27 October 2020

Kennard Watson, Director
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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 2020 nesting season on Panama City Beach (Permit 038). 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:

- 611 of 1040 loggerhead hatchlings that emerged at night were disoriented by artificial lights for a combined disorientation of 58.8%.
- 328 disoriented loggerhead hatchlings were released on a nearby dark beach.
- Mortality documented at 4 nests with approximately 171 disoriented hatchlings either lost in dunes or taken by predators on the beach. Four dead turtles were collected.
- Meetings held to discuss street light improvements on Front Beach Road as part of future construction segments under purview of the Panama City Beach Community Redevelopment Agency (CRA).

All disorientation reports 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 methodology to quantify disorientations and types of lights contributing to the incidents.

Nest Marking and Monitoring Procedure. Nests identified during the morning surveys were marked with four stakes, orange survey tape, caution tape, and an informational sign with the nest number. These nests 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 starting on a date determined from measured sand temperatures in the vicinity of the nest. These nighttime "spot checks" are performed under the "recover and release" section of our permit, required 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. Reports are submitted electronically to local code enforcement and FWC, usually within three days of the incident. The methodology for estimating hatchling disorientation is as follows:

- Most incidents are documented during night surveys by volunteers who are at the nest when hatchlings emerge or arrive shortly after 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.
- The number of disoriented hatchlings is determined by how many are collected, tracks leading away from the water, in addition to any reaching the water after wandering. Nest excavation data are occasionally used to adjust 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 a dark beach within our survey area. In the past, we used Sunnyside Beach on the west end, historically the darkest part of our survey area. Beginning in 2019, we added a release site on the east end, selected from nighttime light levels measured by Shigetomo Hirama of FWC. For nests that hatched on the east end, this site allowed us to reduce holding times between collection and release of disoriented turtles.

Method to Quantify Hatchling Mortality. We used two methods to quantify mortality of disoriented turtles. We collected dead hatchlings found typically 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. We also know from experience that hatchlings are extremely vulnerable to predation by ghost crabs and feral cats on our beach at night. Therefore, by assuming that any turtle track entering the dune where no hatchling is found results in mortality, we can obtain a more realistic estimate than simply counting dead turtles. Both numbers are provided in the results below.

Hatchling Disorientation Results. Main emergence results for 12 loggerhead nests that hatched at night are shown in Table 1, including those at which no disorientation occurred. Thirty five (35) nests were excluded from the sample. Of these, 21 failed to hatch due to flooding or wash-out from storms, 11 hatched nests were excluded because disorientation could not be quantified or only a small number of hatchlings emerged, one hatched during daylight hours, one had eggs with no embryonic development, and eggs could not be found at one nest which may have been a false crawl. Information also is provided on the time of hatchling emergence, number of live hatchlings collected, and estimated number of dead hatchlings. Results are as follows:

- Combined hatchling disorientation rate was 58.8%, representing 611 of 1040 turtles from 12 loggerhead nests that emerged at night.
- 328 disoriented hatchlings were collected at night during nest monitoring and released on a dark beach within our survey area.
- Hatchling mortality was documented at 4 loggerhead nests. We estimated 171 of 1040 hatchlings (16%) were lost in dune vegetation or taken by predators. We collected 4 dead hatchlings.
- Volunteers observed the main emergence at 5 nests, and the remaining 7 were documented by tracks observed and hatchlings collected after the emergence, either at night or during the morning survey.
- Figure 1 shows the locations of all hatchling disorientation incidents (7 reports).
- Figure 2 shows the types of lights contributing to hatchling disorientation incidents in 2019. Lights from single family homes were the largest contributor at 43% (interior and exterior). Condo interior and exterior lights contributed 35%.

Adult Disorientation Results. Only one disorientation incident of an adult female was recorded this season, a green turtle that wandered about 200 feet in the dunes after nesting (Table 2). Disorientation was assessed by examining the crawl after the turtle had returned to the water.

Street light impacts. Street lights affecting sea turtles were discussed by the Panama City Beach Community Redevelopment Agency (CRA) at meetings on September 14 and October 12. I presented results showing that street lights are the second most common cause of hatchling disorientation incidents on Panama City Beach, based on reports filed to FWC since 2013 when our lighting ordinances went into full effect (Figure 3). Most of these lights are located outside of the ordinance boundary, which generally follows the southern border of the coastal highway (Front Beach Road), so the ordinances have not led to significant improvements in street lighting. At the October meeting, CRA representatives agreed to investigate "intelligent" street lighting that can be manually dimmed, brightened, and have their color changed to reduce impacts to sea turtles. These lights would be installed on future re-development segments of Front Beach Road.

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 Director

cc: Tonya Long FWC Tequesta, Patty Kelly FWS Panama City, David Campbell (CRA)

Table 1. Nighttime hatchling emergences on Panama City Beach in 2020 (12 loggerhead nests).

