

St. Andrew Bay
RESOURCE MANAGEMENT ASSOCIATION
Post Office Box 15028
Panama City, Florida 32406
www.sabrma.org

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Kennard Watson, Turtle Watch Coordinator
St. Andrew Bay Resource Management Association
6509 Palm Court
Panama City Beach, Florida 32408

Robbin Trindell, Ph.D.
Imperiled Species Management
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600

Dear Robbin:

This letter summarizes results of disorientation incidents during the 2016 nesting season on Panama City Beach (Permit 038). We estimated a combined disorientation rate of 71% for hatchlings that emerged from 26 loggerhead nests that hatched at night. Additionally, three adult female loggerheads were disoriented on the beach. These incidents were documented in 24 hatchling reports and three adult turtle reports. All have been provided to local code enforcement with copies to the Florida Fish and Wildlife Conservation Commission (FWC). The following provides detailed results and includes a description of the survey area, methodology to quantify disorientations, and types of lights contributing to disorientation incidents.

Survey Area, Nest Marking, and Monitoring Procedure. The survey area extends 17.6 miles between St. Andrews State Park and Camp Helen State Park. This entire area is under two lighting ordinances, passed in 2009 by the City of Panama City Beach and Bay County. The ordinances became effective in 2013. Of the 55 loggerhead nests found here in 2016, all but one were marked with four stakes, orange survey tape, and an informational sign with the nest number. We checked the marked nests for signs 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 the nesting surveyors, while volunteers performed the early evening and late-night checks. The start date for nighttime monitoring was determined from the measured sand temperature in the vicinity of the nest (typically after incubation day 50). Nighttime monitoring of the nests is not required by our permit but is performed due to the serious lighting problems in our survey area.

Method to Quantify Hatchling Disorientations. We submit disorientation reports only for main emergences and not for small numbers of hatchlings that may emerge before or after. All reports are submitted electronically to local code enforcement officers and FWC during the season, usually within three days of the incident. Most are documented during night surveys by volunteers who are at the nest when the hatchlings emerge or arrive shortly after the emergence while hatchlings are still on the beach and tracks are fresh. Volunteers collect disoriented hatchlings and estimate the number of turtles reaching the water by observing the animals or counting tracks. Volunteers note the location of lights affecting the hatchlings and document the sky condition at the time of emergence, including the presence or absence of moonlight. When volunteers are present during the emergence, the number of disoriented hatchlings is

determined by how many the volunteers collect, in addition to any turtles observed reaching the water after wandering. Nest excavation data are used to adjust some disorientation estimates. For example, if volunteers arrive after an emergence and see all tracks leading away from the water, the nest is assumed to have 100% disorientation and the number of disoriented hatchlings is obtained from the excavation data. Disoriented turtles collected at the nest site are released the same night at Sunnyside Beach, the darkest part of our survey area.

Beginning in 2015, we also collected data using an alternative method, called the Hatchling Orientation Index (HOI), to quantify hatchling disorientation. In 2015 we used a hand-held sighting compass to measure the angular range of hatchling tracks emerging from the nest. This year we took compass measurements using an iPhone app provided by Shigetomo Hiramasa from FWC. Three types of data were collected with the phone compass, as shown in Figure 1. Ocean direction is the angle of a line perpendicular to the shoreline at the nest location, pointing toward the water. Mode is the bearing of the most frequent hatchling direction, as estimated by the observer. Finally, angular range consists of the difference between two angles representing bearings of the most widely separated hatchling tracks. Mode and angular range are measured from the nest location to the point where tracks cross a 10-meter radius circle centered on the nest. Additional information can be found in the paper “A Hatchling Orientation Index for Assessing Orientation Disruption from Artificial Lighting,” by Witherington, Crady, and Bolen (1996).

