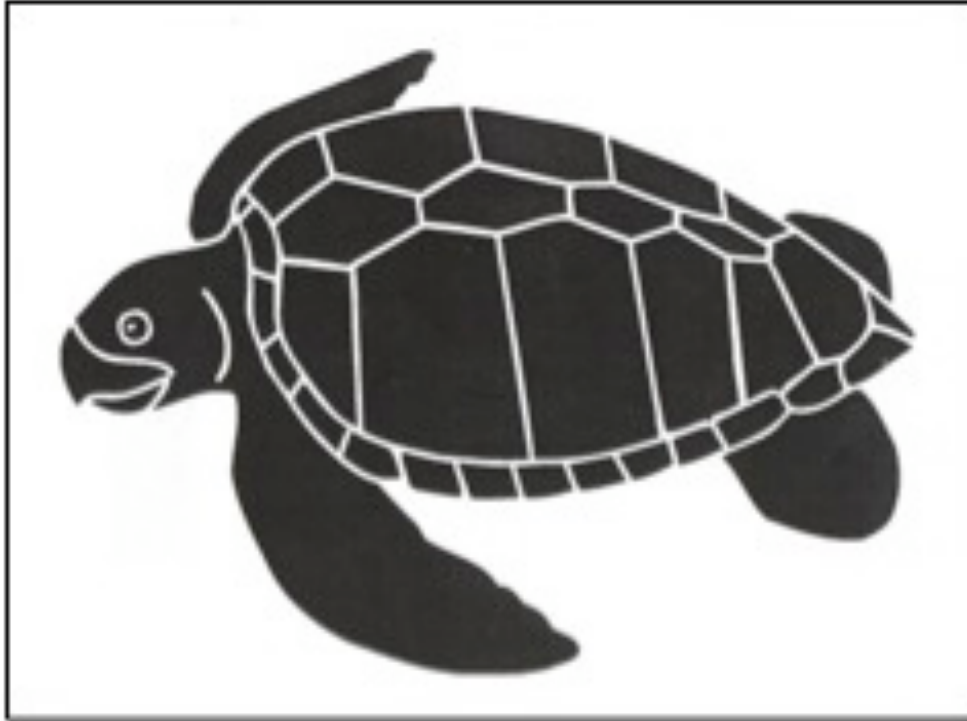


CARETTA RESEARCH PROJECT

ANNUAL REPORT – 2009 SEASON

WASSAW NATIONAL WILDLIFE REFUGE, GA



Prepared by:

Kristina Williams
Project Director
and
Michael Frick
Research Director

Caretta Research Project
P.O. Box 9841
Savannah, GA 31412
912-447-8655
WassawCRP@aol.com

ABSTRACT

The 2009 Caretta Research Project recorded a total of 63 individual loggerhead sea turtles on Wassaw Island. This resulted in 91 nests and 143 false crawls. The average clutch size was 110.1 eggs per nest with an average incubation period of 55 days. All nests were protected by 4' X 4' screening anchored with pencil rod, resulting in minimal predation. The overall hatching success was 68.6% and approximately 6,418 hatchlings reached the water.

INTRODUCTION

The Savannah Science Museum's Caretta Research Project (CRP) is a non-profit research organization based in Savannah, GA. This season was the 37th consecutive year of operation. The project is a hands-on research, conservation and education program that protects the threatened loggerhead sea turtles (*Caretta caretta*) that nest on Wassaw National Wildlife Refuge (WNWR).

The purpose of the CRP is three-fold: 1) to learn more about populations levels, trends and nesting habits of loggerhead sea turtles; 2) to enhance the survival of eggs and hatchlings on a nesting beach where loss to predators and beach erosion historically have been high; and 3) to educate and involve the public in research and conservation efforts. Since 1973, the project has welcomed the help of over 2,830 volunteers. To date, crews have been successful in monitoring 2,646 nests containing about 320,000 eggs, ultimately releasing approximately 194,000 hatchlings into the ocean.

METHODS AND MATERIALS

This year, three leaders, four assistants and 82 volunteers worked on the CRP. Research crews consisting of one island leader, one assistant and up to six volunteers worked week-long shifts from May 16-September 5.