Nest No.	Nearest Landmark	Incident Date	Emergence Time	Total Emerged	Number Disoriented	Percent Disoriented	Estimated Mortality	Dead Collected	Live Collected	Report Filed
7	Townhouse, 17175 Front Beach Rd	5-Aug	nighttime	8	6	75%	6	0	0	N
14	Vacant lot, 21328 Front Beach Rd	13-Aug	<8:35 PM	86	5	6%	0	0	5	N
15	House, 17811 Front Beach Rd	18-Aug	~1:30 AM	111	111	100%	91	3	14	Y
17	House, 21222 Front Beach Rd	20-Aug	8:50 PM - 11:52 PM	73	0	0%	0	0	0	N
18	Townhouse, 17329 Front Beach Rd	19-Aug	11:46 PM	91	91	100%	0	0	91	Y
19	House, 20205 Front Beach Rd	18-Aug	7:30 PM - 8:15 PM	119	0	0%	0	0	0	N
20	Gulf Crest Condo, 8715 Surf Dr	20-Aug	10:47 PM	84	84	100%	0	0	84	Y
25	Shoreline Villas, 23007 Front Beach Rd	26-Aug	9 PM - 10:10 PM	102	98	96%	35	1	32	Y
28	House, 378 Beachside Dr, Carillon Beach	29-Aug	9:20 PM	101	29	29%	0	0	29	Y
31	House, 13223 Oleander Dr	29-Aug	8 PM - 10 PM	115	115	100%	39	0	1	Y
33	Townhouse, 17195 Front Beach Rd	1-Sep	10:25 PM	78	0	0%	0	0	0	N
34	Holiday Inn Express, 12907 Front Beach Rd	10-Sep	10:27 PM	72	72	100%	0	0	72	Y
			TOTAL	**1040**	**611**	**58.8%**	**171**	**4**	**328**	

Table 2. Adult turtle disorientation incidents on Panama City Beach in 2020 (1 green nest).

Crawl No.	Crawl Type	Nearest Landmark	Incident Date	Observations	Report Filed
42	Nest	House, 320 Beachside Dr, Carillon Beach	28-Jul	Track wandered east about 200 ft along beach in dunes after nesting	Y

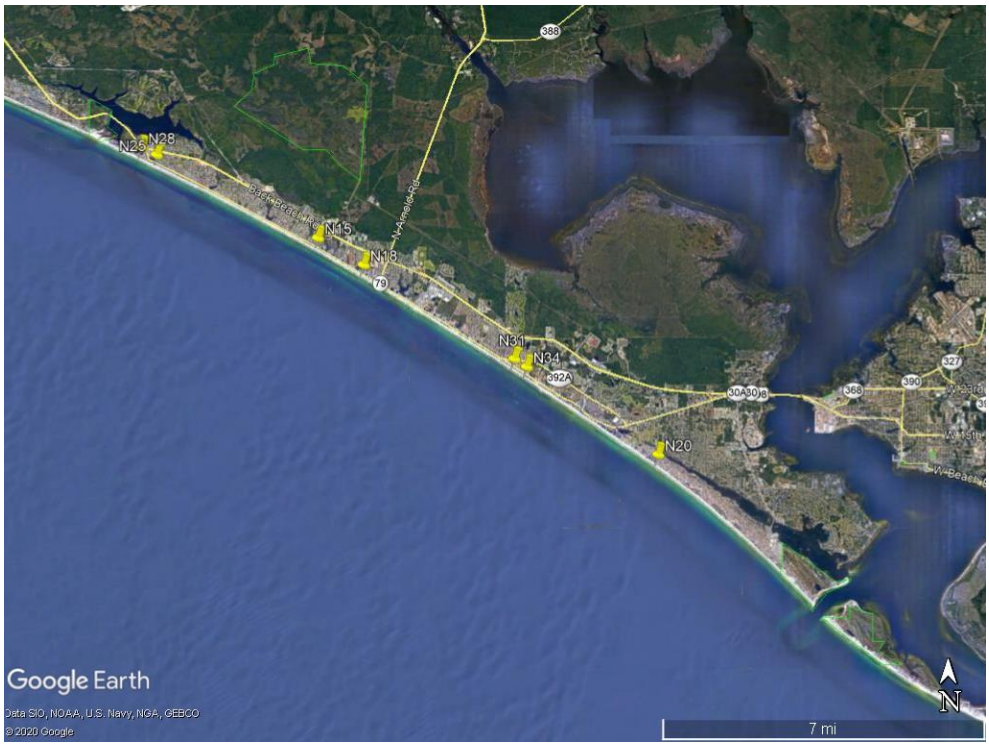

Figure 3. Map showing locations of hatchling disorientation incidents on Panama City Beach in 2020 (7 loggerhead nests).

