Turtle Watch Disorientation Report

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Prepared for:

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Imperiled Species Management
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Summary. This report provides results of hatchling disorientation incidents during the 2025 nesting season on Panama City Beach under Marine Turtle Permit 271. The survey area extends 17.5 miles between St. Andrews State Park and Camp Helen State Park and is covered by two lighting ordinances. Major results are as follows:

- 2576 of 3694 hatchlings (70%) were disoriented by artificial lights from 42 nests, laid by loggerheads and greens, which were checked nightly from July 25 to November 9.
- Disorientation reports were filed for 33 nests, both loggerhead and green, where at least 5 hatchlings were disoriented.
- 1908 disoriented hatchlings were collected during night monitoring, of which 126 were cold stunned and taken to a rehab facility along with one deformed hatchling. The remaining 1781 hatchlings were released on a nearby dark beach within the survey area. An additional 117 cold stunned hatchlings were collected during the morning survey and taken to a rehab facility.
- No dead hatchlings were found during night monitoring, but 8 dead hatchlings were later found on the beach during the morning survey deceased as a result of disorientation.
- Streetlights were one of our top three contributors to disorientation incidents this year. Turtle Watch has encouraged the use of wildlife-friendly streetlights along the coastal highway as part of the Community Redevelopment Agency effort on Panama City Beach.

All disorientation reports have been provided to local code enforcement and submitted into the web-based system of the Florida Fish and Wildlife Conservation Commission (FWC). The following provides detailed results and includes a description of the methodology to quantify disorientations and types of lights contributing to the incidents.

Monitoring Procedure. All nests identified during the morning surveys were marked with four stakes, flagging tape, and informational signs with the nest number. They were checked for evidence of emergence each morning (6-8 am), early evening (7-9 pm), and late night (10-12 pm). The early morning checks were done by paid surveyors starting immediately after the nest was found. Volunteers performed the nightly checks beginning on a date determined from measured sand temperatures in the vicinity of the nest (Reference 1). The morning and early evening checks were performed throughout the hatching season, while the late-night checks were restricted to the period of peak hatching activity, between July 27 and September 15, due to personnel limitations. Throughout the season, volunteers also responded to reports of hatch activity from the public.

Referring to Table 1, the nighttime spot checks were subject to the following monitoring requirements by FWC described in Permit 271:

- Maximum of two volunteers monitoring nests with each check taking no longer than 10 minutes unless there was emergence activity.
- Monitoring personnel required to maintain a log of each spot check.
- Results reported to FWC include start and end times of spot checks, disoriented live and dead hatchlings collected, number of bystanders, and any turtles taken to a rehab facility.

Data Set. Of the 49 loggerhead nests found this season, disorientation was estimated for 42 nests that hatched at night, including those at which no disorientation occurred. Six (6) nests were

excluded from the data set, because they failed to hatch. One (1) nest hatched during daytime hours and was excluded from the data set. Hatched nests were concentrated in the central and western parts of the survey area, as shown in Figure 1.

Method to Quantify Hatchling Disorientation. Reports were filed for nests where 5 or more hatchlings were disoriented by artificial lights. We used two methods to estimate hatchling disorientation. The methodology is summarized below:

- Direct Observation (night checks). Disorientation was documented during nighttime monitoring through direct observation of hatchlings during emergence or from hatchling tracks and live turtles collected shortly after the emergence. The number of disoriented hatchlings included those crawling in the wrong direction away from the water (misoriented) and those showing uncertainty by changing direction or circling (disoriented), regardless of whether they eventually reached the water. Disorientation was confirmed by allowing hatchlings to crawl at least 20 feet before they were collected and released on a nearby dark beach within the survey area. Lights contributing to disorientation incidents were documented mostly during night surveys, immediately after the emergence event. See Reference 1 for more information.
- Post Hatch Observation (morning survey). Disorientation was documented during morning survey monitoring through direct observation of hatchlings tracks and from finding live turtles still on the beach following the prior night's emergence. The number of disoriented hatchlings was estimated by the visible tracks and live and dead turtles collected.