BEACH PATROLS

Nightly patrols began on May 8th and continued through August 8th. Two Kawasaki Mules were used to patrol, beginning shortly after sunset and continuing after sunrise the following morning. Two crews conducted the patrols, each comprised of one CRP staff member and up to three volunteers. Each crew looked for and recorded any signs of turtle activity. Patrols were staggered at various intervals during the night depending on tides, frequency of turtle activity and weather conditions. The beach was checked daily throughout the season for stranded animals.

FALSE CRAWLS AND NESTING

Any turtle crawl observed on Wassaw was identified and examined for evidence of nest deposition. If a turtle or the tracks of a turtle were discovered 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. For each emergence, information regarding date, time and location with respect to the nearest beach marker were recorded, and GPS coordinates were taken.

DATA COLLECTION

When a turtle was observed, crews recorded any existing tags, unusual markings or abnormalities and carapace measurements. Morphometrics were determined using a fiberglass measuring tape and were taken at the longest (curved carapace length-CCL) and widest (curved carapace width-CCW) points on the turtle carapace. Turtles were also surveyed for previously undocumented epibiont species. External flipper tags were located by visually inspecting the flippers of the turtle and all flippers were scanned for the presence of injected Passive Integrated Transponder (PIT) tags. Crawls were recorded as either a false crawl or nest, and given a corresponding number.

TAGGING

Two types of tags were applied to turtles this season. Inconel tags were applied to the second or third proximal scutes along the rear edge of both the right and left flippers. If tags were already present, the numbers were recorded. Turtles were also tagged using Destron brand PIT tags. Prior to the application of a PIT tag, the turtle's flippers were thoroughly scanned for previously implanted tags using a Destron-EX pocket reader. If no PIT tag was detected, a new tag was placed subcutaneously in the central area of the turtle's 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.

CLASSIFICATION OF OBSERVED TURTLES

For the purpose of the following results and discussion, a description of the observed sea turtle population structure, as gleaned from tagging information, is necessary. We use such tagging data to classify an individual turtle as a neophyte, remigrant or immigrant. A neophyte is a turtle that has not previously been tagged (although she may have nested before). By tagging neophytes we can determine if the turtle is a remigrant or an immigrant during future nesting events. A remigrant is a turtle that has been tagged on Wassaw Island before and continues to use Wassaw during subsequent nesting attempts and nesting seasons. An immigrant is a turtle that was previously tagged on a different nesting beach, but will use different islands for nest deposition.

NEST PROTECTION AND RELOCATION

If nesting was not observed and tracks or the presence of a body pit indicated the possibility of a nest, CRP staff initiated a search for the nest chamber. If no eggs were found, the site was recorded as a false crawl. If nesting was observed or a nest was located after a turtle returned to the water, the decision was made whether to leave the nest *in situ* or to relocate the nest away from an area which would be inundated during the next spring tide and to the base of a neighboring dune system. If the nest was to be relocated, the eggs were carefully removed and placed in a 5-gallon bucket filled with a layer of sand for transportation. Any broken eggs discovered due to a turtle covering her clutch or by CRP staff locating the nest were noted on the datasheet and disposed of. At the relocation site, a new egg chamber was dug by hand replicating the size, shape and depth of the original egg chamber. The eggs were carefully counted and transferred into the new chamber, then reburied and labeled. Both original and relocated nest sites were recorded. All relocated nests were moved within the first six hours of deposition.

Two types of protective screening were placed over the nest sites. A 1.5' X 1.5' screen with 0.4" x 0.4" mesh was placed above the egg chamber, covered by a 4' X 4' screen with 2" X 4" mesh. Screens were secured in place by pencil rod anchored in each corner of the large screen. Reflective markers identified the nest locations. Nests were monitored throughout the season for evidence of predation, tidal wash and beach erosion. Predation was recorded for known instances of nest or egg destruction. A notation was recorded in cases where fire ants or ghost crabs had previously entered nest cavities.

