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

2 November 2015

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 2015 nesting season on Panama City Beach (Permit 038). We estimated a combined disorientation rate of 50% for hatchlings that emerged from 38 loggerhead nests that hatched at night. Additionally, five adult female loggerheads were disoriented on the beach while returning to the water after nesting. These incidents were documented in 22 hatchling reports and five adult nesting 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 used 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 to 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. We found 49 loggerhead nests here in 2015. 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 afterward. All reports are submitted electronically to local code enforcement officers and FWC during the season, usually within three days of the incident. Most incidents 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.

During the 2015 season, Shigetomo Hirama from FWC provided training on an alternative method to quantify hatchling disorientation, based on the paper "A Hatchling Orientation Index for Assessing Orientation Disruption from Artificial Lighting," by Witherington, Crady, and Bolen (1996). The method uses a hand-held sighting compass to measure the angular range of hatchling tracks emerging from the nest. The measurements are intended to be made in the early morning following the previous night's hatchling emergence. Unfortunately, on our urban beach, hatchling tracks can quickly disappear under foot traffic. Most of our nests hatch in the early evening before 11 pm (see Figure 4), thus increasing the odds of people being present when hatchlings emerge. As a result, tracks were mostly obscured when found during the morning survey, and we were able to collect data using this method at only five nests.

Hatchling Disorientation Results. Of the 49 loggerhead nests found in 2015, main emergence results for 38 nests that hatched at night are shown in Table 1, including those at which no disorientation occurred. Eight nests were excluded because five failed to hatch (nest no. 7, 10, 11, 20, 49), four hatched during the day and thus experienced negligible disorientation (4, 9, 16, 17), and one nest was excluded because we could not determine if hatchlings emerged during daylight or evening hours (30). The column for "Total Emerged" represents the main emergence which excludes stragglers that may have emerged afterwards. Information also is provided on the time of hatchling emergence, if known, and the method used to document the emergence. Results show that 1450 of 2908 hatchlings were disoriented by artificial lights, giving a combined disorientation of 50%. Turtle Watch personnel observed the main emergence at 27 nests. The remaining 11 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, some mortality occurred at several nests, the most severe of which was at nest 46, located at 19440 Front Beach Rd, where most of the 77 disoriented turtles were killed by predators (ghost crabs, dogs). Figure 1 shows locations of all disorientation incidents in 2015.

Adult Disorientation Results. Nesting loggerheads became disoriented at 10% of the nests found this year (5 of 49 nests). Table 2 shows results of the five disorientation 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 29, located at 6617 Gulf Drive, where a loggerhead became disoriented after nesting and crawled over 700 ft before entering the water, encountering numerous obstacles along the way. Figure 2 shows pictures of the exit track when the nest was found.

Lights Contributing to Hatchling Disorientation. Figure 3 shows the types of lights contributing to hatchling disorientation incidents this year. Condo exterior lights were the largest contributor at 29%. Other significant contributors were urban glow (19%), street lights (14%), and parking lot lights (12%). Gulf Power Company placed shields on pole lights in the vicinity of some nests prior to hatching at the request of Turtle Watch. The shields reduced light spillover onto the beach and may have helped reduce disorientation from street lights.

Discussion. We saw improvements in hatchling disorientation incidents this year. In fact, the value of 50% is the lowest combined disorientation percentage since 2013 when the lighting ordinances became effective. However, closer examination of the emergence data reveals an important caveat. An unusually large number of nests hatched at dusk, during twilight hours after sunset but before complete darkness. Figure 4 shows the percentage of nests that hatched during the daytime (sunrise to sunset), dusk (up to 45

minutes after sunset), early evening (dusk to 11 pm), and late night (11 pm to sunrise). The results show that 19% our nests hatched at dusk when hatchlings benefited from residual sunset glow on the Gulf horizon. Hatchlings that emerged from these nests experienced significantly less disorientation (28% from 8 nests hatched at dusk) compared to those emerging in total darkness (56% from 30 nests that hatched in early evening and late night). Another potential mitigating factor is the role of moonlight, which is known to reduce disorientation when hatchlings emerge at night on developed beaches in the presence of artificial lights. It is possible that a higher proportion of nests hatched in the presence of moonlight compared to previous years, although this is hard to confirm since volunteers aren't present at all hatchings. In any case, beachfront lighting remains a serious threat to sea turtles on this developed beach.