Hatchling Disorientation Results. Of the 55 loggerhead nests found in 2016, main emergence results for 26 nests that hatched at night are shown in Table 1, including those at which no disorientation occurred. Twenty nine (29) nests were excluded from the sample. Of these, 18 failed to hatch due to flooding or wash-out from storms, one hatched during daylight hours, and 10 hatched nests were excluded because disorientation could not be quantified or only a small number of hatchlings emerged (<10). The column for “Total Emerged” represents the main emergence which excludes stragglers that may have emerged before or after. Information also is provided on the time of hatchling emergence, if known, and the method used to document the emergence. Results show that 1481 of 2082 hatchlings were disoriented by artificial lights, giving a combined disorientation of 71%. Turtle Watch personnel observed the main emergence at 21 nests. The remaining 5 were documented by tracks observed and hatchlings collected after the emergence, either at night or during the morning survey. While most of the disoriented turtles were rescued by Turtle Watch personnel, mortality was documented at two nests (7, 53). The most severe incident was at nest 53, located at 15525 Front Beach Rd, where 15 dead turtles were collected on Front Beach Rd. This nest was missed by the morning surveys and was discovered when hatchlings emerged and reported by the public. Figure 2 shows locations of all disorientation incidents in 2016.

Hatchling Orientation Index Results. Table 2 shows results for 22 nests for which HOI data were collected. Information consists of the measured ocean direction, mode, and angular range of the hatchling tracks (results included for standard method for comparison). The data were used to classify hatched nests as either disoriented or not disoriented using the following procedure. A nest was not disoriented if the mode was within ± 45 degrees of the ocean direction and the angular range also was within ± 45 degrees. Otherwise, the nest was classified as disoriented. Only 2 of the 22 nests were not disoriented using this approach, giving an overall disorientation rate of 91%.

Adult Disorientation Results. Nesting loggerheads became disoriented at 4% of the nests found this year (2 of 55 nests). Additionally, one turtle became disoriented on the beach without nesting. Table 2 shows results of the three incidents. Each was assessed based on a wandering track found during the morning survey after the turtle had returned to the water. The most serious incident occurred at nest 20, located at 20723 Front Beach Rd, where a loggerhead became disoriented after nesting and crawled over 360 ft before entering the water, encountering numerous obstacles along the way. Figure 3 shows pictures of the track when the nest was found.

Lights Contributing to Hatchling Disorientation. Figure 4 shows the types of lights contributing to hatchling disorientation incidents this year. Indirect lighting from urban glow was the largest contributor at 23%, followed by exterior condo lights (21%) and street lights (13%). Dune crosswalks contributed 11% due to unshielded lights at Carillon Beach walkovers.

Discussion. Hatchling disorientation rates were much higher than last year when we measured a combined disorientation rate of 50%. While there is no obvious explanation for this year's increase, the results point to the continuing need for effective enforcement of the lighting ordinance. Problem lights identified in Figure 3 indicate that efforts should focus on reducing beachfront lighting from condos, homes, dune crossovers, and street lights. To encourage compliance, funds to retrofit lights at beachfront developments are available from the Sea Turtle Conservancy (STC) as part of a grant from the National Fish and Wildlife Foundation (NFWF) following the BP Deepwater Horizon Spill. STC is currently working with four condos on Panama City Beach to change their exterior light fixtures. Finally, we will continue to work with Mr. Hirama of FWC to develop improved methods to measure hatchling disorientation on our urban beach.

If you have questions on this material, please contact me during business hours at (850) 238-9895 or at pcbturtle@yahoo.com. Thanks.

Sincerely,

Kennard Watson

Kennard Watson
Turtle Watch Coordinator

cc: Tomo Hirama FWC

Table 1. Nighttime loggerhead hatchling emergences on Panama City Beach in 2016 (26 nests).