NEST HATCHING

After a 45-day incubation period, nests were checked after dusk and following sunrise for signs of hatchling emergence. The small mesh screens were removed from nests to allow for the self-release of emerging hatchlings. Care was taken to check nests following rain and other weather conditions that might have induced a daytime emergence. Evidence of first hatchling emergence was recorded, including depressions in sand or the presence of hatchlings or tracks around the nest. Nest contents were excavated at least three days after first emergence or after an incubation period of 70 days if no evidence of hatching was observed. All nest contents were examined and

recorded, including the number of live and dead hatchlings, the number of egg fragments and the number of unhatched eggs found.

If live hatchlings were found within excavated nests at night, they were immediately released, allowing them to crawl down the beach to the ocean. Live hatchlings found during daylight hours were placed in a 5-gallon bucket containing a layer of sand and kept in a dark, quiet area until release at nightfall. Any live pipped eggs were kept in a bucket filled with sand to allow for further emergence from the eggshell and complete absorption of the yolk sac. Nests that showed signs of fire ants (*Solenopsis invicta* or *S. littoralis*) or ghost crabs (*Ocypode quadrata*) after first emergence were excavated and the hatchlings released.

The number of hatched eggs within each nest was determined by subtracting the number of unhatched eggs within the nest, including dead pipped eggs, from the total number of eggs within the nest cavity. The number of hatched eggs was divided by the total number of eggs within the cavity and multiplied by 100 to determine the hatching success of each nest. Hatchling success or the release rate of each nest was then determined by subtracting the number of dead hatchlings found either in the nest or on the beach from the total number of hatched eggs, divided by the total number of eggs, then multiplied by 100. In the event that the total number of eggs deposited into a nest was unknown, the number of hatched eggs was determined by the number of eggshells (fragment size 50% or greater) found within the cavity. The percent embryonic development of unhatched eggs was also determined. Incubation periods of each nest were determined based on the number of days between egg deposition and first hatchling emergence.

COLLABORATIONS

We are now in our ninth year of collaborative studies with Dr. Dave Rostal at **Georgia Southern University** and we have extended this research to include researchers from the **University of Alabama at Birmingham, Illinois State University and the Duke Center for Marine Conservation at Duke University**. We are investigating the maternal contributions of females to their eggs and hatchlings throughout the season. Temperature dataloggers are placed inside of specific nests to measure clutch temperatures throughout incubation. Blood is taken to assess the physical condition of adult females (i.e. blood proteins, albumin, hematocrit) and to compare these values to egg yolk and albumin composition. Any seasonal changes in the levels of sex hormones and the relation to temperature dependent sex determination are determined. Hatchlings from these nests are collected for additional analysis to determine maternal investment as well as the occurrence of multiple paternity within nests.

This is the fifth year we are collecting data for Brian Shamblin, a doctoral student at the **University of Georgia**. We are collecting biopsies from individual turtles to assess the genetic population structure of eastern U.S. nesting loggerheads. In addition, he will match the DNA of eggs with biopsied females, identifying the females of any nests that are missed on the beach.

We resumed data collection for Hannah Vander Zanden from the **University of Florida at Gainesville** to determine whether sea turtles feed during the reproductive period through the use of stable isotopes and osmolyte biomarkers.

STRANDINGS

The locations of any stranded turtles found on the beach, dead or alive, were recorded on datasheets provided by the Sea Turtle Stranding and Salvage Network (STSSN) based in Miami, FL. Curved length and width of each dead turtle's carapace and plastron were measured using a measuring tape and the condition of the turtle was also recorded. Probable cause of death and species of turtle were determined by necropsies performed by CRP personnel. A picture of the

dead turtle was taken in its original location whenever possible. After examination, a large red “X” was spray-painted on the carapace of each dead turtle before the burial high in the dune area, away from any tidal influence to ensure it didn’t wash away. Complete reports were forwarded to the Georgia Department of Natural Resources.

RESULTS

TAGGING DATA

Turtles were observed on 134 occasions on Wassaw Island. Tagging data indicates that at least 63 individual turtles utilized Wassaw Island during the 2009 season (Appendix A). However, since not all of the turtles were observed, this number does not represent the total number of turtles utilizing the refuge. Thirty-six (57.1%) of the observed turtles were neophytes, 16 (25.4%) were remigrants, 9 (14.3%) were immigrants and 2 (3.2%) were tag-scarred. Three remigrants were identified solely by their PIT tags.

