

# CARETTA RESEARCH PROJECT

## ANNUAL REPORT – 2016 SEASON

### WASSAW NATIONAL WILDLIFE REFUGE, GA



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## 1. ABSTRACT

In 2016, the Caretta Research Project (CRP) recorded 333 nests and 353 false crawls from at least 155 individual loggerhead turtles. The average clutch size was 109.5 eggs and the average incubation period was 52.0 days. Egg predation increased over last year, with 14 nests affected by foxes, 13 nests affected by raccoons and 4 by ghost crabs. Eighty-one hatchlings were predated by raccoons, ghost crabs and ants. The overall hatching success was 72.2% and 23,818 hatchlings emerged. Six assistants and 86 volunteers participated in data collection and fieldwork.

## 2. INTRODUCTION

The Caretta Research Project (CRP) is a non-profit environmental organization created for the conservation of loggerhead sea turtles in the Wassaw National Wildlife Refuge (WNWR). Founded in 1972 by the Savannah Science Museum, CRP is now in its 44th consecutive year of operation. The three goals of CRP are: (1) to monitor the long-term population trends and nesting habits of loggerheads in the WNWR, (2) to enhance the survival of eggs and hatchlings in an area where loss to predators and beach erosion are historically high, and (3) to educate and involve the public in research and conservation efforts. To date, CRP has recorded 1,559 individual turtles and successfully monitored 4,032 nests containing 464,618 eggs, ultimately releasing over 286,463 hatchlings. Additionally, CRP has involved over 3,000 volunteers in research and conservation.

## 3. METHODS AND MATERIALS

### 3.1 Nesting

#### 3.1.1. Beach patrols

Nightly patrols were conducted from 7 May to 5 August to document all nesting turtle activities on Wassaw Island. Two crews, each with one CRP staff member and up to 3 volunteers, systematically patrolled the beach between 9PM and 7AM using Kawasaki Mules. Patrol intervals varied throughout the night depending on tides, frequency of turtle activity, and weather conditions. If a turtle was encountered during a patrol, care was taken not to disturb the turtle. Vehicles and flashlights were kept off and CRP staff determined when crews could approach the turtle for data collection.

#### 3.1.2. False crawls and nests

All crawls were documented and examined for evidence of egg deposition. If laying was not observed and the presence of a body pit indicated the possibility of a nest, CRP staff initiated a search for the eggs. If no eggs were found, the event was recorded as a 'false crawl'. If laying was observed, a cord was placed in the nest to locate the eggs after the female returned to the ocean. For each crawl, information regarding date, time, and location were recorded. Locations were taken with respect to the nearest beach marker and by GPS position.

#### 3.1.3. Tagging

When encountered, each turtle was examined for and, if necessary, fitted with two external inconel tags and one internal Passive Integrated Transponder (PIT) tag. Inconel tags were located by visually inspecting both front flippers and PIT tags were located by scanning the front flippers using a Destron-EX pocket reader. If present, the tag numbers were recorded. If absent, inconel tags were applied to the second or third proximal scute along the trailing edge of both front flippers and PIT tags were inserted

subcutaneously at the elbow of the right front flipper. The PIT tag was scanned before and after application to ensure that it was functioning properly. All tag numbers and applicable data were sent to the University of Florida, Gainesville, for inclusion into the Archie Carr Center for Sea Turtle Research tagging database.

Tagging data was used to classify each turtle as a neophyte, remigrant, or immigrant. A neophyte is a turtle that has not previously been tagged (although she may have nested before). Tagging neophytes allows us to determine if the turtle is a remigrant or an immigrant during future nesting events. A remigrant is a turtle that was originally tagged on Wassaw Island and continues to use Wassaw during subsequent nesting attempts and nesting seasons. An immigrant is a turtle that was originally tagged on a different nesting beach, but was observed nesting or attempting to nest on Wassaw. Turtles with tag scars and no PIT tag could not be classified.

#### *3.1.4. Morphometrics*

For each turtle, curved carapace length (CCL) and width (CCW) were measured using a flexible, fiberglass measuring tape. CCL was measured medially from the inner nuchal notch (anteriorly) to the longest pygal tip (posteriorly) and CCW was measured at the maximum carapace width. Head width was also measured to the nearest millimeter at the widest part of the head (likely at the squamosal bones, posterior to the eyes) using calipers.

#### *3.1.5. Nest relocation*

Nests deposited above the spring tide line were left *in situ*. Nests deposited at or below the spring high tide line were relocated within six hours of deposition. When relocated, eggs were carefully excavated, counted, and placed in a 5-gallon bucket. Eggs broken by the female turtle or by CRP staff were documented and discarded. At the base of the adjacent dune, a new egg chamber was dug by hand to replicate the size, shape, and depth of the original nest. Eggs were carefully transferred into the new nest and reburied. The locations of both *in situ* and relocated nest sites were recorded.

#### *3.1.6. Nest protection*

After egg deposition or relocation, two types of protective screening were placed over all nests: (1) 1.5' X 1.5' metal screen with 0.4" x 0.4" mesh and (2) 5' X 4' plastic screen with 2" X 3" mesh. Screens were secured in place by pencil rods anchored at each corner of the larger screen. Reflective markers identified the nest locations and plastic labels identified the nest number. Smaller screens were removed and replaced with 0.4" x 0.4" mesh cones at 45 days of incubation in anticipation of hatching emergence. Nests were monitored throughout the season for evidence of predation, tidal wash and beach erosion. We continued to test the effectiveness of a new style of nest protection, plastic columns. After egg deposition or relocation, 8' X 4' plastic screens with 2" x 3" mesh were rolled into a column (~2.5' diameter) and placed erect over the clutch. Columns were secured by burying the bottom 8-10" of the column under sand and anchoring with four pencil rods. The opening at the top was zip tied together.

### **3.2. Hatching**

#### *3.2.1. Beach patrols*

Dawn and dusk patrols were conducted from 6 August to 3 September to monitor nests for signs of hatchling emergence and predation. Upon observing the first signs of hatchling emergence (e.g. distinct depressions, empty eggshells in nest, hatching tracks, or live hatchlings), we recorded the date and allowed time for secondary emergences. Nests that showed signs of ant infestation were inventoried immediately. Nests that were either fully or partially predated by raccoons or foxes were recorded and the extent of predation was estimated by counting eggshells scattered around the nest.

### *3.2.2. Nest inventories*

All nests were inventoried within 5 days of emergence or after 70 days of incubation for nests in which hatchling emergence was never observed. Nest inventories involved excavating all nest contents, then counting the number of live and dead hatchlings, empty eggshells, and unhatched eggs. Live hatchlings found at night were immediately released to crawl to the ocean, while live hatchlings found during the day were retained and released the following night. Live unhatched or pipped eggs were retained until subsequent emergence and release. All unhatched eggs were dissected to determine the percentage of embryonic development that was completed prior to termination.