Nest No.	Nearest Landmark	Incident Date	Emergence Time	Total Emerged	Number Disoriented	Percent Disoriented	Method Used to Document Hatchling Emergence	Report Filed
1	House, 14118 Front Beach Rd	28-Jul	8:15 PM	100	100	100%	Night survey: hatchlings observed emerging from nest	No
2	House, 19214 Front Beach Rd	26-Jul	8:55 PM	74	74	100%	Night survey: hatchlings observed emerging from nest	Yes
5	House, 19404 Front Beach Rd	3-Aug	9:38 PM	101	101	100%	Night survey: hatchlings observed emerging from nest	Yes
9	Runaway Island Restaurant, 14521 Front Beach Rd	15-Aug	8:05 PM	71	33	46%	Night survey: hatchlings observed emerging from nest	Yes
11	Gulf Crest Condo, 8715 Surf Dr	20-Aug	8:15 PM	105	105	100%	Night survey: hatchlings observed emerging from nest	Yes
12	Dunes of Panama Condo, 7205 Thomas Dr	14-Aug	7:50 PM	104	8	8%	Night survey: hatchlings observed emerging from nest	Yes
13	Ramsgate Condo, 23011 Front Beach Rd	14-Aug	8:45 PM	87	0	0%	Night survey: tracks identified	No
14	Tidewater Beach Resort, 16819 Front Beach Rd	21-Aug	8:25 PM	88	88	100%	Night survey: hatchlings observed emerging from nest	Yes
15	House, 19987 Front Beach Rd	13-Aug	10:00 PM	85	85	100%	Night survey: hatchlings observed emerging from nest	Yes
16	Days Inn, 12818 Front Beach Rd	22-Aug	9:00 PM	38	38	100%	Night survey: hatchlings observed emerging from nest	Yes
20	Sugar Sands Motel, 20723 Front Beach Rd	25-Aug	10:50 PM	21	20	95%	Night survey: hatchlings observed emerging from nest	Yes
21	House, 286 Beachside Dr, Carillon Beach	25-Aug	8:50 PM	93	93	100%	Night survey: tracks identified and hatchlings collected	Yes
22	House, 400 Beachside Dr, Carillon Beach	24-Aug	10 PM to 8 AM	84	84	100%	Morning survey: tracks identified	Yes
23	Vacant lot, 17851 Front Beach Rd	25-Aug	8 PM to 10:27 PM	73	73	100%	Night survey: tracks identified and hatchlings collected	Yes
24	Boardwalk Beach Resort, 9500 S. Thomas Dr	31-Aug	9:16 PM	69	69	100%	Night survey: hatchlings observed emerging from nest	Yes
25	House, 22221 Front Beach Rd	30-Aug	10:43 PM	55	55	100%	Night survey: hatchlings observed emerging from nest	Yes
26	House, 382 Beachside Dr, Carillon Beach	30-Aug	10:30 PM	101	101	100%	Night survey: hatchlings observed emerging from nest	Yes

27	House, 382 Beachside Dr, Carillon Beach	28-Aug	12:29 AM	69	69	100%	Night survey: hatchlings observed emerging from nest	Yes
32	House, 8207 Surf Dr	4-Sep	8:23 PM	91	91	100%	Night survey: hatchlings observed emerging from nest	Yes
34	House, 19816 Front Beach Rd	10-Sep	8:35 PM	87	7	8%	Night survey: hatchlings observed emerging from nest	No
36	Townhouse, 17477 Front Beach Rd	13-Sep	10:31 PM	113	6	5%	Night survey: hatchlings observed emerging from nest	No
39	Townhouse, 21000 Front Beach Rd	8-Sep	9:45 PM	105	0	0%	Night survey: hatchlings observed emerging from nest	No
41	Shores Condo, 22519 Front Beach Rd	13-Sep	10:35 PM	65	0	0%	Night survey: hatchlings observed emerging from nest	No
45	Days Inn, 12818 Front Beach Rd	19-Sep	10:07 PM	64	42	66%	Night survey: hatchlings observed emerging from nest	Yes
48	Ramsgate Condo, 23011 Front Beach Rd	22-Sep	8:50 PM	95	95	100%	Night survey: hatchlings observed emerging from nest	Yes
54	House, 22115 Front Beach Rd	11-Oct	6 AM to 12 noon	44	44	100%	Morning survey: tracks identified	Yes
TOTAL				2082	1481	71.1%		

Table 2. Hatchling Orientation Index results for loggerhead hatchling emergences on Panama City Beach in 2016 (22 nests).