Seven of the 16 remigrants have only been seen during one previous nesting season on Wassaw Island. Two turtles have 2-year histories, two have 3-year histories, one has a 4-year history, one a 5-year history, two 6-year histories and one a 9-year history. The average yearly remigration interval of the 16 remigrants is 2.98 years (range 2-6). The aforementioned turtle that has been seen nine seasons prior to 2009 was first tagged as a neophyte in 1986. She has one of the longest nesting histories with the CRP. Since 1986, she has deposited 31 nests containing 3,809 eggs. Her average hatching success rate is 81%, releasing over 3,000 hatchlings into the ocean.

Sixteen individuals nested more than once on Wassaw Island this season. The average number of observed nests per repeat nester was 2.9 nests (range 2-4 nests). The observed nesting interval for repeat nesters during 2009 ranged from 10-27 days, with an average interval of 16 days.

Nine turtles that nested on Wassaw this year were originally tagged on other Georgia beaches. Six were tagged on Blackbeard Island: three this season and three in previous seasons. Two were tagged on Jekyll in 2007, and one on Little Cumberland in 2007. Three turtles originally tagged on Wassaw nested on Jekyll Island this year: they were all tagged as neophytes in 1994, 1999 and 2006. A leatherback that false crawled on Wassaw in 2005 also nested on Jekyll Island this year.

NEST AND CRAWL DATA

The first sign of loggerhead activity was observed on May 10th and the last on August 19th. A total of 91 nests and 143 false crawls were observed. Thirty-nine nests were left in situ and 52 were relocated to safer areas. Nesting activity peaked in June and occurred across the island (Figures 1 and 2). The overall crawl success was 38.38%, which is lower than the average crawl success of 46.54% (Appendix B). Activity was concentrated on the north end of the island.

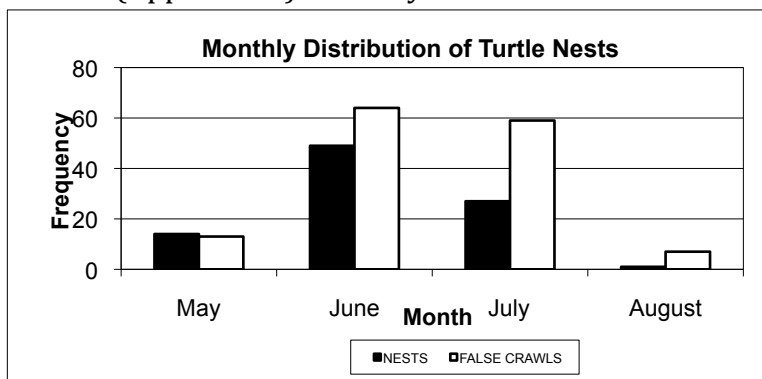


Figure 1. Monthly distribution of nests on Wassaw NWR.

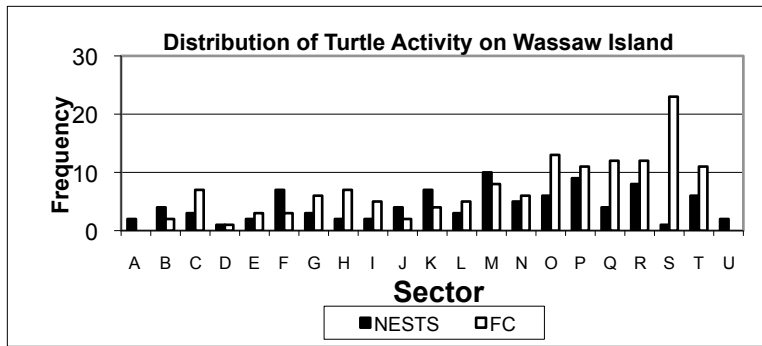


Figure 2. Distribution on nests on Wassaw NWR.