Nest inventories were conducted to quantify the hatching and emergence success of each nest. Hatching success was calculated by dividing the number of hatched eggs by the total number of eggs in each nest (multiplied by 100). For nests with known clutch sizes, the number of hatched eggs was determined by subtracting the number of unhatched eggs (including dead pipped eggs) from the total number of eggs. For nests with unknown clutch sizes, the number of hatched eggs was estimated by counting the eggshells (fragment size 50% or greater) found in the nest, while the total number of eggs was determined by adding the number of eggshells and the number of unhatched eggs. Release rate was calculated by subtracting the number of dead hatchlings from both within the nest and found predated outside the nest from the number of hatched eggs, then dividing by the total number of eggs (multiplied by 100). Incubation periods of each nest were determined based on the number of days between egg deposition and first hatchling emergence.

### **3.3. Strandings**

All turtles (dead or alive) found stranded on Wassaw Island were photographed and reported to the Sea Turtle Stranding and Salvage Network (STSSN) based in Miami, FL. We reported the species, location, size (CCL, CCW, straight CL, and straight CW), condition, and probable cause of death (estimated via necropsy by CRP staff). After examination, a large red “X” was spray-painted on the carapace of the turtle before moving it into the dunes. Complete reports were forwarded to the Georgia Department of Natural Resources.

### **3.4. Additional procedures – Collaborations**

#### *3.4.1. Daniel B. Warner School of Forestry and Natural Resources, University of Georgia – Dr. Brian Shamblin*

For the 10<sup>th</sup> year, we collected skin biopsies and eggshell samples from each female and each nest, respectively. Skin biopsies were collected between the neck and right front flipper using a 6mm biopsy punch and placed in 95% ethanol. The eggshell from one egg in each nest was collected and placed in 95% ethanol.

#### *3.4.2. Archie Carr Center for Sea Turtle Research, University of Florida – Dr. Hannah Vander Zanden*

Additional skin biopsies were collected from nesting females using the same methodology as above.

#### *3.4.3. Armstrong Atlantic State University - Dr. Kathryn Craven*

Fresh eggs were caught during deposition using sterile gloves and placed into bags and frozen.

#### *3.4.4 University of Georgia - Charlie Braman (MS student)*

Ants were collected and preserved during ant predation and scavenging events, and nest characteristics were measured.

## 4. RESULTS

### 4.1. Loggerhead nesting

#### 4.1.1. False crawls and nests

We recorded 333 nests and 353 false crawls. The first nest was deposited on 16 May and the last on August 13. Nesting activity peaked in June (Fig. 1) and was distributed across the island (Fig. 2). Of the 333 nests, 218 were left *in situ* (65.5%) and 115 were relocated (34.5%) (Appendix C). Crawl success was 48.54%.

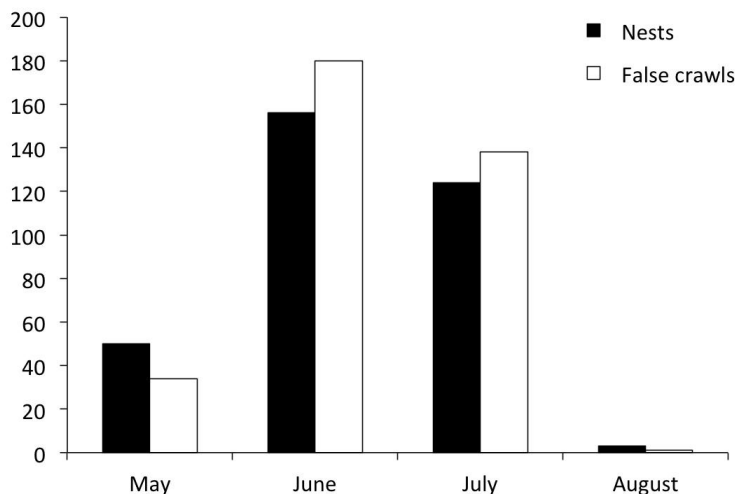


Figure 1. Histogram showing the monthly distribution of nests and false crawls on Wassaw Island.

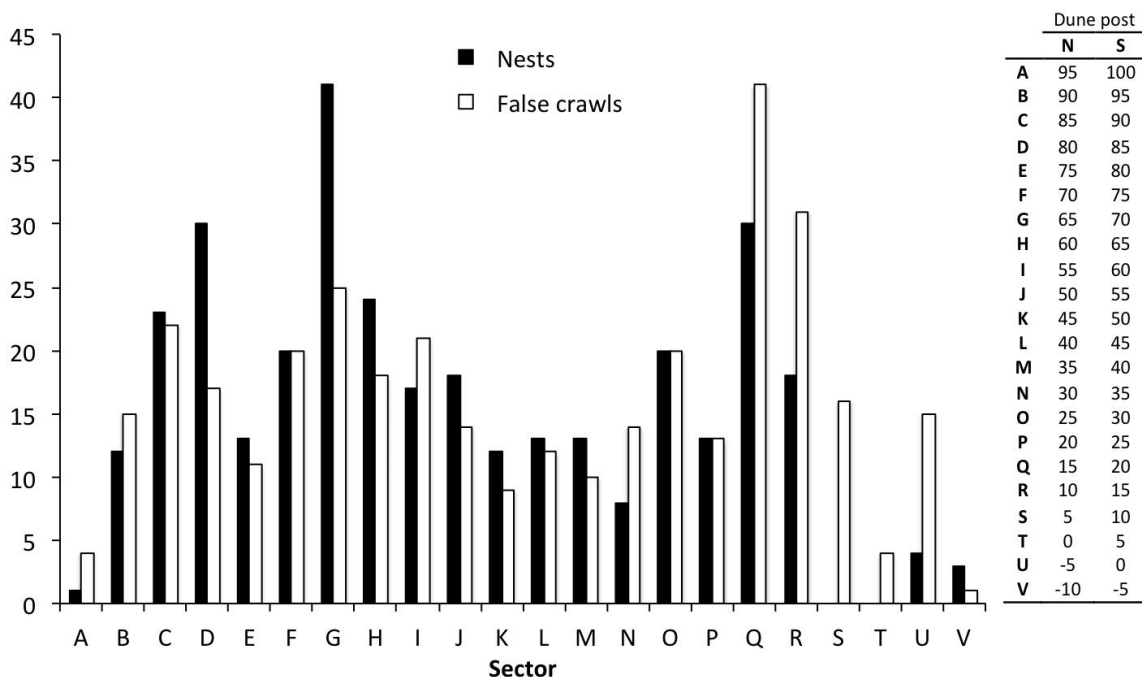


Figure 2. Histogram showing the distribution of loggerhead nests and false crawls on Wassaw Island. Letters correspond to the sectors of the beach between each U.S. Fish & Wildlife sign located at every five dune posts.

#### 4.1.2. Individual loggerhead turtles

We recorded 155 individual loggerheads: 83 neophytes (53.6%), 58 remigrants (37.4%), and nine immigrants (5.8%), four scarred (2.6%) and one of unknown origin (0.6%) (Appendix A). Four remigrant turtles were identified solely by their PIT tags.

Of the 333 loggerhead nests, 170 (51.1%) were deposited by 56 remigrants (including scarred), 119 (35.7%) were deposited by 68 neophytes, 14 (4.2%) were deposited by 9 immigrants, one nest was deposited by an individual of unknown origin (0.3%), and 29 (8.7%) were deposited by females that were not observed nesting (i.e. 'missed nests'). We recorded 21 turtles that were not observed depositing a nest (false crawls only) and 66 turtles that deposited only one nest. Sixty-nine turtles deposited more than one nest, resulting in a mean clutch frequency of 3.4 nests per female (range=2-7 nests). The observed interesting interval for these females ranged from 9-41 days, with a mean interval of 14.5 days.

