

TECHNICAL REPORT

BROWARD COUNTY SEA TURTLE CONSERVATION PROGRAM 2017 REPORT

**For the
BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS**



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EXECUTIVE SUMMARY

The BCSTCP is funded and administered by the Broward County Board of County Commissioners through the Environmental Planning and Community Resilience Division (BCEPCRD) and carried out by Nova Southeastern University (NSU) to conduct sea turtle nesting surveys daily from March 1–October 31, 2017 for all Broward County beaches excluding Dr. Von D. Mizell-Eula Johnson State Park (Mizell-Eula State Park; monitored by Park staff). All loggerhead, green and leatherback turtle crawls (nests and false crawls) were identified to species and recorded by Geographic Positioning System (GPS). All nests were marked using wooden stakes and Red-Glo flagging tape and monitored throughout the season until they hatched or reached a maximum incubation time determined by FWC guidelines.

The 2017 sea turtle nesting season set a record for the highest number of nests since the inception of the BCSTCP in 1981, although earlier years may have varied slightly in survey area and season length. A total of 3,587 (2,898 loggerhead, 665 green, 12 leatherback, and 12 unknown species) nests were deposited in Broward County from March 25 to September 20, 2017. This is 20 more nests for all species combined than 2016 which was the previous record high nesting season. Loggerhead turtles led the nesting again this year with 2,898 nests, which is 502 less than last year. Loggerheads fell very close to the five-year average of 2,875 nests per season. Green turtles laid a record 665 nests, which was far above the previous record 2013 season of 495 nests. This was anticipated since the local population of green turtles appears to have a biennial reproductive cycle where an individual may only return to nest every two years in most cases. The 2016 season was a low nesting year for green turtles, and so high green turtle nesting was expected in 2017. This season was much higher than the five-year average of 378 green turtle nests. Leatherback turtles are the least common nesters in Broward County, laying 112 nests in 2017. This season, leatherback nesting fell below the five-year average of 26 nests.

Nesting success (nests/(nests + false crawls)) averaged 45.25% for all species combined, 1.6% higher than the 2016 season but still 1% lower than the five-year average of 46.72%. Loggerhead nesting success was 43.20%, very similar to 2016 (43.38%), and about 2% lower than the five-year average of 45.64%. Green turtle nesting success was 55.74%, about 10% higher than 2016 (45.97%) and slightly higher than the five-year average of 51.97%. Leatherbacks showed an increased nesting success of 92.31%, compared to the 2016 season at 84.38% and fell about 4% above the five-year average of 88.70%.

Reproductive success was investigated for 2,080 nests after hatch out (1,958 *in situ*, 59 relocated, and 63 restraining cage nests). Emergence success for *in situ* loggerhead nests in 2017 (69.00%) was slightly higher compared to 2016 (57.29%). A similar trend was observed among *in situ* green nests. Emergence success for *in situ* green nests in 2017 was 77.42% whereas 2016 had an emergence success of 75.83%. However, emergence success for *in situ* leatherback nests fell from 60.84% in 2016 to 51.61% in 2017.

The Hillsboro/Deerfield Beach survey zone had the most nesting in Broward County with an average of 328.37 nests/mile (201.71 nests/km; all species combined). The Hollywood Beach survey zone had the lowest nesting density with an average of 33.62 nests/mile (20.74 nests/km; all species combined). This nesting distribution could be influenced by a

number of factors. Historically, Hillsboro housed an active sea turtle “hatchery” facility where nests were transported from other areas of Broward County and relocated into a fenced facility until hatchout. Likewise, nests have historically been relocated out of Hollywood Beach. Additionally, Florida’s east coast exhibits a general nesting trend of increasing nesting densities moving south to north from Miami to Brevard Counties. The same trend might be occurring within Broward County, as Hollywood is the southernmost zone while Hillsboro/Deerfield is the northernmost zone. Both historical relocations into hatcheries and the south-north nesting trend may influence the nest distributions seen in Broward County.

The BCSTCP monitored sea turtle nesting activity relative to three renourishment projects in recent years and one active maintenance/bypass project:

- Broward County Segment II Beach Renourishment and Restoration Project (R36-R41, R51-R72), sand placement concluded on December 24, 2016.
- Flood Control and Coastal Emergency Beach Erosion Control (FCCE) Truck Haul Project in Pompano Beach (R26-R53), sand placement concluded in November 2013.
- Hillsboro/Deerfield Beach Nourishment Project (R6-R8), sand placement concluded on April 11, 2011 but an amendment allowed additional sand to be placed in 2015.
- Hillsboro Inlet Maintenance & Sand Bypass Project (R25-R26).