CLUTCH DATA

Ninety-one nests were deposited on Wassaw Island this year, containing a total of 10,017 eggs (15-168) (Appendix C). Raccoons depredated 264 eggs. No nests were lost to human tampering. Five nests were washed over by high tides. The incubation period for both in situ and relocated nests was 55 days and ranged from 48-62 (31) and 49-65 (39) days respectively. The overall hatch rate was 68.6% (0-99.2%). The average hatch rate for *in situ* nests was 62.3% (0-98.9%) (39), and 73.3% (1.7-99.2%) (52) for relocated nests.

A total of 20 broken eggs were encountered this season: fifteen were found broken in the nest, either by the female while she was covering her nest or wrack discovered in the wrack cavity; and 5 were broken by staff trying to locate the nest. An additional 221 eggs were removed from nests for collaborative research studies (see Collaborations section).

Of the 10,017 eggs deposited on Wassaw Island, 6,948 hatched. Five hundred and thirty hatchlings did not make it to the water, as 394 were found dead in the nest and 136 were predated by raccoons, ghost crabs or fire ants. An estimated 6,418 hatchlings reached the water, resulting in a 64.1% release rate.

COLLABORATIVE DATA

Georgia Southern University: Blood samples were taken from 25 individual nesting turtles for hormone and blood composition analysis. Each of these nests had temperature dataloggers placed within and six eggs were collected from each nest. Additionally, up to 20 hatchlings from these nests were collected for maternal effects research.

University of Georgia: Biopsies and eggs were collected from 38 individual turtles, as well as 16 biopsies from non-nesting individuals. Additionally, eggs from 12 missed nests were collected for genetic analysis.

University of Florida: Blood and biopsies were taken from 47 individual turtles for stable isotope analysis. Sixteen of these individuals were bled throughout the season to determine if the turtles were foraging between their nesting events. Biopsies were taken from eight additional individuals.

STRANDINGS

One stranding was found on Wassaw this year. The dead loggerhead was a female and stranded on April 3rd. She was 77.5 cm X 75.5 cm.

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- Mr. Chris Wells for designing and maintaining our website.
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- Custom Car and Truck for undercoating and protecting our Mules.
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APPENDIX A - 2009 INDIVIDUAL TURTLES

