey was broken up into two shorter surveys due to time restraints.

I began the first section of the Sand Island survey at Turtle Beach at 13:21 and ended at Rusty Bucket at 14:28. There was an adult female basking turtle with no markings east of Cargo Pier next to two monk seals. There were also two sets of basking tracks under the Fuel Pier next to the Cargo Pier. There were three swimming turtles, one juvenile, and two subadults, all of

unidentified gender, and were all seen surfacing to breathe. Once I reached Rusty Bucket I turned around and walked back to Turtle Beach arriving at 15:20 where there were two new basking turtles, one was an adult male with no injuries, and the second turtle was of unidentifiable gender due to its missing (amputated) tail.

USFWS Biologist Meg Duhr-Schultz suggested I finish surveying the rest of the island on the south and west sides. She dropped me off with a golf cart at Bulky Dump on South Beach starting my survey at 15:40 and ending again at Rusty Bucket at 17:05. From Bulky Dump I walked west towards the southern peninsula of the island around South Beach and Frigate Point to Rusty Bucket again. During this survey I saw two old pits and four sets of basking turtle tracks and pits.

### *Key Findings*

I was surprised that there were not as many basking turtles out on Turtle Beach and near Cargo Pier. Bret Wolfe mentioned the highest number of baskers he has seen on Turtle Beach was about 50 turtles. I was also expecting more nesting activity especially since the time of the survey was nearing the end of the nesting season. It is possible due to the long stretches of beach at Frigate Point as well as throughout West Beach that older pits were up high in the vegetation approximately 35 meters from the waterline, and were not encountered.

### *Summary Counts*

Nests: 0

Pits: 2

Nesting Tracks: 0

Nesting Turtles: 0

Basking Turtles: 3

Basking Tracks: 4

Swimming Turtles: 3

### *Eastern Island*-August 14, 2015

#### *Field Report*

The second day at Midway Atoll I was able to survey Eastern Island early in the morning, making it all the way around, but observing little turtle nesting activity. Meg was already headed over to Eastern for a Laysan duck survey that began at sunrise so I was able to begin at 06:40, and finish by 09:00.

I started the survey at the pier walking east, and away from Sand Island. There was a set of long, intermediate basking tracks that were above the high tide line, almost into the vegetation. This was the only set of nesting activity observed on Eastern Island. A lot of the north and eastern

portions of the island are made up of rocky, rubble and coral substrate that did not appear to be suitable for turtle nesting habitat, containing little sandy areas. One adult swimming turtle of unidentified gender was observed when it surfaced to breathe. Next to the pier on the western side was a subadult female basking turtle first observed upon docking at Eastern, and was still present when we left around 09:30. Spit Island was not surveyed, but it is possible that nesting and basking evidence may have been present.

### *Key Findings*

After speaking with Meg and Bret, it sounded like minimal turtle activity has been observed on Eastern Island. Along the northern and eastern parts of the island was a hard coral substrate that would make it difficult for the turtles to swim in and nest, however the southern and western sides of the island have flat sandy surfaces ideal for turtle nesting and basking. This survey was done early in the morning and late in the nesting season, which could contribute to the low number of basking turtles sighted.

### *Summary Counts*

Nests: 0

Pits: 0

Nesting Tracks: 0

Nesting Turtles: 0

Basking Turtles: 1

Basking Tracks: 1

Swimming Turtles: 1

LISIANSKI ISLAND-August 17, 2015

### *Field Report*

I began my patrol of Lisianski at 09:40 and ended at 12:45 accompanying HMSRP biologists Hope Ronco and Jen Cate on their daily monk seal survey around the island. We started the survey from camp walking south and counterclockwise around the island. Starting at camp there was a set of 12 pits and a set of 16 pits (all old). Many of the digs outside of the monk seal field camp came from one juvenile turtle that attempted to nest on August 10, 2015 and eventually laid eggs but did not cover them. Hope covered the eggs and took photos of the turtle digging its nest, as well as the pits surrounding camp.

There was a lot of digging activity observed along “Turtle Bay”, south of camp along the west side of the island before reaching South Point. Nearly all of the pits in this stretch of beach were old and found above the vegetation line, often in densely covered areas behind *Tournefortia* shrubs. There were two swimming turtles of unknown gender on this stretch of beach, one



juvenile and one subadult. One old potential nest was found in this area high on the berm within the *Tournefortia* shrubs.

Along the southwestern part of the island there was a basking subadult female turtle. She had deep grooves and scratches down the right and left sides of her carapace along the lateral scutes suggestive of a shark attack. There was a cluster of four digs behind this turtle up the berm and into the vegetation line. No basking or nesting tracks were found due to the high tide that probably washed away any remaining tracks.

