

Turtle Watch Disorientation Report

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Prepared for:

Florida Fish and Wildlife Conservation Commission
Imperiled Species Management
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Summary. This report provides results of hatchling disorientation incidents during the 2024 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:

- 1249 of 1830 hatchlings (68%) were disoriented by artificial lights from 24 loggerhead nests which were checked nightly from July 14 to September 23. No other turtle species nested this year.
- Disorientation reports were filed for 18 loggerhead nests where at least 5 hatchlings were disoriented.
- 1094 disoriented hatchlings were collected during night monitoring and released on a nearby dark beach within the survey area. None required rehabilitation, and no dead turtles were found.
- Streetlights were a significant contributor 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).

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.
- 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 34 loggerhead nests found this season, disorientation was estimated for 24 nests that hatched at night, including those at which no disorientation occurred. Ten (10) nests were excluded from the data set, because they failed to hatch due to flooding or washout. No nests hatched during daytime hours. 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.** 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.
- **HOI Method.** We also estimated hatchling disorientation using the Hatchling Orientation Index (HOI), obtained by morning surveyors at nests where hatchling tracks were visible. HOI uses three types of data shown in Figure 2. 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 direction of hatchling tracks. Angular range is the difference between two angles representing bearings of the most widely separated hatchling tracks. Mode and angular range were measured from the marked nest boundary to the point where tracks cross a 33 ft (10 meter) radius circle centered on the nest or sometimes at smaller distances when tracks were hard to see. Ocean direction was not measured but instead estimated from GIS methods. This was done to expedite HOI data collection by the morning surveyors. Disorientation was determined by comparing modal measurements with the ocean direction. For this report, nests were considered “disoriented” if the mode differed by more than ± 45 degrees from the ocean direction (angular range not considered). See Reference 2 for more information.

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 and 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, dead disoriented hatchlings collected, and whether a disorientation report was filed. Results are as follows:

- Combined hatchling disorientation was 68% using the direct observation method (24 nests) and 70% using the HOI method (20 nests).
- 1094 disoriented hatchlings were collected during nighttime monitoring and released on a dark beach within our survey area.
- No dead turtles were collected at night, and only 6 hatchlings were lost in dune vegetation or crab holes and assumed to have perished. One live hatchling injured by a ghost crab was collected during the morning survey and taken to Gulf World Marine Institute for treatment.
- Figure 3 shows HOI results for 20 nests. Modal direction deviated over ± 45 degrees from the ocean direction for 14 of 20 nests, giving a combined disorientation of 70%.
- Figure 4 shows lights contributing to 18 disorientation incidents. Urban glow was the largest contributor at 32%, followed by streetlights and single-family homes (exterior lights) which contributed 12% and 11%, 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 an upcoming CRA segment.
- Log sheet results of nighttime monitoring (Table 1) are available at https://docs.google.com/spreadsheets/d/11XhjHWVt8WO5A_zKEmiQ_HzAZxvr4rX/edit?usp=sharing&oid=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.