We will continue to work with Mr. Hirama to find better ways to quantify hatchling disorientation. Mr. Hirama's method is likely more reliable than our technique of estimating disorientation from turtles collected and observations made by volunteers with varying levels of experience. We need a way to adapt his technique to our urban beach where hatchling tracks quickly disappear under human footprints.

If you have questions on this material, please contact me during business hours at (850) 234-4643 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 2015 (38 nests).

Nest No.	Nearest Landmark	Incident Date	Emergence Time	Total Emerged	Number Disoriented	Percent Disoriented	Method Used to Document Hatchling Emergence	Report Filed
1	Townhouse, 22405 Front Beach Rd	11-Jul	10:25 PM	104	63	61%	Night survey: tracks identified and hatchlings collected	Yes
2	Beachside Resort, 21905 Front Beach Rd	24-Jul	9:57 PM	56	1	2%	Night survey: hatchlings observed emerging from nest	No
3	Seascape Inn, 14929 Front Beach Rd	22-Jul	11:41 PM	124	117	94%	Night survey: hatchlings observed emerging from nest	Yes
5	House, 19989 Front Beach Rd	1-Aug	8:05 PM	59	20	34%	Night survey: hatchlings observed emerging from nest	Yes
6	Whispering Seas Condo, 8610 Surf Dr	9-Aug	10:15 PM	68	68	100%	Night survey: hatchlings observed emerging from nest	Yes
8	House, 5135 Gulf Dr	29-Jul	9:10 PM	90	18	20%	Night survey: hatchlings observed emerging from nest	Yes
12	Harpoon Harry's, 12627 Front Beach Rd	7-Aug	8:29 PM	84	84	100%	Night survey: hatchlings observed emerging from nest	Yes
14	Days Inn, 12818 Front Beach Rd	12-Aug	10:05 PM	68	68	100%	Night survey: hatchlings observed emerging from nest	Yes
15	House, 16407 Front Beach Rd	19-Aug	7:41 PM	115	0	0%	Night survey: hatchlings observed emerging from nest	No
18	Edgewater Beach Resort, 11212 Front Beach Rd	19-Aug	8:03 PM	69	55	80%	Night survey: hatchlings observed emerging from nest	Yes
19	Townhouse, 17327 Front Beach Rd	21-Aug	8:57 PM	71	29	41%	Night survey: hatchlings observed emerging from nest	Yes
21	Aquavista Condo, 17155 Front Beach Rd	21-Aug	7:47 PM	98	0	0%	Night survey: tracks identified	No
22	Palazzo Condo, 17281 Front Beach Rd	22-Aug	7:52 PM	68	0	0%	Night survey: hatchlings observed emerging from nest	No
23	House, 21320 Front Beach Rd	24-Aug	7:26 PM	100	0	0%	Night survey: hatchlings observed emerging from nest	No
24	Laguna Beach Christian Retreat, 20016 Front Beach Rd	27-Aug	10:00 PM	11	0	0%	Night survey: hatchlings observed emerging from nest	No
25	House, 6715 Gulf Dr	21-Aug	9:08 PM	80	7	9%	Night survey: hatchlings observed emerging from nest	No
26	Townhouse, 22425 Front	25-Aug	8:45 PM	83	0	0%	Night survey: hatchlings observed	No