We did not collect data using the Hatchling Orientation Index (HOI) method (Reference 2), which our morning surveyors used in previous years to supplement data obtained from the above methods. While HOI provides a more quantitative approach for assessing hatchling disorientation, surveyors found it to be too time consuming for use in an operational setting, and they also had difficulty calibrating their phone compasses required to measure hatchling direction. We may resume using this method if these problems can be solved.

Method to Quantify Hatchling Mortality. We quantified mortality of disoriented turtles using direct and indirect methods. The direct method involved collecting dead hatchlings which are typically found in the dunes but sometimes on the road after an emergence. This number underestimates actual mortality, because disoriented hatchlings are difficult to find once they enter dune vegetation, where they are vulnerable to predation by ghost crabs and feral cats prevalent on our beach. Therefore, we also used an indirect method that assumed mortality occurred for any track entering the dune without exiting or the tracks ended at a crab hole where no hatchling was found. Adding this value to the count of dead turtles collected provides a more realistic estimate of mortality from artificial lights.

Hatchling Disorientation Results. Table 2 shows main emergence results for nests that hatched at night. The column "Total Emerged" represents the main emergence, excluding small numbers that may have emerged before or after. Also provided is information on the time of emergence, number of live disoriented hatchlings collected during the day and night, dead disoriented hatchlings collected during the day and night, and whether a disorientation report was filed. Results are as follows:

- Combined hatchling disorientation was 70% based on volunteer and surveyor documented disorientation (42 nests; 35 loggerhead and 7 green).
- 2025 (1443 loggerhead and 582 green) disoriented hatchlings were collected during nighttime or morning monitoring. Of this total:
    - 1781 disoriented hatchlings (1442 loggerhead and 339 green) collected during nighttime monitoring were released on a dark beach within our survey area.
    - 243 cold stunned green hatchlings collected at night (126) and during morning (117) were taken to the FWC authorized rehab facility, Gulf World Marine Institute (GWMI), where they were slowly warmed up and then released into the Gulf via boat. Air temperatures were in the 40s at the time of both hatches.
    - One deformed loggerhead hatchling collected at night was taken to GWMI and released the following night.
- Eight (8) dead turtles were collected on the beach after the disorientation event was documented, and 14 hatchlings were lost in dune vegetation or crab holes and assumed to have perished.
- Figure 2 shows lights contributing to 33 disorientation incidents. Condo exterior lights were the largest contributor at 21%, followed by urban glow and streetlights which contributed 20% and 16%, respectively.
- Turtle Watch reached out to Panama City Beach officials to urge the use of wildlife-friendly streetlights associated with the Community Redevelopment Agency (CRA) effort on Front Beach Road. We also submitted comments to the Florida Department of Environmental Protection on a proposed lighting plan for the upcoming CRA Segment 4.2. We received confirmation from FWC that the CRA project will use a FWC-approved streetlight fixture with an amber light source and appropriate shielding.
- Log sheet results of nighttime monitoring (Table 1) are available at https://docs.google.com/spreadsheets/d/1yiHwsYBGgoizMchFHtPUWLolpk50DNDG/edit?usp=drive_link&ouid=101840964247469977202&rtpof=true&sd=true

References

1. Watson, K.P and Lamont, M.M. 2021. Temperature-based modeling of incubation period to protect loggerhead hatchlings on an urban beach in Northwest Florida. Journal of Experimental Marine Biology and Ecology. 546. 10.1016/j.jembe.2021.151647.

2. Hirama, S., 2018. Evaluation of the impact of artificial lighting on sea turtle hatchling orientation. Ph.D. dissertation, University of Florida, Gainesville, FL, 127 pages.