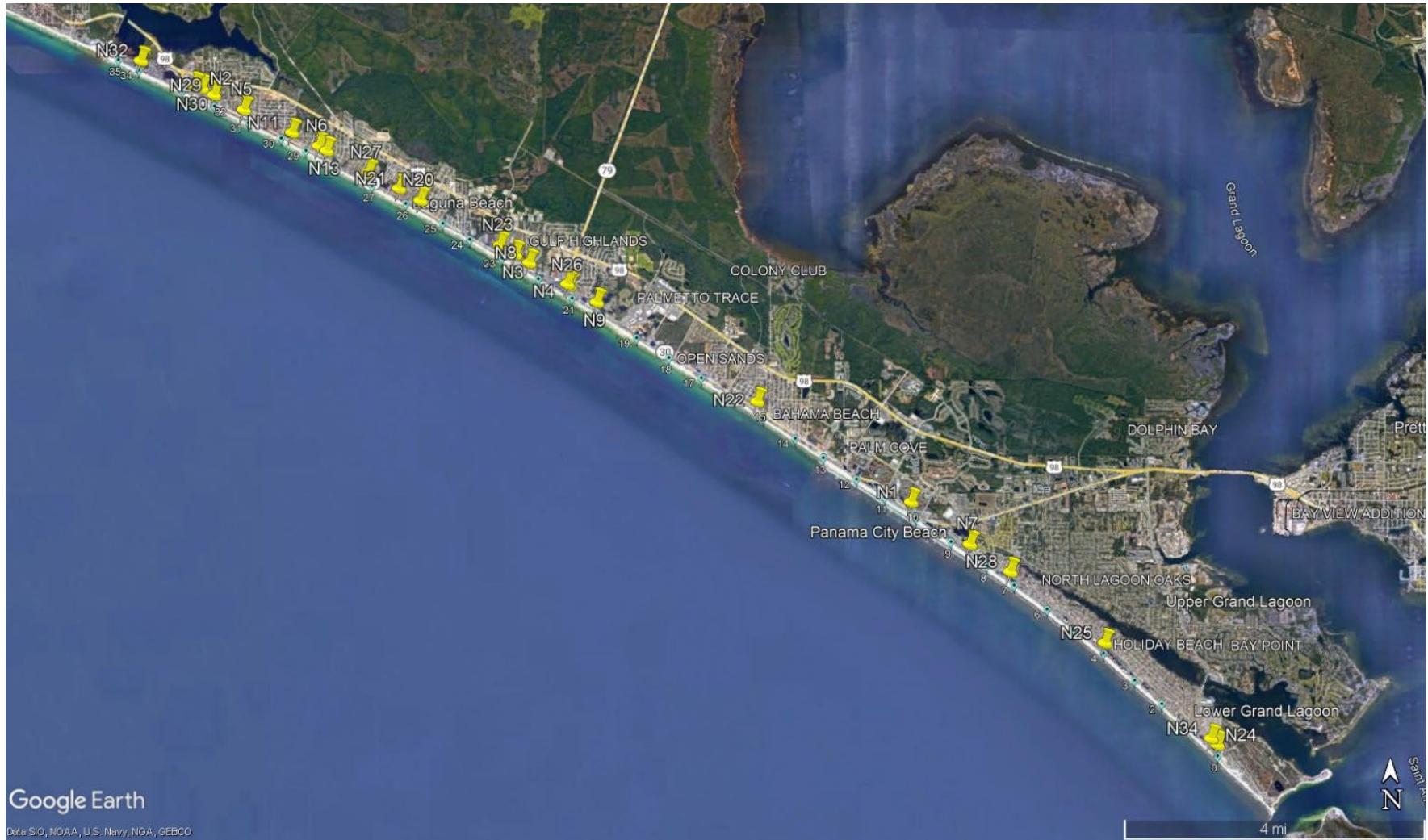


Figure 1. Map showing location of nests with nighttime emergences of 5 or more hatchlings in 2024 (24 loggerhead nests).

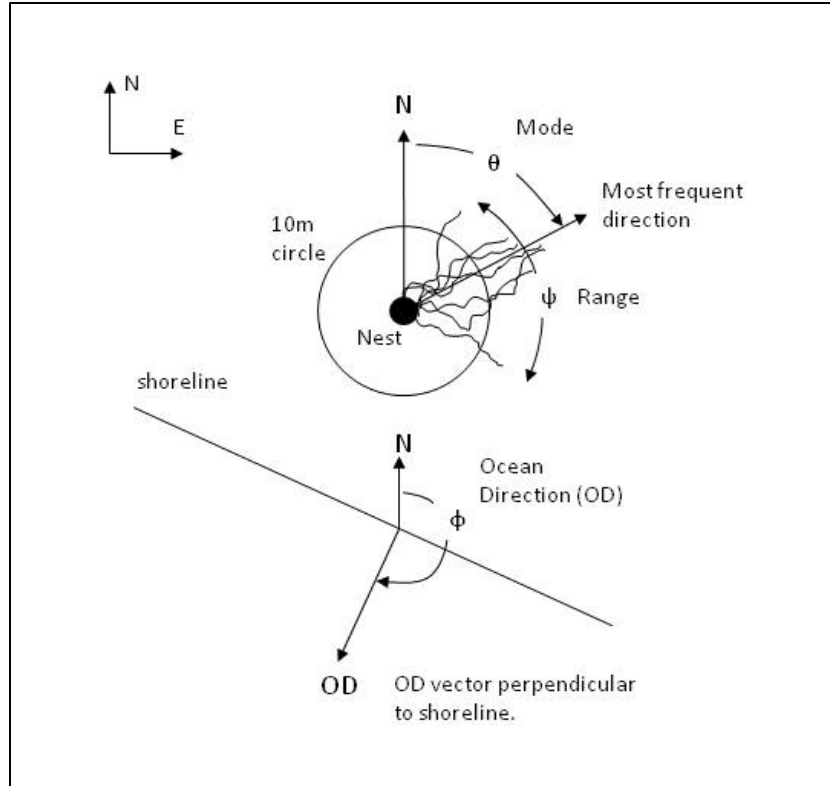


Figure 2. Hatching Orientation Index (HOI) definition of variables.