Of the 58 remigrants recorded, 20 were recorded on Wassaw Island in one previous season, 16 in two previous seasons, nine in three previous seasons, six in four previous seasons, two in five previous seasons, three in six previous seasons, one in nine previous seasons and one in 11 previous seasons. The mean remigration interval was 4.1 years (range=2-17 years). The female who has been nesting for 11 previous seasons was first tagged on Wassaw in 1986. Since then, she has deposited 38 nests containing nearly 4,700 eggs, releasing 3,782 hatchlings into the ocean.

Six turtles originally tagged on Wassaw Island were seen elsewhere this year: one (originally tagged in 2000) was seen nesting on Pritchard's Island, SC; one was caught by a dipnet (by NOAA employees) off of Ocean City, DE and was subsequently released; one (2011) was caught in a NOAA trawler off of Charleston, SC; one (2005) nested on Little St. Simon's Island; one (2013) nested in Beaufort, SC; and one (2016) nested on Dauguskie Island, SC. Unfortunately, one of our neophyte turtles from this year was found stranded on Bay Point Island, SC. Additionally, nine turtles tagged on other beaches were seen on Wassaw this year. Three were tagged on Blackbeard in 2008 (1) and 2010 (2), and the other six were tagged on Jekyll in 2013 (2) and 2016 (4).

## 4.2. Loggerhead hatching

#### 4.2.1. Nests and eggs

Within 326/333 nests, we recorded approximately 35,683 eggs. The mean clutch size was 109.5 eggs per nest (range=29-361 eggs per nest;  $N=326$ ) (Appendix C). The overall mean hatching success was 72.2% (range=0-98.3%;  $N=326$  nests). The mean hatching success was 74.2% for *in situ* nests (range=0-98.3%;  $N=215$  nests) and 68.2% for relocated nests (range=0-97.5%;  $N=111$  nests). The mean emergence rate was 66.7%. Overall mean incubation time was 52.0 days (range=45-69 days;  $N=236$  nests). The mean incubation period was 51.9 days for *in situ* nests (range=45-65 days;  $N=152$  nests) and 52.0 days for relocated nests (range=44-69;  $N=84$  nests).

#### 4.2.2. Nest and egg loss

Nine nests were washed away completely by Tropical Storms Julia and Hermine, and Hurricane Matthew and 8 nests were washed over this year between 1-3 times. Five of the nests that were washed away were *in situ* and no egg counts were recorded. Thirty-one were affected to some degree by predation. Fox predation included one full nest, 10 partial nests, and post hatching predation of three nests where no

accurate measure of predation was possible. Raccoon predation included 10 partially predated nests (232 eggs), and post hatching predation of three nests where no accurate measure of predation was possible. Ghost crabs predated one egg from each of four nests. One nest lost nine hatchlings to ghost crab predation. Sixty hatchlings from three nests were consumed by ants. One nest lost 12 hatchlings to raccoons. It is important to note, however, that fox and raccoon predation was evident during the hatching of many nests throughout the season, but accurate counts of hatchling predation is impossible. No nests were lost to human tampering.

Thirty-six broken eggs were encountered this season: 15 were broken by turtles while covering their nests and 21 were broken by CRP staff while probing for eggs. An additional 341 eggs were collected for collaborative research studies (see Collaborations section).

#### **4.4. Strandings**

No turtles were found stranded on Wassaw Island this year between May 7-September 3.

#### **4.5. Collaborations**

*4.5.1. Daniel B. Warner School of Forestry and Natural Resources, University of Georgia – Dr. Brian Shamblin*

We collected skin biopsies from 150 individual loggerheads and one egg from each of 331 nests. These samples will be used to assess the genetic population structure of the loggerhead nesting population in the southeastern US. In addition, DNA extracted from the eggshells of missed nests can be used to match those nests with previously sampled females.

*4.5.2. Archie Carr Center for Sea Turtle Research, University of Florida – Dr. Hannah Vander Zanden*

We collected skin biopsies from 148 individual loggerheads. These samples will be used in stable isotope analyses to determine the foraging strategies of nesting loggerheads.

*4.5.3. Armstrong Atlantic State University - Dr. Kathryn Craven*

Ten eggs were collected from nests to further determine the species of fungus and bacteria that affect hatching success in loggerhead sea turtle nests.

*4.5.4. University of Georgia - Charlie Braman (MS student)*

Ants were collected and preserved from 23 nests.

### **5. ACKNOWLEDGEMENTS**

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**APPENDIX A – 2016 INDIVIDUAL TURTLES**