	Beach Rd						emerging from nest	
28	Townhouse, 17135 Front Beach Rd	28-Aug	11:00 PM	26	7	27%	Night survey: hatchlings observed emerging from nest	No
29	House, 6617 Gulf Dr	21-Aug	11:32 PM	94	91	97%	Night survey: hatchlings observed emerging from nest	Yes
31	House, 19300 Front Beach Rd	29-Aug	10:10 PM	72	4	6%	Night survey: tracks identified and hatchlings collected	No
32	House, 6709 Gulf Dr	26-Aug	9:31 PM	96	0	0%	Night survey: hatchlings observed emerging from nest	No
33	Regency Condo, 5801 Thomas Dr	26-Aug	8:05 PM	116	0	0%	Night survey: hatchlings observed emerging from nest	No
34	Majestic Beach Resort, 10901 Front Beach Rd	29-Aug	9:00 PM	17	12	71%	Night survey: tracks identified and hatchlings collected	Yes
35	House, 19008 Front Beach Rd	23-Aug	10:20 PM	58	22	38%	Night survey: hatchlings observed emerging from nest	Yes
37	Townhouse, 8517 Surf Dr	8-Sep	7:20 PM	95	92	97%	Night survey: hatchlings observed emerging from nest	Yes
38	Blue Horizon Lodge, 19016 Front Beach Rd	3-Sep	7:40 PM	4	1	25%	Night survey: hatchlings observed emerging from nest	No
39	Aquavista Condo, 17155 Front Beach Rd	2-Sep	11 PM to 7:50 AM	76	1	1%	Morning survey: tracks identified and hatchlings collected	No
40	Landmark Condo, 17501 Front Beach Rd	6-Sep	8:30-9:30 PM	78	54	69%	Night survey: hatchlings collected	Yes
41	Townhouse, 20647 Front Beach Rd	7-Sep	7:46 PM	90	9	10%	Night survey: hatchlings observed emerging from nest	No
43	Splash Condo, 17739 Front Beach Rd	10-Sep	12:14 AM	89	89	100%	Night survey: hatchlings observed emerging from nest	Yes
44	En Soleil Resort, 7509 Thomas Dr	15-Sep	7:30-11:45 PM	28	28	100%	Night survey: tracks identified	Yes
45	House, 344 Beachside Dr, Carillon Beach	17-Sep	9:14 PM	94	94	100%	Night survey: hatchlings observed emerging from nest	Yes
46	Carousel Store, 19440 Front Beach Rd	14-Sep	11:20PM-7:10 AM	77	77	100%	Morning survey: tracks identified and hatchlings collected	Yes
47	Casa Loma Motel, 13615 Front Beach Rd	21-Sep	10:45 PM	75	74	99%	Night survey: hatchlings observed emerging from nest	Yes
48	House, 17757 Front Beach Rd	19-Sep	8:25 PM	103	99	96%	Night survey: tracks identified and hatchlings collected	Yes
50	Sunrise Beach Condo, 14825 Front Beach Rd	25-Sep	7:25 PM	75	75	100%	Night survey: hatchlings observed emerging from nest	Yes

51	Pinnacle Port Condo, 23223 Front Beach Rd	23-Sep	9:20 PM	107	1	1%	Night survey: hatchlings observed emerging from nest	No
52	House, 388 Beachside Dr, Carillon Beach	16-Oct	9 PM to 7:15 AM	90	90	100%	Morning survey: tracks identified and hatchlings collected	Yes
		TOTAL		**2908**	**1450**	**49.9%**		

Table 2. Adult loggerhead disorientation incidents on Panama City Beach in 2015 (5 nests).

Crawl No.	Crawl Type	Nearest Landmark	Incident Date	Observations	Report Filed
1	Nest	Townhouse, 22405 Front Beach Rd	21-Apr	Turtle disoriented during return to water after nesting.	Yes
7	Nest	Beachcomber by the Sea Motel, 17101 Front Beach Rd	3-Jun	Turtle crawled about 100 ft along shoreline before returning to water after nesting.	Yes
11	Nest	House, 21018 Front Beach Rd	10-Jun	Turtle became disoriented after nesting, making 2 small circles and then crawling parallel to shoreline before entering water.	Yes
29	Nest	House, 6617 Gulf Dr	25-Jun	Turtle crawled over 700 ft after nesting, went into dune and between rows of lounge chairs, around flag pole, condo sign and vendor box before returning to water.	Yes
45	Nest	House, 344 Beachside Dr, Carillon Beach	17-Jul	Turtle disoriented during return to water after nesting.	Yes