INTRODUCTION

Since 1978, the BCEPCRD and Broward County Board of County Commissioners have provided for the conservation of endangered and threatened sea turtles in Broward County, Florida. Florida's coastline experiences the densest sea turtle nesting in the United States. Broward County is classified by FWC as a medium-density nesting area in Florida and is in the normal nesting ranges of three species of sea turtles: loggerhead (*Caretta caretta*), green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) turtles. In the coastal waters around Broward County, Kemp's ridley (*Lepidochelys kempii*) and hawksbill (*Eretmochelys imbricata*) sea turtles can also be found, but do not nest regularly in the area. The leatherback is categorized as endangered in this region, while the loggerhead and green turtles are listed as threatened. The North Atlantic distinct population segment of green turtles (including Florida) was recently down-listed from endangered to threatened in 2016. All species of sea turtles in U.S. waters are protected under the U.S. Endangered Species Act of 1973 and Florida's Marine Turtle Protection Act (379.2431, Florida Statutes).

These statutes protect all life history stages of sea turtles and therefore all conservation, monitoring, or research efforts require permitting by FWC. Permitting is administered by the U.S. Fish and Wildlife Service for sea turtles on land and the National Oceanic and Atmospheric Association (NOAA) protects all in-water turtles. All monitoring and conservation efforts for this program were administered and supported by the BCEPCRD and conducted by NSU as part of the BCSTCP.

Beach Renourishment Projects

Coastal development alters the natural accumulation and loss of sand on natural beaches. Broward County's highly developed and armored coastline and beachfront calls for needed maintenance of beach profiles, beach width, and dune structures. To help mitigate erosion along sections of Broward County beaches, intermittent beach renourishment projects have been established in some areas of the County to ensure the continuation of coastal preservation, beach recreation and infrastructure protection. The BCEPCRD has maintained the sea turtle conservation and monitoring program in years with and without sand placement projects, to better understand the long- and short-term impacts of sand placement projects on nesting sea turtles. There have been four County-sponsored renourishment projects in recent years:

- Broward County Segment II Beach Renourishment and Restoration Project (R36-R41, R51-R72), approximately 607,000 cubic yards of sand was placed in January–April 2016. More sand was placed in November–December 2016.
- FCCE Truck Haul Project in Pompano Beach (R26-R53), approximately 115,000 cubic yards of sand was placed in this area. Sand placement concluded in November 2013.
- Hillsboro/Deerfield Beach Nourishment Project (R6-R8), approximately 375,000 cubic yards of sand was placed. Sand placement concluded on April 11, 2011. In 2015, an amendment to this project permitted an additional 50,000 cubic yards of sand to be placed in the same area.

- Hillsboro Inlet Maintenance and Sand Bypass Project in Hillsboro Beach (R25-R26).

Program Goals

The BCSTCP goals in 2017 were to:

- 1) Conduct daily sea turtle nesting surveys and beach monitoring for mechanical beach cleaning and various permitted projects and beach events.
- 2) Relocate or protect imperiled sea turtle nests to maximize hatchling survival.
- 3) Conduct nest evaluations to examine hatching success.
- 4) Conduct stranding and salvage activities and maintain a 24-hour sea turtle emergency hotline.
- 5) Inform and educate the public through educational seminars, public hatchling releases, and table events about sea turtles and sea turtle conservation/management.
- 6) Provide accurate and timely reporting.

MATERIALS AND METHODS

Personnel

The BCSTCP works with a protected species, therefore all sea turtle monitoring and work is authorized by FWC's Imperiled Species Management section (ISM), and was conducted by permitted individuals under Marine Turtle Permits #214, #215, #148 issued to Curtis Slagle (January 1–December 31, 2017). The FWC Marine Turtle Permit, FWC Marine Turtle Conservation Handbook, and the contract with Broward County were used to set procedures for all monitoring, stranding, and survey protocols for this program.

2017 BCSTCP Staff:

Stephanie Kedzuf – Broward County Contract Administrator
Derek Burkholder – Principle Investigator
Curtis Slagle – Project Manager / Permit Holder
Jessica Novy – Assistant Project Manager / Outreach Coordinator
Samantha McCorkle – Data Manager

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Alexis Peterson	Morning Staff	Carmen Rodriguez	Lighting Staff
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Sea Turtle Nesting Surveys

Daily sea turtle nesting surveys were conducted by BCSTCP staff from March 1–October 31, 2017 for all Broward County beaches (24 miles) excluding Mizell-Eula State Park (previously John U. Lloyd State Park; 2.4 miles; Figure 1). Mizell-Eula State Park is an FWC Index Beach that is used by researchers following a standardized set of survey protocols and specific beaches to monitor the long-term nesting trends of marine turtles in Florida. Survey protocols and data collected on FWC Index Beaches are slightly different from the data that is collected throughout the rest of Broward’s beaches, so some information may not be recorded in this area and therefore will be left out of parts of this technical report. Park rangers carried out surveys in Mizell-Eula State Park and they provided all data for this survey area.