<b>TURTLE #</b>	<b>STATUS</b>	<b>NEO #</b>	<b>RF TAG</b>	<b>RF #</b>	<b>LF TAG</b>	<b>LF #</b>	<b>PIT TAG</b>	<b>PIT TAG #</b>	<b>NOTES</b>
1	REMIGRANT		OLD	EEK 883	OLD	YYP 837	OLD	4A1C046322	
2	REMIGRANT		OLD	EEK 788	OLD	EEK 748	OLD	982.00016366834	
3	REMIGRANT		OLD	RRG 363	OLD	YYZ 530	OLD	4B11394A22	
4	REMIGRANT		OLD	EEK 758	OLD	EEK 752	OLD	982.000153658431	
5	REMIGRANT		NEW	LLM 843	NEW	LLM 842	OLD	0000143325	
6	REMIGRANT		NEW	LLM 826	OLD	YYZ 414	OLD	4B11675308	
7	REMIGRANT		OLD	SSK 673	OLD	SSK 412	OLD	407B143806	MARE
8	REMIGRANT		OLD	RRG 303	OLD	RRG 304	OLD	444A194904	TALLULAH
9	REMIGRANT		NEW	LLM 834	NEW	LLM 890	OLD	000133DEB9	DEBINATOR
10	REMIGRANT		OLD	EEK 822	OLD	YYP 856	OLD	4615575366	
11	REMIGRANT		NEW	LLM 837	NEW	LLM 864	OLD	446A6D4313	
12	REMIGRANT		OLD	BBN 006	OLD	BBN 010	OLD	4414284816	
13	NEOPHYTE	1	NEW	LLM 824	NEW	LLM 830	NEW	982.000363849128	
14	REMIGRANT		OLD	EEK 726	OLD	EEK 769	NEW	982.000364356975	
15	REMIGRANT		OLD	BBN 202	NEW	LLM 870	OLD	4A40343559	
16	NEOPHYTE	2	NEW	LLM 825	NEW	LLM 835	NEW	982.000363842126	
17	NEOPHYTE	3	NEW	LLM 827	NEW	LLM 803	NEW	982.000363849063	
18	REMIGRANT		OLD	YYZ 462	OLD	EEK 782	OLD	982.000153670379	
19	NEOPHYTE	4	NEW	LLM 831	NEW	LLM 857	NEW	982.000364216239	
20	NEOPHYTE	5	NEW	LLM 805	NEW	LLM 823	NEW	982.000363849226	
21	REMIGRANT		OLD	YYZ 549	OLD	YYZ 599	OLD	407D0D787B	GYPSY
22	REMIGRANT		OLD	EEK 770	OLD	EEK 739	OLD	982.000163677352	
23	REMIGRANT		OLD	BBN 013	NEW	LLZ 853	OLD	407B16093F	LEAH MAE
24	NEOPHYTE	6	NEW	LLM 972	NEW	LLM 974	NEW	982.000363848882	
25	REMIGRANT		OLD	RRC 777	OLD	RRG 322	OLD	441410253F	KAT
26	REMIGRANT		NEW	LLM 973	OLD	EEK 858	OLD	989.001001238122	
27	SCAR		NEW	LLM 869	NEW	LLM 847	NEW	982.000364216651	
28	REMIGRANT		OLD	EEZ 697	NEW	LLM 969	OLD	4B1161554D	
29	REMIGRANT		OLD	BBN 171	NEW	LLM 971	OLD	452C70161C	
30	NEOPHYTE	7	NEW	LLM 988	NEW	LLM 852	NEW	982.000363828011	
31	REMIGRANT		NEW	LLM 970	NEW	LLM 968	OLD	00004EFB2E	ZIG ZAG
32	REMIGRANT		OLD	BBN 147	OLD	BBN 141	OLD	982.000163652811	
33	SCAR		NEW	LLM 997	NEW	LLM 832	NEW	982.000363850591	
34	NEOPHYTE	8	NEW	LLM 998	NEW	LLM 942	NEW	982.000363842440	
35	NEOPHYTE	9	NEW	LLM 862	NEW	LLM 868	NEW	982.000363828596	
36	REMIGRANT		OLD	EEK 896	OLD	EEK 696	OLD	989.001001238107	
37	REMIGRANT		OLD	BBN 016	OLD	YYZ 458	OLD	4A67443D39	
38	REMIGRANT		OLD	TTG 125	OLD	TTG 120	OLD	462B5B4B71	
39	NEOPHYTE	10	NEW	LLM 828	NEW	LLM 833	NEW	982.000363848879	
40	REMIGRANT		OLD	SSX 833	OLD	BBN 007	OLD	407B3E6F2B	KRISTIE
41	NEOPHYTE	11	NEW	LLM 946	NEW	LLM 949	NEW	982.000364218941	
42	REMIGRANT		OLD	YYP 894	OLD	YYZ 306	OLD	4B1167447B	
43	NEOPHYTE	12	NEW	LLM 950	NEW	LLM 993	NEW	982.000363842216	
44	REMIGRANT		OLD	YYZ 409	OLD	YYZ 410	OLD	4B115E381B	
45	REMIGRANT		OLD	BBN 011	OLD	RRJ 761	OLD	982.000163695216	
							OLD	44537E4020	
46	REMIGRANT		NEW	LLM 855	OLD	EEK 795	OLD	982.000163695162	
47	REMIGRANT		NEW	LLM 937	NEW	LLM 932	OLD	4A65420027	AMELIA
							OLD	0000171832	
48	REMIGRANT		OLD	YYZ 422	OLD	EEK 787	OLD	4B1137740B	
49	NEOPHYTE	13	NEW	LLM 901	NEW	LLM 903	NEW	982.000363848699	
50	NEOPHYTE	14	NEW	LLM 989	NEW	LLM 948	NEW	982.000363850622	
51	NEOPHYTE	15	NEW	LLM 947	NEW	LLM 975	NEW	982.000363849458	

52	REMIGRANT		OLD	YYZ 573	OLD	YYZ 562	OLD	4467336230	
53	NEOPHYTE	16	NEW	LLM 926	NEW	LLM 929	NEW	982.000363830841	
54	NEOPHYTE	17	NEW	LLM 804	NEW	LLM 995	NEW	982.000364303108	
55	NEOPHYTE	18	NEW	LLM 902	NEW	LLM 905	NEW	982.000364357840	
56	REMIGRANT		NEW	LLM 927	NEW	LLM 928	OLD	44146B4161	
57	REMIGRANT		NEW	LLM 850	OLD	YYZ 332	OLD	407B3F5D76	
58	NEOPHYTE	19	NEW	LLM 944	NEW	LLM 945	NEW	982.000364219005	
59	IMMIGRANT		OLD	BBT 875	OLD	BBT 829	OLD	989.001001238147	JEKYLL ISLAND 2013
							OLD	982.000359623821	
60	NEOPHYTE	20	NEW	LLM 996	NEW	LLM 990	NEW	982.000364221341	
61	NEOPHYTE	21	NEW	LLM 845	NEW	LLM 841	NEW	982.000364218959	
62	REMIGRANT				OLD	EEK 789			
63	REMIGRANT		OLD	TTG 270	NEW	LLM 904	OLD	4A18796612	
64	NEOPHYTE	22	NEW	LLM 906	NEW	LLZ 874	NEW	982.000363828406	
65	REMIGRANT		NEW	LLM 943	OLD	YYZ 448	OLD	4414612E60	SIREN
66	NEOPHYTE	23	NEW	LLM 863	NEW	LLM 931	NEW	982.000363842465	
67	REMIGRANT		NEW	LLM 940	NEW	LLZ 802	OLD	407C4E6035	
68	NEOPHYTE	24	NEW	LLM 849	NEW	LLM 872	NEW	982.000364218503	
69	REMIGRANT		OLD	YYZ 443			OLD	4466520F33	QUEENIE
70	NEOPHYTE	25	NEW	LLM 934	NEW	LLM 936	NEW	982.000363848876	
71	NEOPHYTE	26	NEW	LLM 871	NEW	LLM 930	NEW	982.000363848838	
72	NEOPHYTE	27	NEW	LLM 965	NEW	LLM 967	NEW	982.000363841958	
73	REMIGRANT		OLD	BBN 172	NEW	LLZ 814	OLD	407B7E462C	
							OLD	0001BBF7AC	
74	NEOPHYTE	28	NEW	LLM 991	NEW	LLM 999	NEW	982.000364295007	
75	NEOPHYTE	29	NEW	LLM 933	NEW	LLM 888	NEW	982.000363849094	
76	NEOPHYTE	30	NEW	LLM 838	NEW	LLM 951	NEW	982.000364215845	
77	NEOPHYTE	31	NEW	LLM 983	NEW	LLM 982	NEW	982.000364216545	
78	REMIGRANT		NEW	LLZ 861	NEW	LLM 960	OLD	452B2A145A	
79	NEOPHYTE	32	NEW	LLM 935	NEW	LLM 989	NEW	982.000364215800	
80	REMIGRANT		OLD	SSX 292			OLD	989.001001239155	
81	NEOPHYTE	33	NEW	LLM 976	NEW	LLM 962	NEW	982.000364357350	
82	REMIGRANT		NEW	LLM 979	NEW	LLM 997	OLD	407D152235	
83	NEOPHYTE	34	NEW	LLM 867	NEW	LLM 844	NEW	982.000364217214	
84	NEOPHYTE	35	NEW	LLZ 849	NEW	LLZ 844	NEW	982.000364358590	
85	NEOPHYTE	36	NEW	LLZ 850	NEW	LLZ 847	NEW	982.000363842088	
86	REMIGRANT		NEW	LLM 921	NEW	LLM 919	OLD	43492C6C7C	
87	NEOPHYTE	37	NEW	LLM 980	NEW	LLZ 845	NEW	982.000363849215	
88	NEOPHYTE	38	NEW	LLM 839	NEW	LLM 910	NEW	982.000363828264	
89	REMIGRANT		NEW	LLM 987	NEW	LLM 909	OLD	462B0E3A43	
90	REMIGRANT		OLD	EEK 759	OLD	EEK 761	OLD	989.001001238016	
91	NEOPHYTE	39	NEW	LLM 952	NEW	LLM 954	NEW	982.000363830900	
92	IMMIGRANT		NEW	LLZ 785	NEW	LLZ 793	OLD	989.001000095251	JEKYLL ISLAND 2013
93	IMMIGRANT		OLD	BBT 937	OLD	BBT 936	NEW	982.000364216488	JEKYLL ISLAND 2016
							OLD	989.001005040672	
94	REMIGRANT				OLD	RRC 779	OLD	407C51477F	OLD FAITHFUL
95	NEOPHYTE	40	NEW	LLZ 843	NEW	LLM 978	NEW	982.000364300271	
96	NEOPHYTE	41	NEW	LLZ 846	NEW	LLM 938	NEW	982.000363850507	
97	SCAR		NEW	LLM 958	NEW	LLZ 804	NEW	982.000364217308	
98	IMMIGRANT		OLD	LLR 750	OLD	LLR 749	OLD	989.001005040678	JEKYLL ISLAND 2016
99	NEOPHYTE	42	NEW	LLZ 824	NEW	LLZ 822	NEW	982.000364300714	
100	REMIGRANT		OLD	EEK 803	OLD	EEK 879	OLD	989.001001239174	
101	REMIGRANT		NEW	LLZ 820	NEW	LLM 992	OLD	444B0C5849	
102	NEOPHYTE	43	NEW	LLZ 805	NEW	LLZ 825	NEW	982.000364218829	
103	NEOPHYTE	44	NEW	LLM 981	NEW	LLZ 806	NEW	982.000406134689	
104	NEOPHYTE	45	NEW	LLZ 819	NEW	LLZ 809	NEW	982.000364216829	
105	NEOPHYTE	46	NEW	LLZ 823	NEW	LLM 966	NEW	982.000406134887	