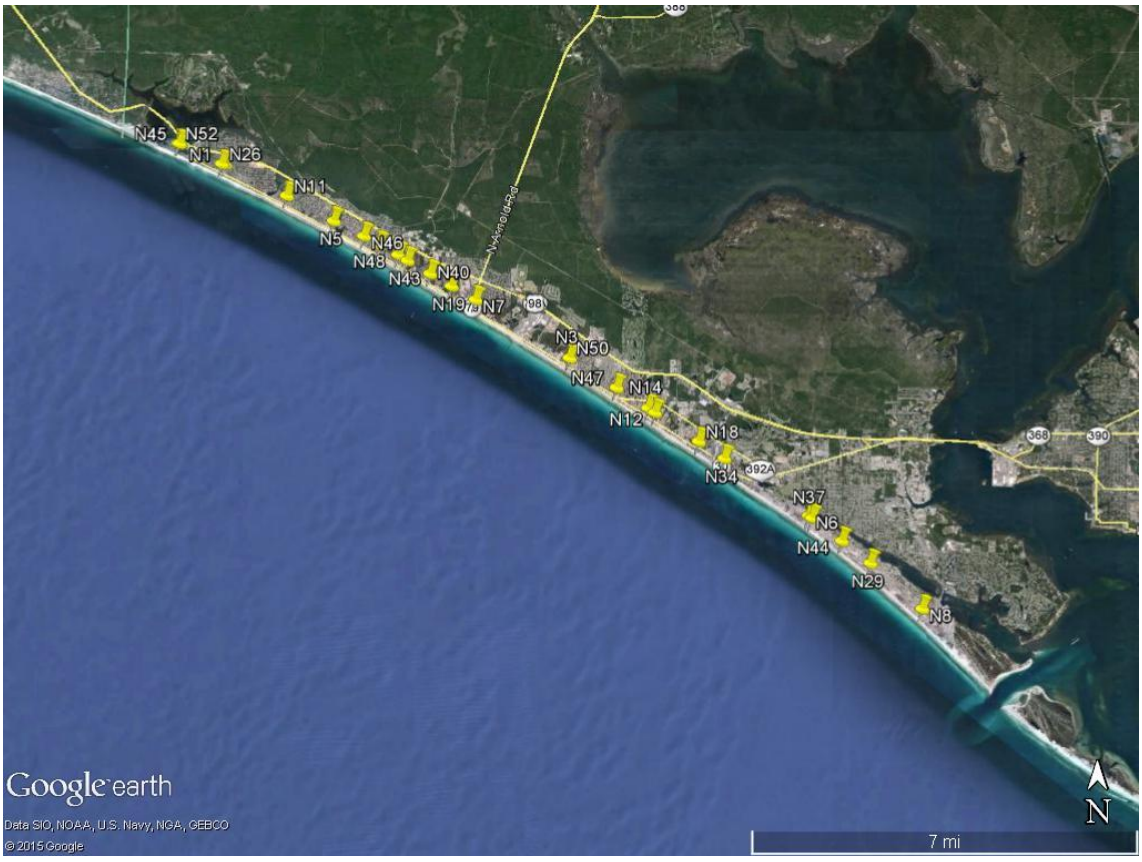

Figure 1. Map showing locations at which loggerhead hatchling and adult turtle disorientation occurred and reports filed on Panama City Beach in 2015 (24 nests).