Nest Data			Hatchling Orientation Index				Turtle Watch Method		
Nest No	Emergence Date	Emergence Time	Ocean Direction (deg)	Mode (deg)	Range (deg)	Disoriented (Yes or No)	Night Emerged	Total Disoriented	Percent Disoriented
5	3-Aug	9:38 PM	210.0	117.0	34.0	Y	101	101	100%
7	6-Aug	before 10 PM	205.0	353.0	319.0	Y	UNK	>50	UNK
11	20-Aug	8:15 PM	211.5	6.0	242.0	Y	105	105	100%
12	14-Aug	7:50 PM	201.5	274.0	62.0	Y	104	8	8%
13	14-Aug	8:45 PM	190.0	267.0	60.0	Y	87	0	0%
14	21-Aug	8:25 PM	212.0	95.0	76.0	Y	88	88	100%

15	13-Aug	10:00 PM	189.5	52.0	27.0	Y	85	85	100%
16	22-Aug	9:00 PM	207.5	58.0	87.0	Y	38	38	100%
21	25-Aug	8:50 PM	202.0	12.0	291.0	Y	93	93	100%
22	24-Aug	10 PM to 8 AM	200.5	37.0	16.0	Y	84	84	100%
23	25-Aug	8 PM to 10:27 PM	155.5	123.0	185.0	Y	73	73	100%
24	31-Aug	9:16 PM	212.0	53.0	106.0	Y	69	69	100%
26	30-Aug	10:30 PM	205.0	50.0	286.0	Y	101	101	100%
27	28-Aug	12:29 AM	178.5	16.0	54.0	Y	69	69	100%
34	10-Sep	8:35 PM	180.5	164.0	162.0	Y	87	7	8%
36	13-Sep	10:31 PM	171.0	288.0	30.0	Y	113	6	5%
37	12-Sep	UNK	192.0	255.0	177.0	Y	17	UNK	UNK
39	8-Sep	9:45 PM	167.5	201.0	38.0	N	105	0	0%
41	13-Sep	10:35 PM	209.5	200.0	30.0	N	65	0	0%
45	19-Sep	10:07 PM	166.0	190.0	124.0	Y	64	42	66%
48	22-Sep	8:50 PM	204.0	108.0	182.0	Y	95	95	100%
54	11-Oct	6 AM to 12 noon	189.0	124.0	67.0	Y	44	44	100%

TOTAL 90.9%

Table 2. Adult loggerhead disorientation incidents on Panama City Beach in 2016 (2 nests, 1 false crawl).

Crawl No.	Crawl Type	Nearest Landmark	Incident Date	Observations	Report Filed
19	False Crawl	House, 17883 Front Beach Rd	25-Jun	Turtle crawled over 100 ft along shoreline without nesting.	Yes
20	Nest	Sugar Sands Motel, 20723 Front Beach Rd	27-Jun	Turtle crawled over 360 ft along shoreline before returning to water after nesting.	Yes
34	Nest	House, 19816 Front Beach Rd	9-Jul	Turtle crawled over 100 ft along shoreline before returning to water after nesting.	Yes