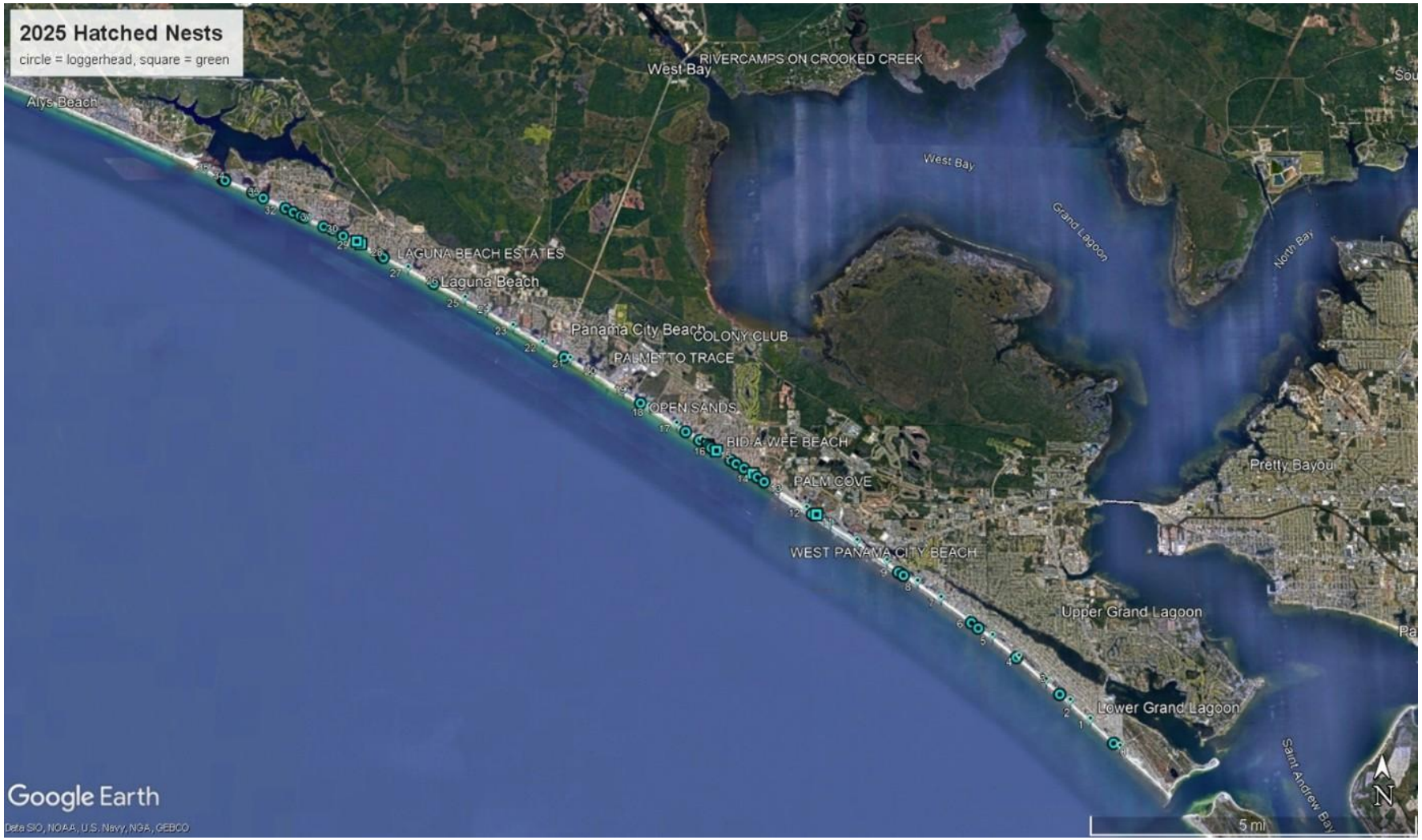

Figure 1. Map showing location of nests with nighttime emergences of 5 or more hatchlings in 2025 (35 loggerhead nests, 7 green nests).