106	NEOPHYTE	47	NEW	LLZ 859	NEW	LLZ 852	NEW	982.000406134990	
107	NEOPHYTE	48	NEW	LLZ 815	NEW	LLZ 801	NEW	982.000364215536	
							NEW	982.000364300143	
108	NEOPHYTE	49	NEW	LLZ 813	NEW	LLM 986	NEW	982.000364357439	
109	NEOPHYTE	50	NEW	LLZ 858	NEW	LLZ 848	NEW	982.000406135103	
110	NEOPHYTE	51	NEW	LLM 908	NEW	LLZ 817	NEW	982.000364216024	
111	NEOPHYTE	52	NEW	LLZ 851	NEW	LLZ 866	NEW	982.000406135228	
112	NEOPHYTE	53	NEW	LLM 907	NEW	LLZ 816	NEW	982.000364216646	
113	NEOPHYTE	54	NEW	LLM 959	NEW	LLM 953	NEW	982.000363828376	
114	IMMIGRANT		NEW	LLZ 879	NEW	LLZ 877	OLD	452D3D6652	BLACKBEARD ISLAND 2010
115	NEOPHYTE	55	NEW	LLZ 810	NEW	LLZ 807	NEW	982.000406093106	
116	NEOPHYTE	56	NEW	LLZ 867	NEW	LLZ 821	NEW	982.000406134623	
117	NEOPHYTE	57	NEW	LLZ 869	NEW	LLZ 811	NEW	982.000406134916	
118	NEOPHYTE	58	NEW	LLZ 864	NEW	LLZ 808	NEW	982.000406134871	
119	REMIGRANT		NEW	LLM 813	NEW	LLM 817	OLD	4B121C6576	
120	NEOPHYTE	59	NEW	LLZ 854	NEW	LLZ 862	NEW	982.000406135323	
121	NEOPHYTE	60	NEW	LLZ 855	NEW	LLM 963	NEW	982.000364221211	
122	SCAR		NEW	LLM 994	NEW	LLZ 857	NEW	982.000406135049	
123	NEOPHYTE	61	NEW	LLZ 883	NEW	LLZ 856	NEW	982.000406134763	
124	REMIGRANT		NEW	LLZ 870	NEW	LLZ 875	OLD	407B09022A	
125	REMIGRANT		OLD	EEK 742	OLD	TTG 194	OLD	4A3074265D	
126	IMMIGRANT		OLD	BBT 839	OLD	EEZ 438	OLD	989.001005040663	JEKYLL ISLAND 2016
127	REMIGRANT		OLD	QQY 811	NEW	LLZ 876	OLD	407B547B09	
128	NEOPHYTE	62	NEW	LLZ 872	NEW	LLZ 871	NEW	982.000406135176	
129	IMMIGRANT		OLD	LLR 724	OLD	LLR 725	OLD	989.001005040648	JEKYLL ISLAND 2016
130	NEOPHYTE	63	NEW	LLZ 881	NEW	LLZ 890	NEW	982.000364300276	
131	NEOPHYTE	64	NEW	LLZ 865	NEW	LLZ 887	NEW	982.000364220426	
132	NEOPHYTE	65	NEW	BBN 072	NEW	BBN 035	NEW	982.000406092763	
133	REMIGRANT		OLD	EEK 772	OLD	EEK 733	OLD	982.000163668203	
134	NEOPHYTE	66	NEW	YYZ 582	NEW	LLZ 888	NEW	/982.000406092892	
135	IMMIGRANT		NEW	LLZ 800	NEW	LLZ 797	OLD	436A016F53	BLACKBEARD ISLAND 2008
136	NEOPHYTE	67	NEW	BBN 026	NEW	BBN 228	NEW	982.000406093054	
137	NEOPHYTE	68	NEW	LLZ 765	NEW	LLZ 766	OLD	982.000406135134	
138	NEOPHYTE	69	NEW	LLZ 772	NEW	LLZ 769	NEW	982.000406092688	
139	IMMIGRANT		NEW	LLZ 789	OLD	YYY 104	OLD	4B04681569	BLACKBEARD ISLAND 2010
140	REMIGRANT						OLD	0001323575	
141	NEOPHYTE	70	NEW	LLZ 771	NEW	LLZ 751	NEW	982.000406135094	
142	NEOPHYTE	71	NEW	LLM 984	NEW	LLZ 760	NEW	982.000406134817	
143	NEOPHYTE	72	NEW	BBN 051	NEW	LLZ 891	NEW	982.000406092407	
144	NEOPHYTE	73	NEW	BBN 042	NEW	LLZ 886	NEW	982.000406129283	
145	NEOPHYTE	74	NEW	LLZ 786	NEW	BBN 089	OLD	982.000406135160	
146	NEOPHYTE	75	NEW	LLZ 818	NEW	LLZ 788	NEW	982.000406135064	
147	NEOPHYTE	76	NEW	LLZ 900	NEW	LLZ 897	NEW	982.000406092787	
148	NEOPHYTE	77	NEW	YYZ 484	NEW	BBN 148	NEW	982.000406135319	
149	UNKNOWN		NEW	LLZ 885	NEW	BBN 097	OLD	452A274761	
150	NEOPHYTE	78	NEW	LLZ 787	NEW	LLZ 799	NEW	982.000406134853	
151	NEOPHYTE	79	NEW	LLZ 894	NEW	LLZ 784	NEW	982.000406093010	
152	NEOPHYTE	80	NEW	BBN 207	NEW	LLZ 776	NEW	982.000406134661	
153	NEOPHYTE	81	NEW	LLZ 783	NEW	LLZ 795	NEW	982.000406134649	
154	NEOPHYTE	83	NEW	LLZ 756	NEW	LLZ 753	NEW	982.000406092734	
155	NEOPHYTE	84	NEW	LLZ 754	NEW	LLZ 759	NEW	982.000406134791	