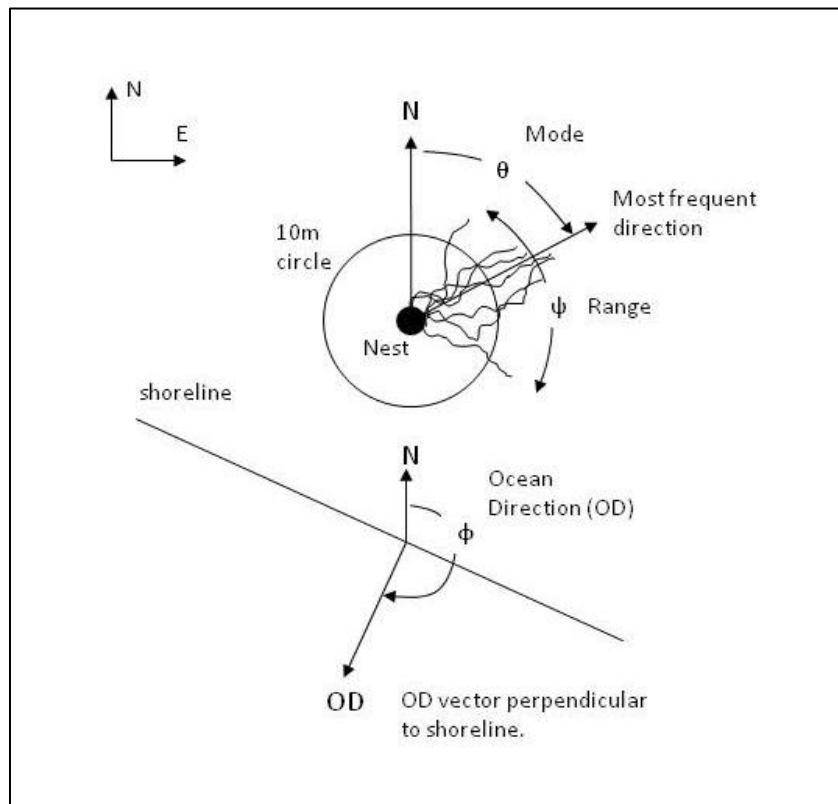


Figure 1. Definition of variables used in the Hatchling Orientation Index.