Turtle #	Status	Neo #	RF Tag	RF Tag #	LF Tag	LF Tag #	PIT Tag	PIT Tag #	Old PIT Tag #s
1	scarred		new	TTG 134	new	TTG 135	new	4A301E050F	
2	remigrant		old	RRG 341	old	SSX 404	old	444F76591C	
3	neophyte	1	old	TTG 235	old	TTG 126	new	4A1C085409	
4	neophyte	2	new	TTG 132	new	TTG 127	new	4A3723535D	
5	neophyte	3	new	TTG 153	new	TTG 131	new	4A305B1C6D	
6	neophyte	4	new	TTG 149	new	TTG 136	new	4A415E703B	
7	remigrant		new	TTG 185	new	TTG 186	old	44132F1B36	
8	neophyte	5	new	TTG 188	new	TTG 187	new	4A33220B54	
9	remigrant		old	SSX 736	old	TTG 145	old	4414612E60	
10	remigrant		new	YYP 841	old	RRC 779	old	0000171A56	
11	neophyte	6	new	TTG 138	new	TTG 137	new	4A1A11114D	
12	immigrant		new	TTG144	old	TTG 637	old	45252F7120	
13	remigrant		old	RRC 732	old	SSX 241	old	407B596A1B	
14	remigrant		new	TTG 263	new	TTG 177	old	407B612208	
15	remigrant		old	RRG 330	OLD	RRG 378	OLD	44127F7832	
16	remigrant		old	TTG 309	old	TTG 313	old	44137c4e76	
17	neophyte	7	new	TTG 128	new	TTG 146	new	4A43224D0F	
18	neophyte	8	new	TTG 130	new	TTG 157	new	4A3C474057	
19	immigrant		old	YYG 228	old	YYG 227	new	4A42482432	
20	neophyte	9	new	TTG 133	new	TTG 152	new	4A1A73436F	
21	neophyte	10	new	TTG 178	new	TTG 156	new	4A306B5324	
22	remigrant		old	SSX 592	old	SSX 584	old	407D2F442A	
23	remigrant		new	TTG 139	new	TTG 141	old	000133DEB9	4A3F196F3D
24	neophyte	11	new	TTG 118	new	TTG 116	new	462C41642A	4A43224D0F
25	remigrant		old	TTG 393	old	RRC 753	old	0000146509	
26	scarred		new	TTG 142	new	TTG 114	new	462A6A5D2A	
27	neophyte	12	new	TTG 121	old	TTG 124	new	462A222821	
28	neophyte	13	new	TTG 117	new	TTG 113	new	462D3F5849	
29	remigrant		old	YYP 796	old	YYP 684	old	443575736F	
30	neophyte	14	new	TTG 129	new	TTG 298	new	4615151A7C	
31	neophyte	15	new	TTG 122	new	TTG 101	new	462231331B	
32	immigrant		new	TTG 104	old	RRC 931	old	436A330547	
33	neophyte	16	new	TTG 103	new	TTG 108	new	460E133C05	
34	immigrant		new	TTG 109	old	YYB 820	new	457E6B7D77	
35	neophyte	17	new	TTG 198	new	TTG 196			
36	neophyte	18	new	TTG 107	new	TTG 110	new	4613527E29	
37	neophyte	19	new	TTG 195	new	TTG 194	new	4A3074265D	
38	neophyte	20	new	YYP 844	new	TTG 115	new	457E5D4D1A	
39	neophyte	21	new	YYP 849	new	YYP 846	new	46155A1669	
40	remigrant		old	RRG 333	new	TTG 106	old	442C7B523B	
41	neophyte	22	new	TTG 119	new	TTG 111			
42	neophyte	23	new	YYP 838	new	YYP 837	new	4A1C046322	
43	neophyte	24	new	TTG 125	new	TTG 120	new	462B5B4B71	
44	immigrant		old	RRG 116	old	RRG 225	old	4414620775	
45	remigrant		old	SSK 673	old	SSK 412	old	407B143806	
46	neophyte	25	new	YYP 836	new	TTG 189	new	462A502C46	
47	immigrant		old	TTG 121					
48	neophyte	26	new	TTG 190	new	TTG 154	new	46142B556D	
49	neophyte	27	new	YYP 874	new	YYP 875	new	4568196232	
50	neophyte	28	new	TTG 155	new	TTG 193	new	4628721905	
51	neophyte	29	new	YYP 845	new	YYP 842	new	462C59331B	
52	neophyte	30	new	YYP 852	new	TTG 112	new	4622145D06	
53	neophyte	31	new	YYP 822	new	YYP 819	new	461503323E	
54	neophyte	32	new	YYP 853	new	YYP 856	new	4615575366	
55	neophyte	33	new	YYP 828	new	YYP 826	new	457F51772A	
56	immigrant		old	YYP 672	old	YYP 686	old	47091A942B	
57	remigrant		old	RRC 718	old	SSX 782	old	407B55173B	
58	remigrant		new	YYP 863	old	RRG 319	new	462C641C67	
59	immigrant		old	YYG 052			new	4B11432965	
60	neophyte	34	new	YYP 869					

61	neophyte	35	new	YYP 831	new	YYP 834	old	46154D644A	
62	immigrant		old	YYP 721	old	YYP 713	old	44677B6B63	
63	neophyte	36	new	YYP 860	new	YYP 870	new	4B12333B26	

APPENDIX B

Loggerhead Activity on Wassaw Island 1973-2009

*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	DRY RUNS	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
TOTAL	1,728	1,105	5,828	2,646	3,174	46.54