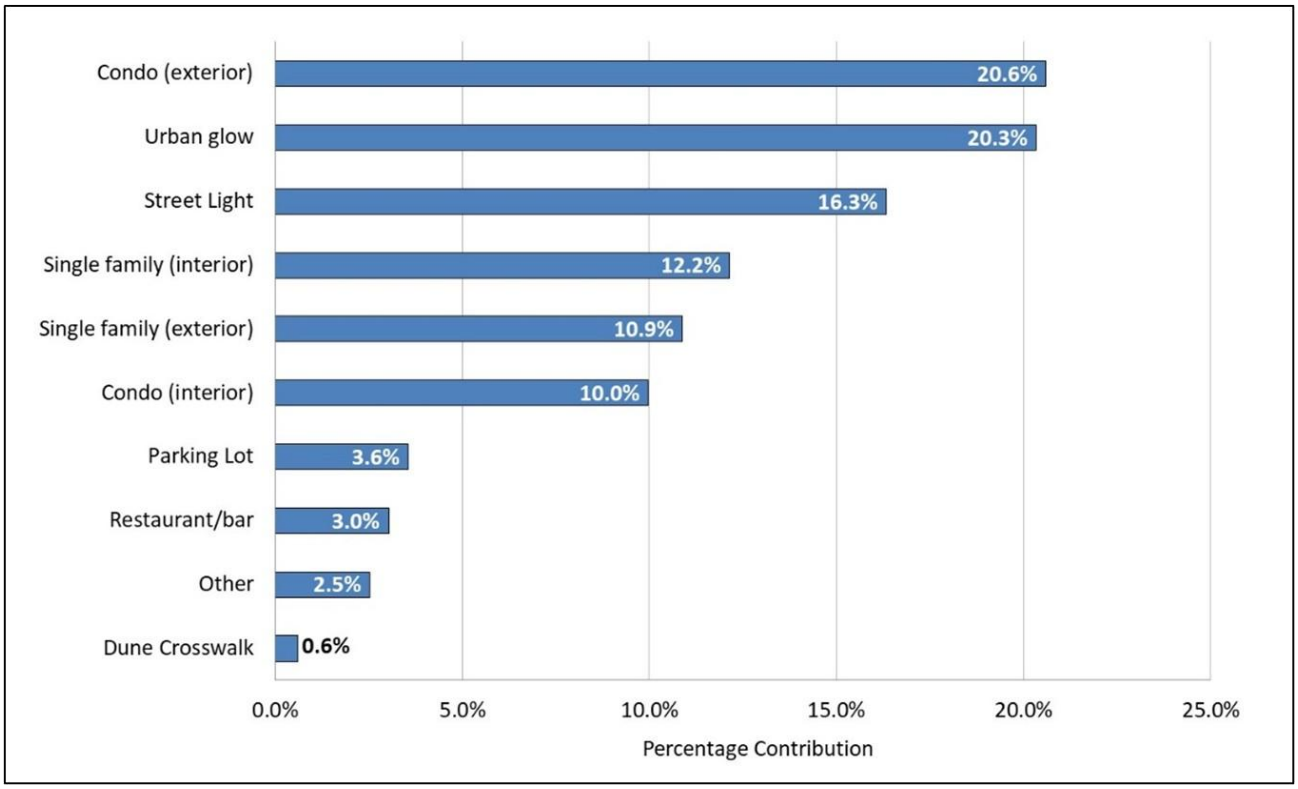

Figure 2. Lights contributing to hatchling disorientation incidents on Panama City Beach in 2025 (28 loggerhead nests, 5 green nests).

Table 1. Reporting requirements for nighttime hatchling monitoring under MTP-271.