## APPENDIX B

### Loggerhead Activity on Wassaw Island 1973-2016

\* Patrols did not cover the entire nesting season 1973-1977

\*\* Crawl Success=(# nests/# crawls)X100

\*\*\*One nest composed of 5 abnormal eggs is included

YEAR	TURTLES	NEOPHYTES	CRAWLS	NESTS	FALSE CRAWLS	**CRAWL SUCCESS (%)
1973*	25	25	82	35	47	42.68
1974*	49	46	116	61	55	52.59
1975*	40	36	135	56	79	41.48
1976*	47	40	157	51	106	32.48
1977*	44	38	247	76	171	30.77
1978	52	35	186	65	121	34.95
1979	56	34	160	55	105	34.38
1980	44	30	112	51	61	45.54
1981	54	36	163	75	88	46.01
1982	52	39	158	65	93	41.14
1983	49	34	133	61	72	45.86
1984	47	31	139	71	68	51.08
1985	60	46	116	66	50	56.90
1986	43	27	135	47	88	34.81
1987	23	18	55	23	32	41.82
1988	30	19	90	43	47	47.78
1989	35	20	126	43	83	34.13
1990	46	35	166	60	106	36.14
1991***	53	41	170	77	93	45.29
1992	52	38	140	80	60	57.14
1993	18	12	58	28	30	48.28
1994	55	38	185	105	80	56.76
1995	39		185	80	105	43.24
1996	63	40	230	135	95	58.70
1997	25	9	101	60	41	59.41
1998	42	20	118	69	49	58.47
1999	69	35	289	125	164	43.25
2000	60	41	143	82	61	57.34
2001	38	23	126	74	52	58.73
2002	38	22	91	56	35	61.54
2003	59	28	221	115	106	52.04
2004	20	12	71	37	34	52.11
2005	65	31	233	104	129	44.64
2006	60	29	266	141	125	53.01
2007	43	25	202	63	139	31.19
2008	70	36	275	120	155	43.64
2009	63	36	234	91	143	38.89
2010	86	50	352	159	193	45.17
2011	93	61	323	165	158	50.62
2012	101	68	541	138	403	25.51
2013	112	66	452	250	202	55.31
2014	51	31	193	122	71	63.21
2015	111	75	418	218	200	52.15
2016	155	83	686	333	353	48.54
<b>TOTAL</b>	<b>2,437</b>	<b>1,539</b>	<b>8,779</b>	<b>4,031</b>	<b>4,748</b>	<b>46.70%</b>

## APPENDIX C: 2016 Nest Summary for Wassaw Island

NEST #	NEST LOCATION	INC (DAYS)	# EGGS	HATCHED	SUCCESS	NOTES
1	IN SITU		120	92	76.7%	ANT DEPREDATION
2	RELOCATED		150	138	92.0%	
3	RELOCATED	59	131	117	89.3%	
4	RELOCATED	59	131	107	81.7%	
5	IN SITU		108	12	11.1%	
6	IN SITU	62	119	108	90.8%	
7	IN SITU	65	106	81	76.4%	GHOST CRAB DEPREDATION, WASHED OVER 3X
8	IN SITU	58	115	90	78.3%	
9	IN SITU	62	109	104	95.4%	
10	IN SITU		129	0	0.0%	WASHED OVER 2X
11	IN SITU	60	147	131	89.1%	
12	IN SITU		132	63	47.7%	
13	IN SITU	60	90	86	95.6%	
14	RELOCATED		136	71	52.2%	
15	RELOCATED	59	89	63	70.8%	FOX PREDATION
16	RELOCATED	59	92	78	84.8%	
17	IN SITU	60	116	103	88.8%	
18	IN SITU	64	88	76	86.4%	
19	RELOCATED		115	UNKNOWN	UNKNOWN	POST-HATCH FOX PREDATION
20	RELOCATED	60	140	126	90.0%	
21	IN SITU		106	0	0.0%	
22	RELOCATED	59	114	92	80.7%	
23	RELOCATED	55	149	125	83.9%	
24	RELOCATED	59	81	65	80.2%	
25	RELOCATED	57	104	94	90.4%	
26	RELOCATED	56	133	128	96.2%	
27	IN SITU	56	126	60	47.6%	GHOST CRAB PREDATION
28	RELOCATED	57	137	111	81.0%	
29	IN SITU	57	125	121	96.8%	
30	RELOCATED	56	96	83	86.5%	
31	RELOCATED		127	39	30.7%	
32	RELOCATED		125	UNKNOWN	UNKNOWN	POST-HATCH FOX PREDATION
33	IN SITU	58	139	72	51.8%	WASHED OVER 1X
34	IN SITU	63	107	24	22.4%	
35	RELOCATED	54	117	99	84.6%	
36	RELOCATED	65	76	16	21.1%	
37	RELOCATED	56	128	116	90.6%	
38	RELOCATED	57	126	106	84.1%	
39	RELOCATED		82	0	0.0%	
40	RELOCATED		120	91	75.8%	
41	IN SITU	56	88	78	88.6%	
42	RELOCATED	59	124	39	31.5%	
43	RELOCATED	59	116	104	89.7%	
44	IN SITU		97	1	1.0%	
45	IN SITU	59	108	72	66.7%	
46	IN SITU		113	0	0.0%	
47	RELOCATED	69	123	0	0.0%	
48	IN SITU	58	136	124	91.2%	
49	IN SITU	55	101	83	82.2%	
50	IN SITU	55	99	72	72.7%	WASHED OVER 1X
51	RELOCATED	50	132	75	56.8%	FOX PREDATION
52	IN SITU	59	53	50	94.3%	
53	RELOCATED	56	122	119	97.5%	
54	IN SITU	55	101	97	96.0%	
55	IN SITU	52	114	105	92.1%	
56	RELOCATED	51	91	75	82.4%	