Surveys began 30 minutes before sunrise each day and were conducted using ATVs (Honda Rancher 420, Honda Pioneer 500 Side x Side, Polaris Sportsman Touring 570). For survey purposes, Broward County was divided into five survey zones: Hillsboro-Deerfield Beach (Hillsboro), Pompano Beach including Lauderdale-By-The-Sea (Pompano), Fort Lauderdale, Mizell-Eula State Park, and Hollywood-Hallandale including Dania Beach (Hollywood; Table 1; Figure 2). For all survey zones, except Mizell-Eula State Park, nest locations were referenced to Florida Department of

Environmental Protection (FDEP) range monuments (R-zone) numbered consecutively (north to south) from R1-R128.

Data Collection, Management and Analysis

All nesting and non-nesting emergences (false crawls) were recorded and locations marked by GPS when they were first encountered on the survey. Data were recorded on paper data sheets and electronically using a Sonim XP-7 device with the VJGames GPS Coordinates Application in the field. This tablet system uses GPS, Wi-Fi, and mobile networks to determine location. All nests were additionally marked with a Trimble GeoExplorer 6000 Series or Trimble GeoExplorer 2008 Series (<1 m accuracy) to allow for precise nest reestablishment throughout the season if necessary (stakes lost, nest washout, vandalism, etc.). Nest GPS was taken over the center of the clutch when it was verified, the approximate clutch location when it was not known, or at the apex of a false crawl. To ensure crawls were not double counted, after all data was collected from a crawl and it was marked accordingly, the tracks (not the nest site) were driven over with an ATV to indicate they have already been documented.

The following information was recorded for each crawl:

- 1) Survey zone referenced to nearest property and R-zone monument marker
- 2) Crawl type (nest or false crawl)
- 3) A unique identifying number (generated using beach code and nest or false crawl number)
- 4) Date crawl was discovered
- 5) Species identification
- 6) Measurement from nest or apex of false crawl to the previous night's high tide line
- 7) Crawl characteristics (e.g. crawl width, number of body pits or abandoned egg chambers, orientation circles, etc.)
- 8) Final nest treatment (*in situ*, relocation, restraining cage)
- 9) If the turtle encountered an obstruction (ONA)
- 10) If the turtle disoriented

The Data Manager entered data daily into an Excel spreadsheet, all data sheets were photocopied and originals were held until all analysis and reporting requirements were complete. All data were verified by at least one additional senior staff member once the data was entered and before analysis. Data analyzed and presented in this report were compiled using Microsoft Excel 2008 for Mac and JMP Pro 12. All maps were constructed in ESRI ArcMap 10.3 (GCS North American NAD 1983 projection). Historical nesting, nesting success, hatching success trends, and reproductive success were analyzed using analysis of variance for linear regression.

All data collected for this program were reported to FWC as per permitting guidelines. The yearly reports provided to FWC are shown in Appendix 1.

Treatment Zones

Survey zones were further broken down into treatment zones based on different management tools/strategies to minimize unwanted natural and anthropogenic influences in the area. Treatment zones were broken down into “donor,” “*in situ* & recipient,” “restraining cage,” or “*in situ*” categories (Table 2, Figure 3).

All nests classified as “*in situ*” (did not undergo nest relocation) were marked with a minimum of four stakes (one signed stake [see Appendix 2 for example of nest sign], at least three non-signed stakes) with a circle of Red-Glo flagging tape with a radius of at least three feet centered on the clutch. The top of the signed stake was painted white to facilitate clear data recording on the stake. For sites where a clear dig sight could not be identified, the whole area of disturbed sand was encircled with flagging tape. If during the course of the season the nest markers were lost, washed away, vandalized, etc. the nest was reestablished using the Trimble sub-meter GPS units. Upon reestablishment, nests were marked with a circle of Red-Glo flagging tape with at least a five feet radius centered on the nest site.