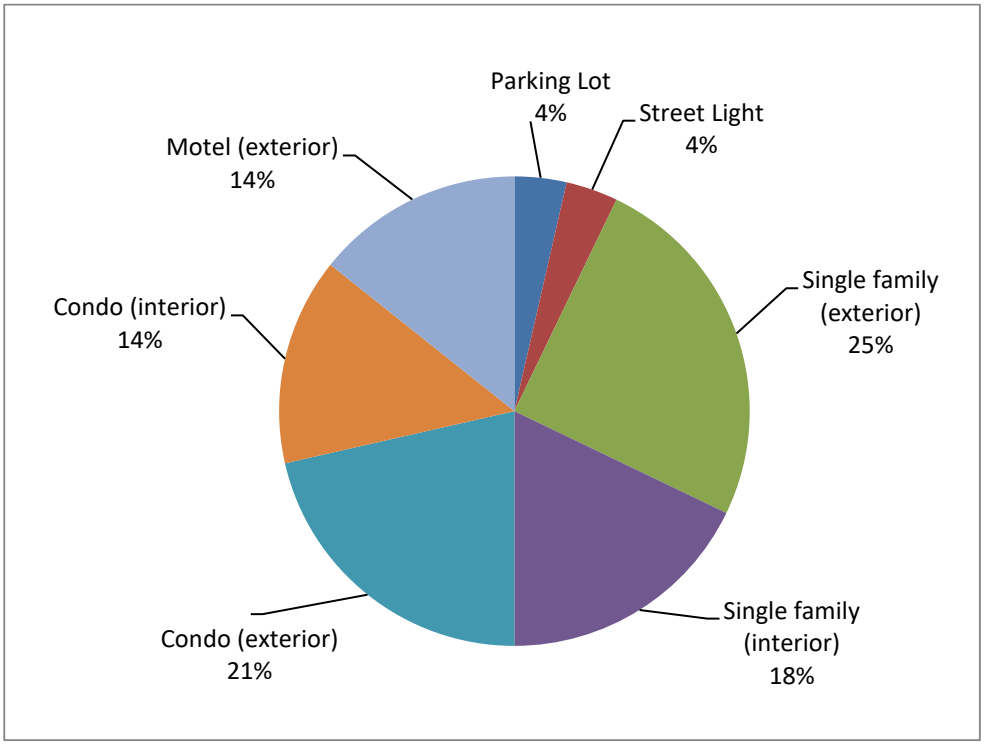

Figure 4. Lights contributing to hatchling disorientation incidents on Panama City Beach in 2020 (7 loggerhead nests).

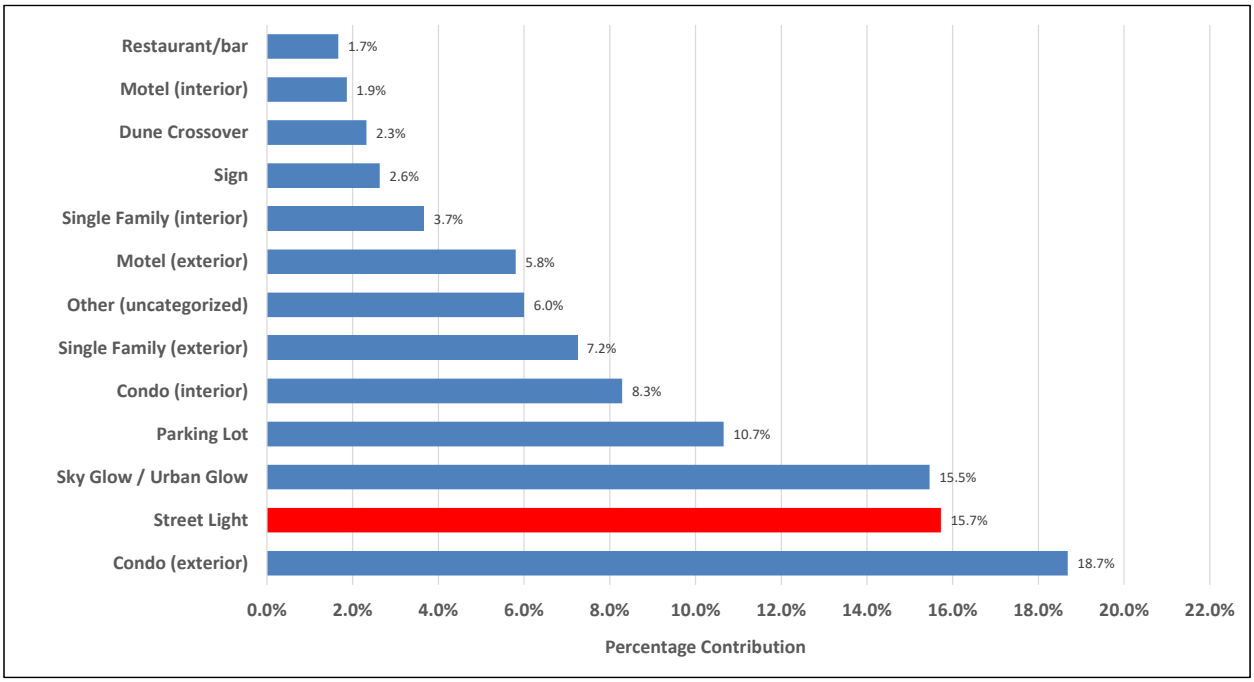

Figure 5. Lights contributing to hatchling disorientation incidents on Panama City Beach during 2013-2020 (152 loggerhead nests).