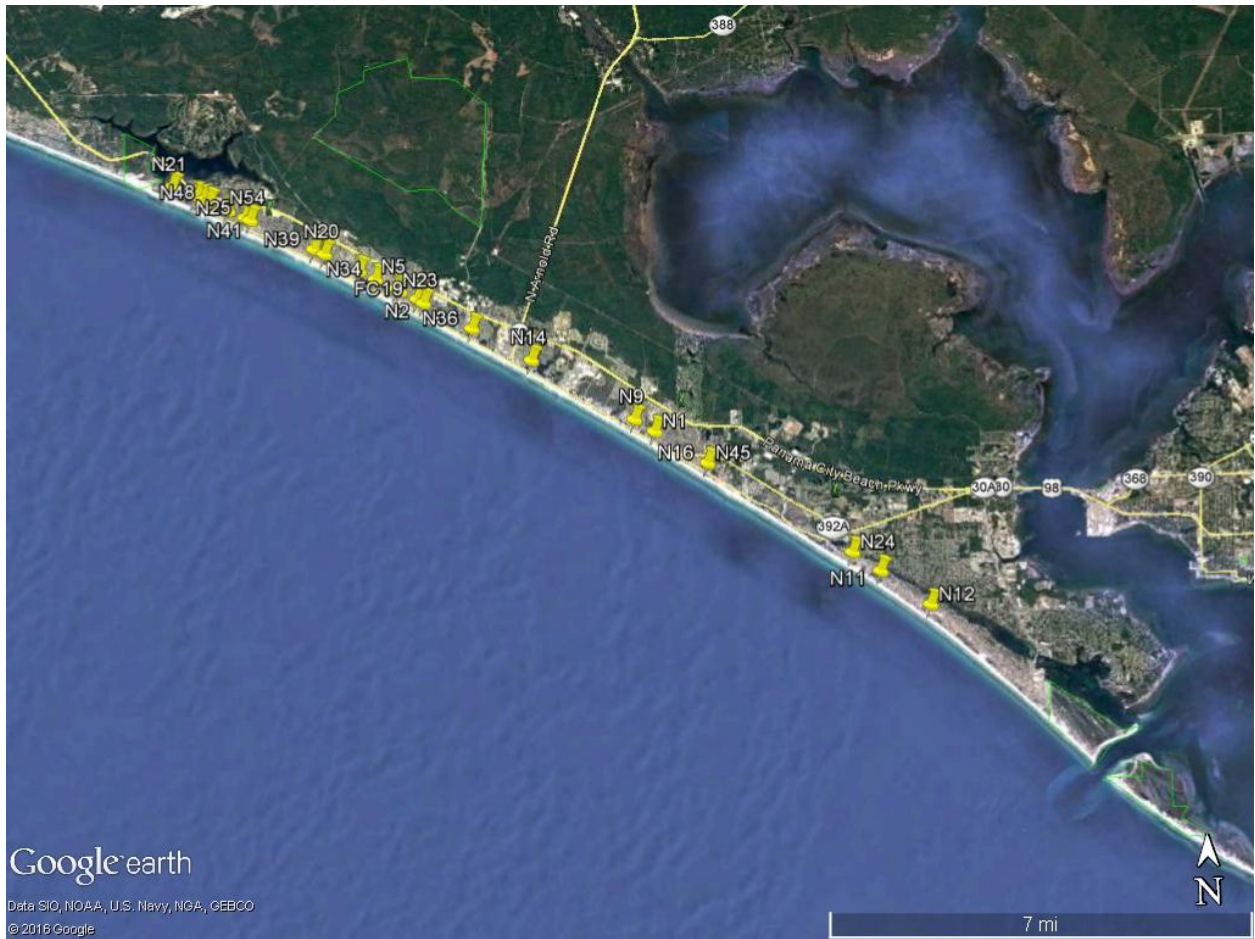


Figure 2. Map showing locations of loggerhead disorientation incidents on Panama City Beach in 2016 (26 nests, 1 false crawl).



Figure 3. Pictures of track at nest 20 where loggerhead became disoriented after nesting.

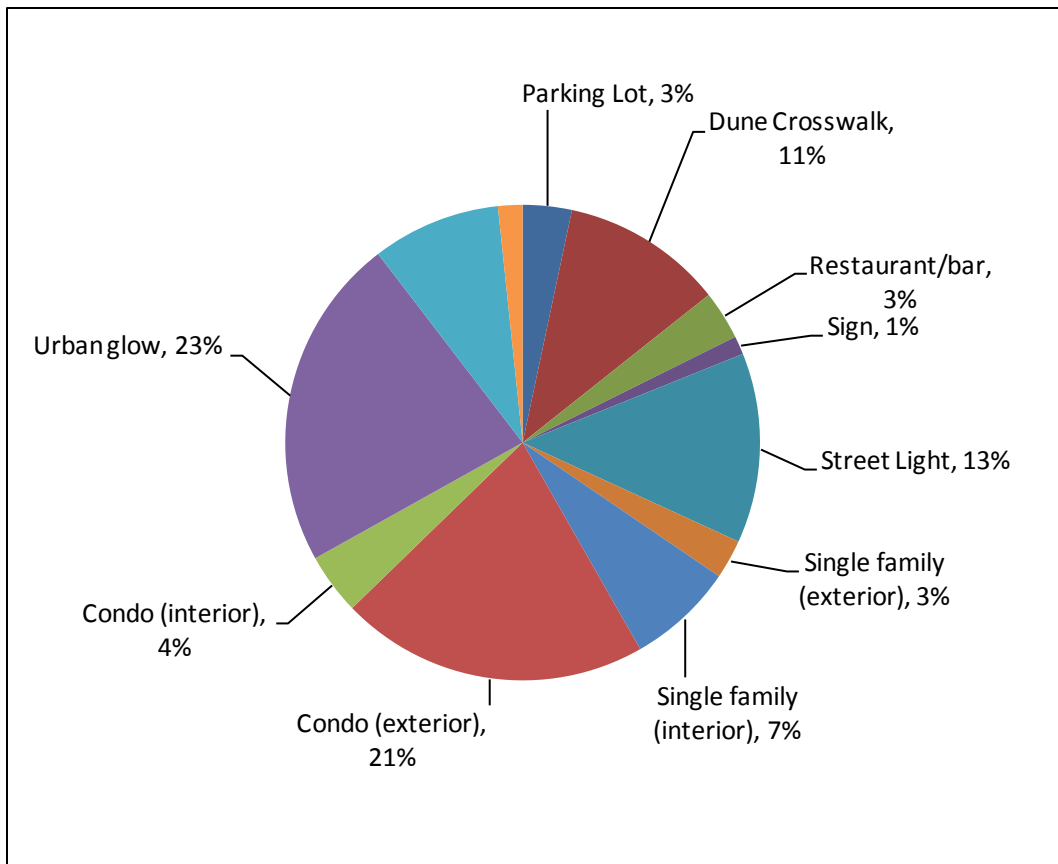


Figure 4. Lights contributing to loggerhead hatchling disorientation incidents on Panama City Beach in 2016 (20 nests).