There was a potential nest found on the northeastern part of the island past “The Cove” where most of the monk seal mom and pups nurse. Throughout the island there was a lot of turtle activity with 128 recorded pits, three new, six intermediate and 117 old but from the 2015 season.

### *Key Findings*

The turtle activity was scattered throughout the island, with no one concentrated area with the exception of the activity outside of the field camp. Most of the pits observed and recorded were found farther up the berm in hard to get to spots due to dense vegetation. Lisianski had the highest number of recorded pits out of the islands surveyed on the RAMP cruise. This survey counted nearly 80 more pits than was previously recorded in 2013. This could be due to surveying later in the nesting season. The HMSRP field campers mentioned that there were a lot of smaller turtles observations this summer.

### *Summary Counts:*

Potential Nests: 2

Pits: 128

Nesting Tracks: 0

Nesting Turtles: 0

Basking Turtles: 1

Basking Tracks: 0

Swimming Turtles: 2

LAYSAN ISLAND-August 20, 2015

### *Field Report*

I began a patrol on Laysan Island after swimming in from one of the Hi‘ialakai’s small boats with the RAMP cruises’ maritime heritage team. The survey began at 09:30 and finished at 12:50. There was no turtle activity near the monk seal field camp, but all nesting activity was scattered throughout the island on both the north and south sides. I walked towards the south end of the island, counterclockwise, where there were clusters of pits together in groups of two,

three, and four all next to each other. Two of the six potential nests were found in these clusters of digs before the bend that leads to “The Ledge” on the southwestern tip of the island. There was little viable nesting habit on the south end of the island due to rough currents and an exposed rocky shelf making it unfavorable for nesting.

On the eastern side of the island there were several sets of pits. The most counted together was a set of seven pits all up at the vegetation line. There was one set of nesting tracks that came very high up the beach, past the tide line and through the field of marine debris in “The Desert” or “The Dead Zone”. There were two potential nests found in “The Desert” very far up from the water and past most of the marine debris with little vegetation surrounding the area. A photo is included at the end of this report.

On the northern side of the island there were three potential nests, along with what appeared to be fresh nesting tracks. These nests were surrounded by several sets of pits right at the edge of the vegetation line that is on a crescent of the northeastern part of the island. There has been previous basking turtle activity in this stretch of beach just north of the monk seal field camp and Landing Cove as reported in the 2013 report. While no baskers were sighted during the survey, there was a lot of nesting activity not previously recorded in the 2013 in this area of the island.

There were no turtles seen swimming, perhaps due to the rough surf, especially on the southeast and northeast sides where RAMP dives had to be abandoned due to rough conditions.

#### *Key Findings*

Overall, there were six potential nests, two were intermediate and four were classified as old. These numbers do not come as a surprise because the survey was conducted towards the end of the nesting season. The turtle activity also matches with previous years’ data, as well as observations from monk seal field campers.

While most of the 40 pits were made within the vegetation high up on the beach berms above the high tide line, there were exceptions for the pits dug in “The Desert” followed by long nesting tracks.

#### *Summary Counts*

Potential Nests: 6

Pits: 40

Nesting Tracks: 3

Nesting Turtles: 0

Basking Turtles: 0

Basking Tracks: 0

Swimming Turtles: 0

## **CONCLUSION**

While the 2013 report focuses on French Frigate Shoals, this report shows an overview of daytime turtle nesting activity at the end of the season. It is possible that not all nests on the islands were accounted for, but were surveyed to the best of my ability due to time restraints. This is why all nests are recorded as potential nests rather than probable nests. Nihoa and Mokumanamana were not included as dive sites in the RAMP cruise so it was not possible to visit these islands.

Lisianski contained the highest number of digs with 128, with just over two thirds (67%) of all observed pits. Of the 191 digs, Laysan contained 21% of all surveyed pits with 40, and Southeast Island contained 10.5% of all pits surveyed with 20.

Pearl and Hermes Atoll had the highest number of nesting tracks recorded with 12/15 (80%) and the remaining were recorded at Laysan (3/15, or 20%). This comes as a surprise to me because the entire atoll of Pearl and Hermes is about 88 acres, while Laysan's size is much larger at 1,016 acres. The other islands surveyed had long stretches of beach that would have ensured that nesting tracks not get washed away, except for Lisianski where the high tide line comes almost all the way up to the vegetation line.

If the cruise schedule would have allowed it, nighttime surveys at each island would have given a better idea of the nesting activity happening throughout the island chain.