Item	Requirement
1	Date disoriented hatchling recovery activities were initiated
2	Date disoriented hatchling recovery activities were terminated
3	Total number of disorientation events documented
4	Spreadsheet providing information related to each nest check; a spreadsheet related to each disorientation event response and an evaluation of the 2025 season. The spreadsheet of nest checks must list for each nest subject to nest checks, minimally: a. nest ID; b. date nest discovered; c. projected hatch date; d. date and time (i.e., HH:MM) of arrival for each nest check; e. date and time (i.e., HH:MM) of departure from each nest check; f. time at nest g. nest status at each check
5	Disorientation event spreadsheet in the summary must list for each disorientation event, minimally: a. date of the event; b. time Authorized Personnel arrived at the nest (i.e., HH:MM); c. time Authorized Personnel departed the nest (i.e., HH:MM); d. form of event notification (i.e., call, text or nest check); e. time of the notification if call or text (i.e., HH:MM); f. time of disorientation event (HH:MM 24hr clock) g. number of Authorized Personnel present at the event; h. number of public present at the event; i. number of live disoriented hatchlings recovered; j. number of dead disoriented hatchlings recovered; k. number of live disoriented hatchlings released; l. number of disoriented turtles transported to an FWC-authorized sea turtle rehabilitation facility
6	Summary sent to MTP@MyFWC.com or uploaded as a report to this permit within FWC's Online Permit System

Table 2. Nighttime hatchling emergences on Panama City Beach in 2025 (36 Cc loggerhead nests, 7 Cm green nests). Data include live and dead hatchlings collected at night and during the morning survey (see notes).

Nest No.	Species	Nearest Landmark	Incident Date	Emergence Time	Total Emerged	Number Disoriented	Percent Disoriented	Nighttime Live Collected	Nighttime Dead Collected	Daytime Live Collected	Daytime Dead Collected	Report Filed
1	Cc	House, 406 Beachside Dr, Carillon Beach	28-Jul	Before 11PM	94	94	100%	19	0	0	1	Y
3	Cc	House, 13213 Oleander Dr	3-Aug	Before 10:04 PM	79	77	97%	26	0	0	0	Y
4	Cc	House, 21511 Front Beach Rd	28-Jul	Before 10:17 PM	88	88	100%	15	0	0	0	Y
5	Cc	House, 20639 Front Beach Rd	28-Jul	9:13 PM	85	85	100%	80	0	0	0	Y
6	Cc	House, 20627 Front Beach Rd	31-Jul	Before 8:48 PM	88	88	100%	34	0	0	0	Y
7	Cc	Landmark Condo, 17501 Front Beach Rd	30-Jul	Daytime (Note 1)	0	0	0%	1 (Note 1)	0	0	0	N
8	Cc	Shoreline Villas, 23007 Front Beach Rd	2-Aug	9:31 PM	83	62	75%	62	0	0	0	Y
9	Cc	Hampton Inn & Suites, 15505 Front Beach Rd	31-Jul	10:11 PM	88	88	100%	91 (Note 2)	0	0	0	Y
10	Cc	House, 13105 Oleander Dr	8-Aug	8:15 PM	78	14	18%	14	0	0	0	Y
11	Cc	House, 14208 Front Beach Rd	9-Aug	8:04 PM	87	36	41%	36	0	0	0	Y
12	Cc	Moonspinner Condo, 4425 Thomas Dr	1-Aug	9:16 PM	131	130	99%	130	0	0	0	Y
13	Cc	Vacant lot, 22209 Front Beach Rd	7-Aug	11:16 PM	116	0	0%	0	0	0	0	N
14	Cc	House, 288 Beachside Dr, Carillon Beach	6-Aug	Before 9:08 PM	77	0	0%	0	0	0	0	N
15	Cc	Boardwalk Beach Hotel and Convention Center, 9600 S Thomas Dr	7-Aug	After 10:34 PM and before sunrise	114	0	0%	0	0	0	0	N
17	Cc	House, 22421 Front Beach Rd	19-Aug	10:04 PM	2	0	0%	0	0	0	0	N
18	Cc	House, 8011 Surf Dr	20-Aug	9:32 PM	32	32	100%	33	0	0	0	Y