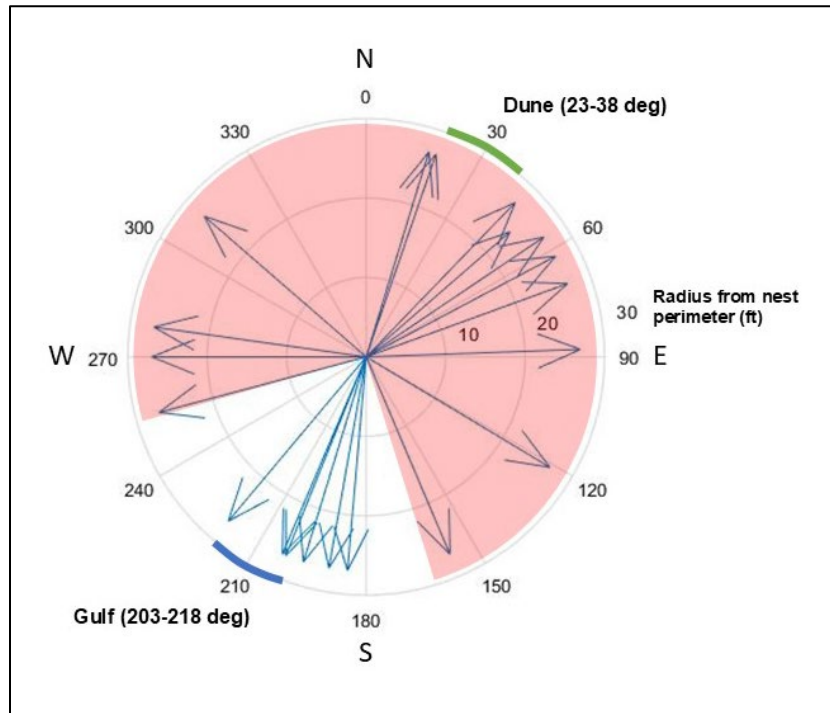


Figure 3. HOI results for hatchling emergences on Panama City Beach in 2024 (20 loggerhead nests). Modal direction shown for each nest with arrows in red area indicating disoriented nests.

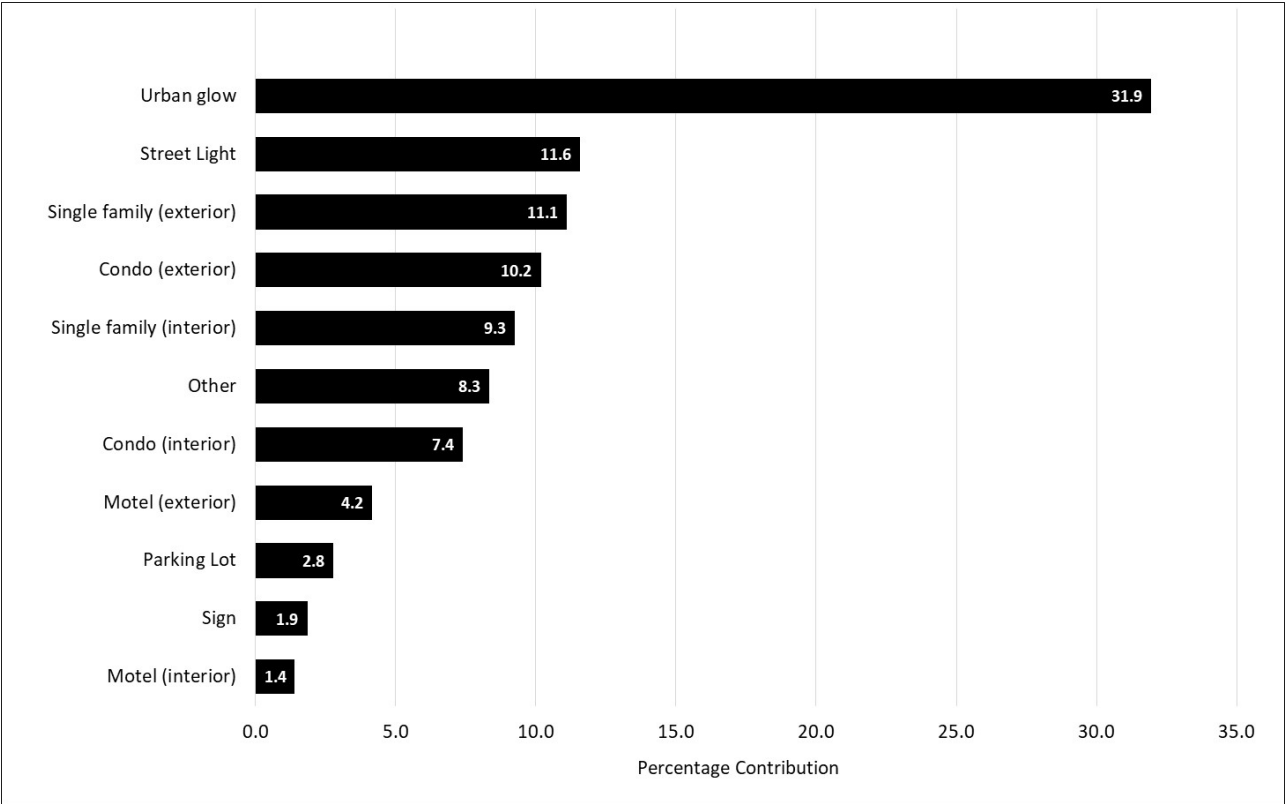


Figure 4. Lights contributing to hatchling disorientation incidents on Panama City Beach in 2024 (18 loggerhead nests).