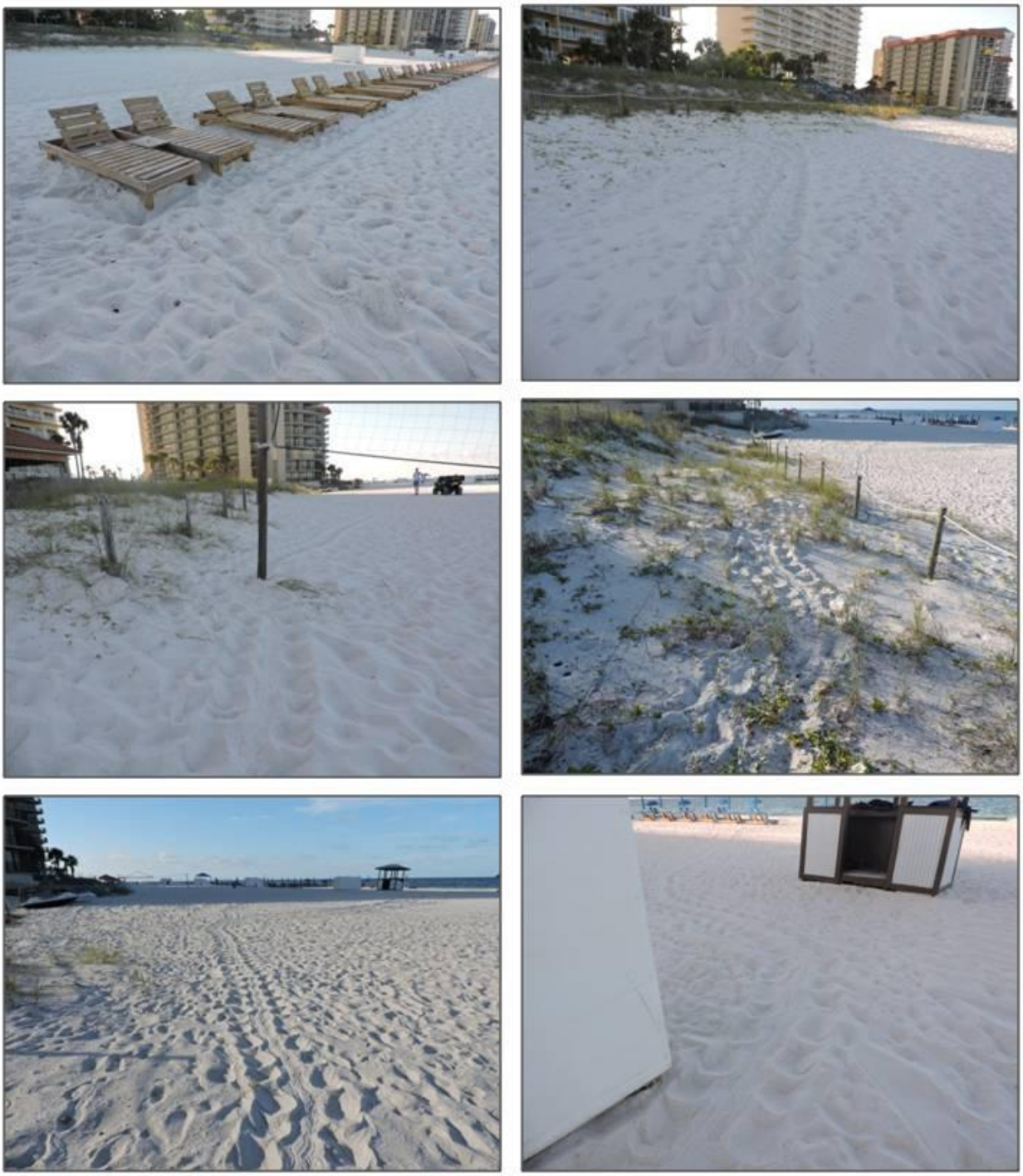

Figure 2. Pictures of exit track at nest 29 where loggerhead became disoriented after nesting and wandered over 700 feet before entering the water.