## **ACKNOWLEDGMENTS**

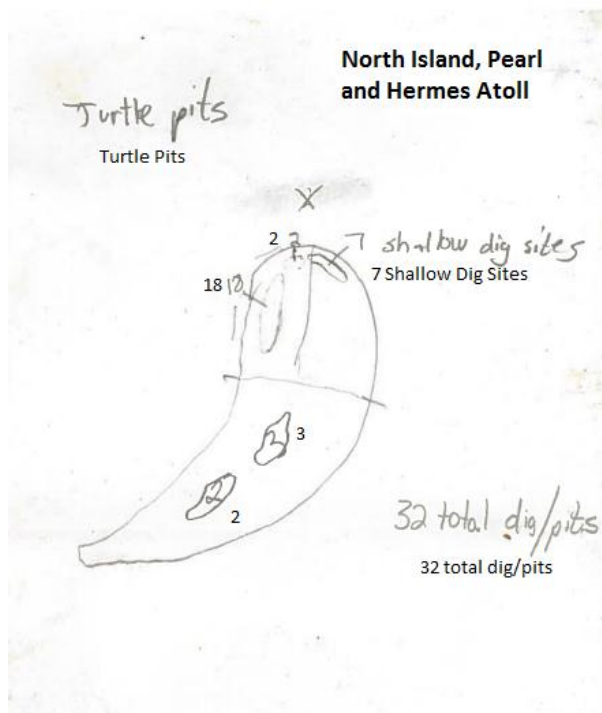
Thank you to everyone aboard the RAMP Cruise especially to Chief Scientist Scott Godwin for helping to arrange transportation with the small boats to access the islands. Additionally, I would like to thank all crew members of the Hi'ialakai for safely transporting the cruise up and down the island chain, and for coxswaining the small boats, along with the Benthic Coral, and Maritime Heritage teams for their support in drop-offs.

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Additional thanks to Joe Spring, for his excellent 2013 report, which I referred to constantly throughout the surveys, as well as the entire Hawaiian Monk Seal Research Program. Finally, thanks to Megan Roberts for collecting data of North Island at Pearl and Hermes Atoll to include in the report and Hope Ronco for her photographs.



Plate 1. Popular basking and nesting stretch of beach reported by monk seal researchers just north of camp on Southeast Island, Pearl and Hermes Atoll



Hand drawn map of North Island, Pearl and Hermes Atoll by Megan Roberts.



Plate 2. Fresh dig and likely successful egg deposition at Southeast Island, Pearl and Hermes Atoll.



Plate 3. Potential nest at Kure Atoll, first observed by Lauri Leach on July 20, 2015.



Plate 4. Potential nest found past the vegetation line near “The Desert” on Laysan.



Plate 5. Small green turtle nesting outside of Lisianski Camp after digging multiple pits. Photo credit Hope Ronco



Plate 6. Turtle Beach on Sand Island, Midway Atoll a popular basking spot for turtles and monk seals.

## 2015 NWHI Hawaiian Green Turtle Survey Nesting Activity

Location	Island	Aug-15	Nesting Turtles			Sets of Nesting Tracks				
		Date	E	X	C	Total	New	Int	Old	Total
<b>Pearl and Hermes Atoll</b>		8/7/2015								
	Southeast Island		0	0	0	0	2	5	5	12
	North Island									
<b>Kure Atoll</b>										
	Green Island	8/10/2015	0	0	0	0	0	0	0	0
<b>Midway Atoll</b>										
	Sand Island	8/13/2015	0	0	0	0	0	0	0	0
	Eastern Island	8/14/2015	0	0	0	0	0	0	0	0
<b>Lisianski Island</b>										
		8/17/2015	0	0	0	0	0	0	0	0
<b>Laysan Island</b>										
		8/20/2015	0	0	0	0	0	3	0	3
<b>Totals:</b>			0	0	0	0	2	8	5	15



Potential Nests				Pits				Basking Turtles		
New	Int	Old	Total	New	Int	Old	Total	Juv	Sub	Adult
1	1	1	3	5	10	5	20	0	1	1
0	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	2	2	0	1	2
0	0	0	0	0	0	0	0	0	1	0
0	0	2	2	3	6	117	128	0	1	0
0	2	4	6	0	7	33	40	0	0	0
1	3	8	12	9	23	157	190	0	4	3

Sex	Total	Sets of Basking Tracks				Swimming Turtles				
		New	Int	Old	Total	Juv	Sub	Adult	Sex	Total
1M, 1F	2	4	8	3	15			1	U	1
	0	0	0	0	0	0	0	0		0
1M, 1F, 1U	3	2	0	2	4	1	2	0	U	3
1F	1	0	1	0	1	0	0	1	U	1
1F	1	0	0	0	0	1	1	0	2U	2
0	0	0	0	0	0	0	0	0	0	0
2M, 4F, 1U	7	6	9	5	20	2	3	2		7