APPENDIX C: Nest Summary for Wassaw Island 2009

Nest #	Nest Loc.	Incubation	Tot # Eggs	Hatched	Success	Notes
1	in situ		110	0	0.00%	
2	in situ		164	1	0.61%	Washed over
3	in situ	62	100	85	85.00%	
4	relocated	56	122	98	80.33%	
5	in situ	52	130	111	85.38%	
6	in situ	58	153	123	80.39%	Washed over
7	in situ	58	99	94	94.95%	
8	in situ	53	148	131	88.51%	
9	in situ	59	110	102	92.73%	
10	in situ	55	130	128	98.46%	Raccoon predation
11	in situ	58	159	144	90.57%	
12	in situ	62	143	136	95.10%	
13	in situ	56	107	95	88.79%	
14	relocated		133	26	19.55%	
15	relocated		97	63	64.95%	
16	in situ	51	103	77	74.76%	
17	relocated	55	145	129	88.97%	
18	relocated	65	61	55	90.16%	
19	relocated	62	82	78	95.12%	
20	relocated	64	90	79	87.78%	
21	in situ		116	0	0.00%	Raccoon predation
22	in situ	52	168	96	57.14%	
23	in situ	51	116	89	76.72%	
24	relocated	55	110	103	93.64%	
25	relocated	54	102	95	93.14%	Raccoon predation
26	relocated	55	126	110	87.30%	
27	in situ	57	84	78	92.86%	
28	in situ	55	121	117	96.69%	
29	relocated	55	139	18	12.95%	
30	in situ	58	109	28	25.69%	
31	in situ		89	88	98.88%	
32	relocated	53	130	123	94.62%	
33	relocated	56	129	26	20.16%	
34	relocated		157	150	95.54%	
35	relocated	56	98	87	88.78%	
36	in situ	54	129	122	94.57%	
37	relocated	52	125	93	74.40%	
38	in situ	58	15	2	13.33%	Washed over
39	in situ	54	128	58	45.31%	
40	relocated	51	153	138	90.20%	Raccoon predation
41	relocated	51	121	105	86.78%	
42	relocated		126	90	71.43%	
43	relocated	53	94	20	21.28%	
44	relocated	50	109	71	65.14%	
45	relocated	58	121	2	1.65%	Raccoon predation
46	relocated	53	75	65	86.67%	Fire ant predation
47	relocated	55	56	42	75.00%	
48	relocated	55	132	75	56.82%	Raccoon predation
49	relocated	51	154	125	81.17%	
50	relocated		82	4	4.88%	
51	relocated	51	108	107	99.07%	Fire ant predation
52	relocated	57	98	38	38.78%	
53	in situ	50	123	108	87.80%	Ghost crab predation
54	in situ	50	118	112	94.92%	Ghost crab predation
55	relocated	55	137	95	69.34%	

Nest #	Nest Location	Incubation	Tot # Eggs	Hatched	Success	Notes
56	relocated	51	137	124	90.51%	
57	relocated	49	59	42	71.19%	
58	relocated	56	148	132	89.19%	
59	in situ	57	97	59	60.82%	
60	in situ	56	117	66	56.41%	
61	in situ	56	61	38	62.30%	
62	in situ	55	60	46	76.67%	
63	relocated	57	52	45	86.54%	Washed over
64	relocated	53	122	110	90.16%	
65	relocated	56	117	116	99.15%	
66	relocated	58	105	87	82.86%	
67	relocated	54	139	132	94.96%	
68	relocated	54	85	69	81.18%	
69	in situ	50	87	0	0.00%	Washed over
70	in situ	59	128	81	63.28%	
71	in situ	48	136	118	86.76%	
72	in situ	52	130	0	0.00%	
73	in situ	52	114	105	92.11%	
74	relocated	52	110	81	73.64%	
75	in situ	55	136	99	72.79%	
76	relocated	58	72	62	86.11%	
77	in situ		96	42	43.75%	
78	relocated	55	87	63	72.41%	
79	relocated	55	111	85	76.58%	
80	relocated	55	57	39	68.42%	
81	relocated		100	91	91.00%	
82	in situ		139	63	45.32%	
83	relocated		127	113	88.98%	
84	relocated		102	90	88.24%	
85	relocated		89	75	84.27%	
86	in situ		102	0	0.00%	Raccoon predation
87	relocated		82	70	85.37%	
88	relocated		79	31	39.24%	
89	relocated		102	97	95.10%	
90	in situ		61	6	9.84%	
91	relocated		87	36	41.38%	Raccoon predation
		55 days	10,017	6,948	68.6%	