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	<p>Spreadsheet providing information related to each nest check; a spreadsheet related to each disorientation event response and an evaluation of the 2024 season. The spreadsheet of nest checks must list for each nest subject to nest checks, minimally:</p> <ol style="list-style-type: none"> 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. nest status at each check
5	<p>Disorientation event spreadsheet in the summary must list for each disorientation event, minimally:</p> <ol style="list-style-type: none"> a. date of the event; b. form of event notification (i.e., call, text or nest check); c. time of the notification if call or text (i.e., HH:MM); d. time Authorized Personnel arrived at the nest (i.e., HH:MM); e. time Authorized Personnel departed the nest (i.e., HH:MM); f. time of the event (e.g., HH:MM if observed in progress, prior to first nest check at HH:MM; after last nest check at HH:MM); 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 disoriented hatchlings released; l. number of disoriented turtles transported to a 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 2024 (24 loggerhead nests).

Nest No.	Nearest Landmark	Incident Date	Emergence Time	Total Emerged	Number Disoriented	Percent Disoriented	Live Collected	Dead Collected	Report Filed
1	Majestic Condo, 10901 Front Beach Rd	18-Jul	10:24 PM	129	129	100%	129	0	Y
2	Pirates Cove Villas, 23001 Front Beach Rd	20-Jul	10:29 PM	96	0	0%	0	0	N
3	Townhouse, 17467 Front Beach Rd	UNK	UNK	4	0	0%	0	0	N
4	Townhouse, 17135 Front Beach Rd	23-Jul	11:09 PM	90	84	93%	84	0	Y
5	House, 22115 Front Beach Road	26-Jul	sunset to 8:50 PM	104	101	97%	101	0	Y
6	Vacant Lot, 21000 Front Beach Road	30-Jul	8 PM to 9 PM	113	0	0%	0	0	N
7	Townhouse, 9610 Beach Blvd	3-Aug	9:32 PM	50	47	94%	47	0	Y
8	Seachase Condo, 17351 Front Beach Rd	30-Jul	11:40 PM	103	101	98%	101	0	Y
9	Polynesian Village Condo, 16621 Front Beach Rd	13-Aug	UNK	9	7	78%	0	0	Y
11	House, 21326 Front Beach Road	8-Aug	10:30 PM	48	42	88%	42	0	Y
13	House, 20804 Front Beach Rd	10-Aug	9:30 PM	99	99	100%	101*	0	Y
20	Laguna Beach, 19334 Front Beach Rd	16-Aug	9:55 PM	74	36	49%	36	0	Y
21	Laguna Beach, 19720 Front Beach Rd	18-Aug	11:03 PM - 7 AM	102	0	0%	0	0	N
22	House, 13661 Front Beach Rd	15-Aug	9:05 PM - 10:35 PM	36	36	100%	0	0	Y
23	Vacant lot, 17561 Front Beach Rd	14-Aug	10:56 PM	102	84	82%	84	0	Y
24	Moonspinner, 4425 Thomas Drive	18-Aug	10:10 PM to 7 AM	19	18	95%	0	0	Y
25	House, 6623 Gulf Drive	19-Aug	10:10 PM	99	3	3%	3	0	N

26	Beachcomber, 17101 Front Beach Rd	23-Aug	9:44 PM	106	106	100%	107*	0	Y
27	House, 20107 Front Beach Rd	25-Aug	12 AM to 1:15 AM	82	82	100%	50	0	Y
28	Sugar Beach Condo, 8727 Thomas Dr	27-Aug	10:50 PM	95	95	100%	100*	0	Y
29	The Shores Condo, 22519 Front Beach Rd	5-Sep	9:58 PM	102	65	64%	65	0	Y
30	Shoreline Villas, 23007 Front Beach Rd	13-Sep	UNK	3	0	0%	0	0	N
32	Pinnacle Port Condo, 23223 Front Beach Rd	18-Sep	9:17 PM	76	25	33%	25	0	Y
34	Venture Out, 4345 Thomas Dr	26-Jul	10:01 PM	89	89	100%	19	0	Y
TOTAL				1830	1249	68%	1094	0	

* live collected exceeds total emerged from excavation results. Source of error unknown.