57	IN SITU	51	116	114	98.3%	
58	RELOCATED	56	133	117	88.0%	
59	IN SITU	64	114	87	76.3%	
60	IN SITU	55	113	100	88.5%	
61	RELOCATED	56	128	108	84.4%	FOX PREDATION
62	IN SITU	57	135	67	49.6%	
63	IN SITU	56	131	125	95.4%	
64	RELOCATED	50	109	106	97.2%	
65	IN SITU	52	109	87	79.8%	
66	IN SITU	59	107	85	79.4%	
67	IN SITU	54	124	115	92.7%	
68	RELOCATED	54	106	87	82.1%	
69	IN SITU	53	131	120	91.6%	
70	IN SITU	52	127	119	93.7%	
71	IN SITU		52	2	3.8%	RACCOON PREDATION
72	RELOCATED	56	134	95	70.9%	RACCOON PREDATION
73	IN SITU		67	60	89.6%	
74	RELOCATED	53	109	97	89.0%	
75	RELOCATED	51	109	90	82.6%	
76	IN SITU	54	112	105	93.8%	
77	IN SITU	55	72	59	81.9%	
78	IN SITU		114	107	93.9%	
79	RELOCATED	50	140	107	76.4%	
80	RELOCATED	51	130	105	80.8%	
81	IN SITU		99	91	91.9%	
82	IN SITU	58	109	103	94.5%	
83	IN SITU	50	118	95	80.5%	
84	RELOCATED	50	103	50	48.5%	
85	IN SITU	51	136	68	50.0%	
86	RELOCATED	50	129	79	61.2%	RACCOON PREDATION
87	IN SITU		114	99	86.8%	
88	IN SITU	52	124	105	84.7%	
89	IN SITU	64	109	76	69.7%	
90	IN SITU		118	96	81.4%	
91	IN SITU	58	135	131	97.0%	
92	RELOCATED	52	103	78	75.7%	
93	IN SITU	53	107	99	92.5%	
94	RELOCATED		100	84	84.0%	
95	IN SITU	58	124	79	63.7%	
96	IN SITU	51	114	110	96.5%	
97	RELOCATED	50	111	101	91.0%	
98	IN SITU		124	114	91.9%	
99	RELOCATED	49	113	75	66.4%	
100	RELOCATED	50	69	48	69.6%	
101	IN SITU	49	104	78	75.0%	
102	IN SITU		89	62	69.7%	
103	IN SITU	50	110	99	90.0%	
104	RELOCATED		107	103	96.3%	
105	IN SITU	54	144	137	95.1%	
106	IN SITU		91	86	94.5%	
107	IN SITU	62	111	83	74.8%	
108	IN SITU		95	26	27.4%	
109	IN SITU	50	106	78	73.6%	
110	IN SITU		94	70	74.5%	
111	RELOCATED	51	111	74	66.7%	
112	RELOCATED	53	128	121	94.5%	
113	RELOCATED	47	129	80	62.5%	
114	RELOCATED		113	101	78.3%	
115	RELOCATED	50	139	123	88.5%	
116	RELOCATED	51	149	UNKNOWN	UNKNOWN	POST-HATCH FOX PREDATION
117	IN SITU	53	106	97	91.5%	

118	RELOCATED	48	141	135	95.7%	
119	IN SITU		83	70	84.3%	
120	IN SITU		104	73	70.2%	
121	IN SITU		74	63	85.1%	
122	RELOCATED	57	109	58	53.2%	
123	IN SITU	54	109	96	88.1%	
124	RELOCATED	54	95	82	86.3%	
125	IN SITU	52	122	97	79.5%	
126	RELOCATED	51	105	78	74.3%	
127	IN SITU	53	115	99	86.1%	
128	RELOCATED	50	124	107	86.3%	
129	IN SITU	58	111	30	27.0%	
130	RELOCATED	50	132	111	84.1%	
131	RELOCATED	51	123	110	89.4%	
132	IN SITU	54	130	119	91.5%	
133	RELOCATED	51	135	115	85.2%	
134	IN SITU	52	115	104	90.4%	
135	RELOCATED	54	134	127	94.8%	
136	IN SITU	50	118	108	91.5%	
137	RELOCATED	50	138	91	65.9%	
138	RELOCATED	55	104	89	85.6%	
139	RELOCATED	51	132	124	93.9%	
140	IN SITU	49	136	131	96.3%	
141	IN SITU	50	55	50	90.9%	
142	IN SITU	53	136	105	77.2%	
143	IN SITU	53	129	123	95.3%	
144	IN SITU	50	96	82	85.4%	
145	RELOCATED	49	97	89	91.8%	
146	IN SITU	52	124	111	89.5%	
147	IN SITU	50	125	114	91.2%	
148	IN SITU	53	141	125	88.7%	
149	IN SITU	54	104	101	97.1%	
150	IN SITU	48	94	90	95.7%	
151	RELOCATED	49	88	59	67.0%	
152	IN SITU	51	130	116	89.2%	
153	IN SITU		91	0	0.0%	
154	IN SITU	52	104	90	86.5%	
155	IN SITU	52	108	101	93.5%	
156	RELOCATED	55	29	22	75.9%	
157	RELOCATED	52	34	17	50.0%	
158	IN SITU	52	89	78	87.6%	
159	IN SITU	52	109	104	95.4%	
160	IN SITU	52	119	112	94.1%	
161	RELOCATED	48	127	120	94.5%	
162	IN SITU	52	111	83	74.8%	
163	IN SITU	52	116	106	91.4%	
164	IN SITU	53	109	101	92.7%	
165	IN SITU	53	137	134	97.8%	
166	IN SITU	57	90	46	51.1%	
167	IN SITU	50	98	65	66.3%	
168	IN SITU	47	120	92	76.7%	
169	IN SITU		101	89	88.1%	
170	IN SITU	53	111	99	89.2%	FOX PREDATION
171	IN SITU	47	113	90	79.6%	
172	IN SITU	55	116	106	91.4%	
173	RELOCATED	47	95	87	91.6%	
174	IN SITU	51	92	90	97.8%	
175	IN SITU	52	114	96	84.2%	
176	IN SITU	48	120	109	90.8%	RACCOON AND GHOST CRAB PREDATION
177	IN SITU	50	117	105	89.7%	
178	RELOCATED	52	132	104	78.8%	