								(Note 2)				
19	Cc	House, 286 Beachside Dr, Carillon Beach	15-Aug	Around 11 PM	70	70	100%	0	0	0	0	Y
21	Cc	House, 5625 Gulf Dr	12-Aug	Between 8PM and 10PM	116	116	100%	106	0	0	0	Y
22	Cc	Beachcomber, 17101 Front Beach Rd	15-Aug	Before 9:36 PM	127	127	100%	58	0	0	0	Y
23	Cc	Days Inn, 12818 Front Beach Rd	19-Aug	8:56 PM	89	89	100%	94 (Note 2)	0	0	0	Y
24	Cc	House, 6619 Gulf Drive	22-Aug	7:30 PM	86	78	91%	78	0	0	0	Y
25	Cc	House, 13401 Oleander Dr	18-Aug	7:23 PM	73	0	0%	0	0	0	0	N
26	Cc	House, 21304 Front Beach Rd	25-Aug	9:09 PM	38	37	97%	37	0	0	0	Y
28	Cc	House, 278 Beachside Dr, Carillon	25-Aug	After 11PM and before sunrise	71	70	99%	0	0	0	0	Y
29	Cc	House, 20611 Front Beach Rd.	1-Sep	9:05 PM	60	46	77%	46	0	0	0	Y
30	Cc	House, 13902 Front Beach Rd	30-Aug	9:45 PM	91	91	100%	98 (Note 2)	0	0	0	Y
31	Cm	House, 264 Belaire Dr	6-Sep	Between 8PM and 9:05 PM	40	0	0%	0	0	0	0	N
32	Cc	Edgewater Beach Resort, 11757 Front Beach Rd	2-Sep	8:51 PM	95	91	96%	91	0	0	0	Y
33	Cc	House, 22105 Front Beach Rd	4-Sep	9:05 PM	100	12	12%	12	0	0	0	Y
34	Cm	House, 21018 Front Beach Rd	1-Sep	10:20 PM	110	1	1%	1	0	0	0	N
35	Cc	House, 9610 Beach Blvd	10-Sep	9:07 PM	97	95	98%	95	0	0	0	Y
37	Cc	House, 14000 Front Beach Rd	13-Sep	9:05 PM	79	79	100%	79	0	0	0	Y
38	Cc	House, 7833 Surf Dr	19-Sep	9:05 PM	59	56	95%	56	0	0	0	Y
39	Cm	Edgewater, 11619 Front Beach Rd	11-Sep	12:20 AM	123	89	72%	89	0	0	0	Y

40	Cc	House, 21715 Front Beach Rd	16-Sep	>9:05PM and before sunrise	90	90	100%	0	0	0	3	Y
41	Cc	Emerald Shores, 19504 Front Beach Rd	19-Sep	9:51 PM	64	52	81%	52	0	0	0	Y
42	Cc	Runaway Island Restaurant, 14521 Front Beach Rd	25-Sep	6:50 PM	94	0	0%	0	0	0	0	N
43	Cc	Hooters, 12705 Front Beach Rd	29-Sep	Between 9:19 PM and 6AM	87	87	100%	0	0	0	4	Y
44	Cm	House, 14002 Front Beach Rd	30-Sep	1:05 AM	131	121	92%	121	0	0	0	Y
45	Cc	Sunnyside Beach and Tennis Resort, 22400 Front Beach Rd	5-Oct	6:28 PM	87	0	0%	0	0	0	0	N
46	Cm	House, 14002 Front Beach Rd	11-Oct	10:35 PM	127	127	100%	128 (Note 2)	0	0	0	Y
47	Cm	House, 13708 Front Beach Rd	3-Nov	Between 10:45 PM and 6AM	120	32	27%	0	0	117 (Note 3)	0	Y
49	Cm	Holiday Inn Express, 12907 Front Beach Rd	9-Nov	Between 9:30 PM and 11PM	128	126	98%	126 (Note 3)	0	0	0	Y
				TOTAL	**3694**	**2576**	**69.7%**	**1908**	**0**	**117**	**8**	

Notes: (1) Main emergence during day; one live deformed straggler collected at night and taken to rehab facility
(2) Live collected exceeds total emerged from excavation results (source of error unknown)
(3) Hatchlings emerged at night became cold stunned hatchlings and taken to rehab facility