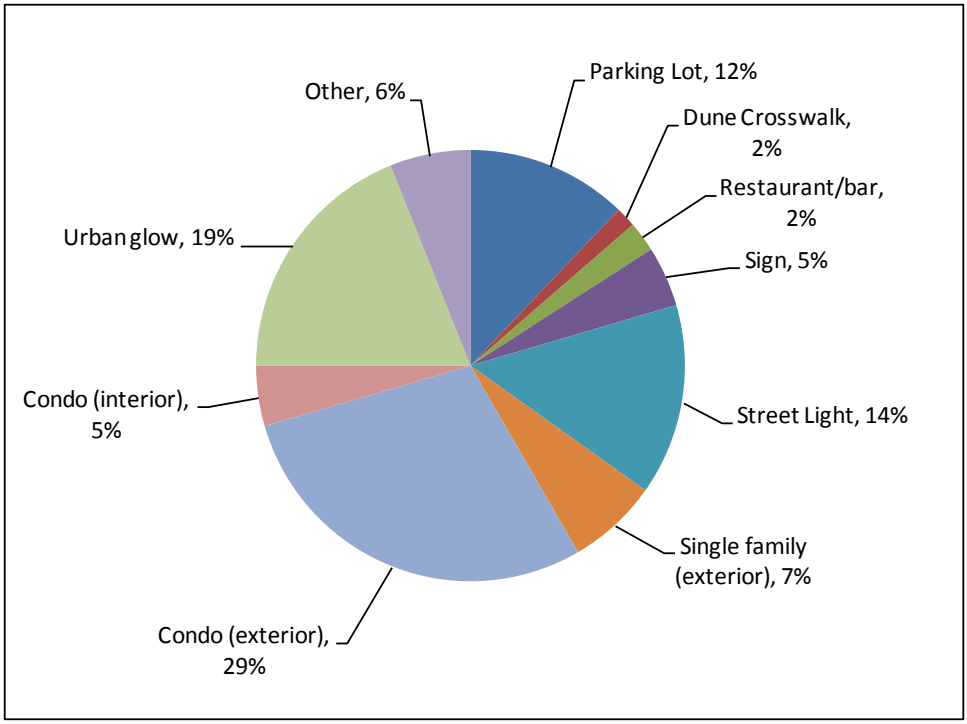

Figure 3. Lights contributing to loggerhead hatchling disorientation incidents on Panama City Beach in 2015 (22 nests).

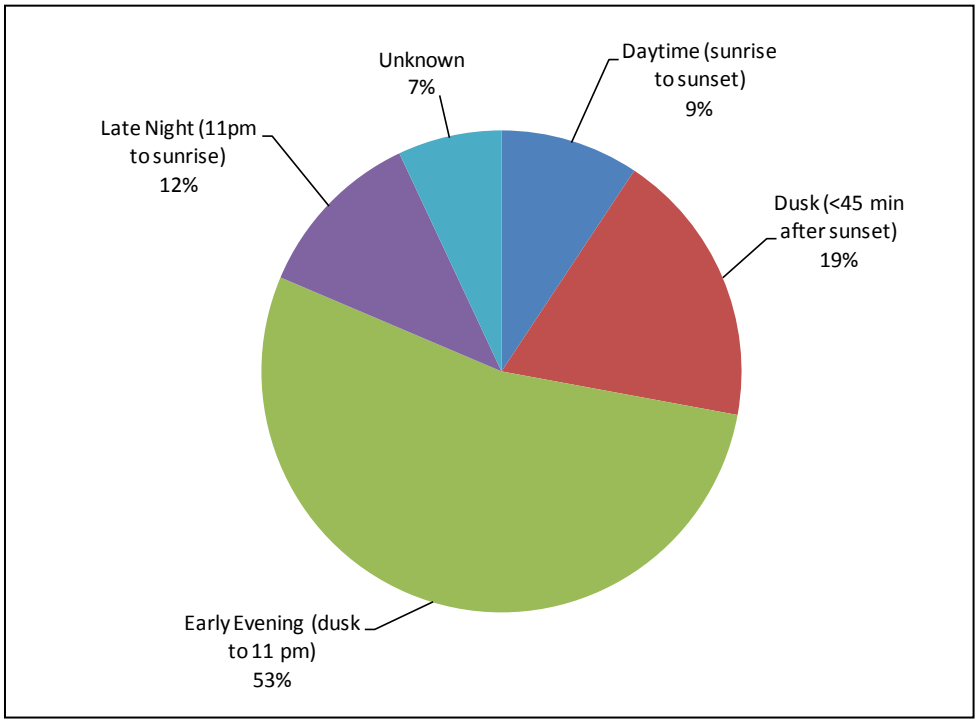

Figure 4. Time of day for loggerhead main hatchling emergence on Panama City Beach in 2015 (43 nests).