179	RELOCATED	49	85	68	80.0%	
180	IN SITU	48	111	106	95.5%	
181	IN SITU	50	90	53	58.9%	
182	RELOCATED	49	145	113	77.9%	
183	IN SITU	52	108	100	92.6%	
184	IN SITU	50	UNKNOWN	UNKNOWN	UNKNOWN	POST-HATCH RACCOON PREDATION
185	IN SITU	47	102	78	76.5%	
186	IN SITU	50	110	88	80.0%	
187	IN SITU	49	113	90	79.6%	
188	IN SITU		87	69	79.3%	
189	RELOCATED	47	110	93	84.5%	
190	IN SITU	50	137	130	94.9%	
191	IN SITU	46	132	115	87.1%	
192	IN SITU	50	126	100	79.4%	
193	IN SITU	49	124	118	95.2%	
194	RELOCATED	48	96	92	95.8%	
195	IN SITU	46	135	116	85.9%	
196	RELOCATED	48	105	91	86.7%	
197	IN SITU	49	138	19	13.8%	
198	IN SITU	49	130	112	86.2%	
199	IN SITU	49	126	105	83.3%	
200	IN SITU	48	99	85	85.9%	
201	IN SITU		119	110	92.4%	
202	IN SITU	52	115	108	93.9%	
203	IN SITU		147	139	94.6%	
204	IN SITU	50	125	43	34.4%	
205	IN SITU	46	129	40	31.0%	
206	IN SITU	47	108	88	81.5%	
207	IN SITU	52	82	64	78.0%	
208	RELOCATED	47	101	86	85.1%	
209	IN SITU	50	94	88	93.6%	
210	IN SITU	50	99	83	83.8%	
211	IN SITU	46	110	91	82.7%	
212	IN SITU	48	94	91	96.8%	
213	IN SITU		109	101	92.7%	
214	RELOCATED	47	115	13	11.3%	
215	IN SITU	50	146	137	93.8%	
216	RELOCATED	48	129	93	72.1%	
217	IN SITU	45	104	99	95.2%	
218	IN SITU		103	94	91.3%	
219	IN SITU	49	110	95	86.4%	
220	IN SITU	49	110	93	84.5%	
221	RELOCATED	47	123	UNKNOWN	UNKNOWN	POST-HATCH RACCOON PREDATION
222	IN SITU	50	113	101	89.4%	
223	IN SITU	49	124	95	76.6%	
224	IN SITU	48	106	97	91.5%	
225	IN SITU	49	115	107	93.0%	
226	IN SITU	47	107	102	95.3%	
227	IN SITU	46	101	86	85.1%	
228	IN SITU	49	125	92	73.6%	RACCOON PREDATION
229	IN SITU		120	13	10.8%	ROOTS THROUGHOUT NEST
230	IN SITU	46	110	84	76.4%	
231	IN SITU		87	55	63.2%	
232	IN SITU	49	119	94	79.0%	
233	IN SITU	50	87	80	92.0%	
234	IN SITU	45	110	66	60.0%	
235	IN SITU	50	106	98	92.5%	
236	IN SITU	47	93	66	71.0%	RACCOON PREDATION
237	IN SITU	51	83	77	92.8%	
238	IN SITU	49	80	61	76.3%	FOX PREDATION
239	IN SITU		95	89	93.7%	



240	RELOCATED	47	85	60	70.6%	
241	IN SITU	48	117	108	92.3%	
242	IN SITU	48	104	58	55.8%	
243	IN SITU	48	118	98	83.1%	RACCOON PREDATION
244	IN SITU	46	130	UNKNOWN	UNKNOWN	POST-HATCH RACCOON PREDATION
245	RELOCATED		153	31	20.3%	RACCOON PREDATION
246	IN SITU	51	131	112	85.5%	
247	IN SITU	53	92	67	72.8%	RACCOON PREDATION
248	IN SITU	57	119	106	89.1%	
249	RELOCATED	53	64	53	82.8%	
250	IN SITU	51	125	112	89.6%	
251	IN SITU	49	100	75	75.0%	
252	RELOCATED	46	93	61	65.6%	
253	IN SITU	47	117	70	59.8%	
254	IN SITU	53	128	115	89.8%	
255	IN SITU	46	113	63	55.8%	
256	RELOCATED	45	85	66	77.6%	
257	IN SITU	51	138	93	67.4%	
258	IN SITU		31	0	0.0%	
259	IN SITU	49	97	69	71.1%	
260	IN SITU		56	21	37.5%	FOX PREDATION, WASHED OVER 1X
261	RELOCATED	48	109	26	23.9%	
262	RELOCATED		70	14	20.0%	RACCOON PREDATION
263	RELOCATED	47	118	93	78.8%	
264	RELOCATED	47	128	84	65.6%	
265	RELOCATED		100	75	75.0%	
266	IN SITU	53	107	95	88.8%	
267	IN SITU	52	122	116	95.1%	
268	RELOCATED		72	55	76.4%	
269	RELOCATED	52	120	86	71.7%	FOX PREDATION
270	RELOCATED	49	100	82	82.0%	FOX PREDATION
271	IN SITU	49	118	111	94.1%	
272	IN SITU	47	89	79	88.8%	
273	IN SITU	47	136	121	89.0%	
274	IN SITU		88	62	70.5%	
275	IN SITU		91	79	86.8%	
276	IN SITU	49	75	70	93.3%	
277	RELOCATED		111	0	0.0%	FOX PREDATION
278	RELOCATED	46	92	29	31.5%	
279	RELOCATED	48	58	26	44.8%	
280	IN SITU		80	77	96.3%	
281	RELOCATED	46	125	92	73.6%	
282	RELOCATED		150	122	81.3%	
283	RELOCATED	47	101	63	62.4%	
284	IN SITU	47	111	91	82.0%	
285	IN SITU		111	93	83.8%	
286	RELOCATED		111	86	77.5%	
287	RELOCATED		122	45	36.9%	
288	IN SITU		110	80	72.7%	
289	IN SITU		88	71	80.7%	
290	RELOCATED		89	81	91.0%	
291	IN SITU	46	106	100	94.3%	
292	IN SITU		105	84	80.0%	
293	IN SITU		99	90	90.9%	
294	RELOCATED		93	81	87.1%	
295	IN SITU		104	91	87.5%	
296	RELOCATED	44	102	85	83.3%	
297	IN SITU		81	65	80.2%	
298	IN SITU		101	74	73.3%	
299	IN SITU		109	90	82.6%	
300	RELOCATED		111	75	67.6%	

301	IN SITU		107	79	73.8%	
302	IN SITU		114	56	49.1%	
303	IN SITU	46	162	39	24.1%	
304	IN SITU		109	30	27.5%	
305	RELOCATED		142	114	80.3%	
306	IN SITU		UNKNOWN	0	0.0%	TS HERMINE - WASHED OUT
307	IN SITU		97	89	91.8%	
308	IN SITU		57	41	71.9%	
309	IN SITU		96	3	3.1%	GHOST CRAB PREDATION
310	IN SITU		78	55	70.5%	
311	RELOCATED		89	0	0.0%	TS HERMINE - WASHED OUT
312	IN SITU		UNKNOWN	0	0.0%	TS HERMINE - WASHED OUT
313	RELOCATED		121	7	5.8%	TS HERMINE - WASHED OUT
314	IN SITU		114	87	76.3%	
315	RELOCATED		89	50	56.2%	TS HERMINE - WASHED OVER
316	RELOCATED		69	35	50.7%	
317	RELOCATED		73	0	0.0%	
318	IN SITU		98	68	69.4%	
319	IN SITU		95	69	72.6%	TS HERMINE - WASHED OVER
320	IN SITU		50	0	0.0%	FOX PREDATION
321	IN SITU		111	0	0.0%	
322	IN SITU		110	75	68.2%	TS HERMINE - WASHED OVER
323	IN SITU		UNKNOWN	0	0.0%	FOX PREDATION
324	RELOCATED		101	0	0.0%	RACCOON PREDATION
325	IN SITU		68	38	55.9%	
326	RELOCATED		89	49	55.1%	
327	RELOCATED		103	0	0.0%	TS JULIA - WASHED OUT
328	IN SITU	54	133	83	62.4%	
329	IN SITU		132	0	0.0%	GHOST CRAB PREDATION
330	IN SITU		UNKNOWN	0	0.0%	TS JULIA - WASHED OUT
331	IN SITU		UNKNOWN	0	0.0%	TS JULIA - WASHED OUT
332	IN SITU		UNKNOWN	0	UNKNOWN	HURRICANE MATTHEW - WASHED OUT
333	RELOCATED		89	0	0.0%	HURRICANE MATTHEW - WASHED OUT