Nest Relocation

Nests deposited in areas that were deemed “donor zones” by FWC or that were laid below the previous night’s high tide line were relocated to the nearest recipient zone or west of the original nest location, respectfully, to ensure the highest possible hatching success. All nests were relocated before 9 am the morning after they were deposited. Each nest was carefully dug by hand and the eggs were transported in buckets containing damp sand from the original nest chamber. Special care was taken to leave eggs in their natural orientation (how they were sitting in the original chamber created by the nesting mother) to minimize mortality of the embryos during transportation. A new “nest chamber” was dug by hand to the same depth/width/shape as the original nest chamber, eggs were placed in the chamber and reburied following the FWC Marine Turtle Conservation Handbook (2016).

Relocated nests were marked with three stakes (one signed stake, two unsigned stakes) in a triangle with the egg chamber in the middle and surrounded with Red-Glo flagging tape. All relocated nests were evaluated post-hatching for hatching success unless extenuating circumstances (washout, vandalism, etc.) made post-hatching analysis impossible.

Restraining Cages

Restraining cages were used as a temporary management tool for zones of high artificial lighting trespass on the beach (Figure 3). In all “restraining cage” zones, egg chambers were located for each nest during the daily survey and nests were marked as per standard procedures for “*in situ*” nests. Restraining cages were constructed for every other loggerhead nest in the “restraining cage” zones. Cages were deployed at 45 days (the beginning of the hatch out window) and monitored until at least 72 hours post-emergence or until the nest reached 70 days incubation time. In either instance, all caged nests were

excavated and assessed for reproductive success.

Cages were constructed of a thick plastic mesh ($\frac{3}{4}$ inch x $\frac{3}{4}$ inch) lined with window screen on the inside of the cage to minimize hatchling entanglement in the cage and protect hatchlings from predators that may reach through the mesh. Cages were a cylinder (24 inch diameter and height), with a flat mesh top secured in place and an access hatch in the top to facilitate hatchling retrieval. Additionally, a door was cut into the eastern side of the cage that was opened during the day so hatchlings that may emerge during the day can leave the cage on their own and not desiccate in the cage during the heat of the day (Appendix 3A). An informative sign was affixed to the outside of the cage with the pertinent response phone numbers if a turtle was found in the cage (Appendix 3B).

For cage construction, the enclosure was placed centered over the top of the egg chamber, a trench was dug around the base of the cage, and the base of the cage was buried in the ground 4-6 inches and then secured to stakes to hold it in place. Daily cage monitoring consisted of closing the eastern door at sunset each day, checking the cage for hatchling activity at least once between 23:00 and 01:00 each night (any hatchlings encountered were removed from the cage and released), and opening the eastern door at sunrise each morning.

Reproductive Success Evaluations

When possible, nests were excavated and assessed for reproductive success at least 72 hours post-hatchout. If a hatchout was not observed, nests were excavated and assessed after a 70-day incubation period for green and loggerhead nests and 80 days for leatherback turtles; after this time the nests are no longer considered viable (FWC Handbook, 2016). Each nest was carefully dug by hand.

The following data were collected for each inventoried nest:

- 1) Number of hatched eggs
- 2) Live hatchlings in nest (LIN)
- 3) Dead hatchlings in nest (DIN)
- 4) Live pipped hatchlings (LPIP)
- 5) Dead pipped hatchlings (DPIP)
- 6) Unhatched egg with visual development (VD)
- 7) Unhatched egg with no visual development (NVD)
- 8) Unhatched egg, white (fertilized egg)

Clutch size was calculated as: Hatched eggs + LPIP + DPIP + VD + NVD

Emergence success for each nest was calculated as:
$$\frac{(\text{Hatched eggs} - \text{LIN} + \text{DIN})}{\text{Clutch size}}$$

Hatchlings released for each nest was calculated as:
$$\text{Hatched eggs} - \text{DIN} + \text{LPIP}$$

Lighting Surveys

Surveys for artificial lighting on Broward County beaches were conducted once each month from March–September 2017 for all survey zones. Surveyors walked each section of beach after dark (commencing between 22:00 and 00:00) to document light fixtures that were not in compliance with local lighting ordinances. Surveyors worked the same section of beach each month to allow the highest level of familiarity with the properties surveyed, minimizing human error and discretion thus providing better long-term tracking of lighting non-compliance throughout the season. Survey protocols followed standard techniques as described by the FWC Technical Report: Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches (Witherington et al., 2014) and Chapter 62B-55, Florida Administrative Code Model Ordinance for Marine Turtle Protection; both documents identify compliant and noncompliant fixtures/bulbs depending on fixture type, bulb type, light wavelength, etc. Properties that exhibited potentially impactful lighting were photographed to better track individual property lighting throughout the season. All lights/fixtures that may impact sea turtle nesting or hatchling behavior were documented on a standardized “BCSTCP Lighting Survey Data Sheet” which is broken down by light/fixture type and property/address (Appendix 4). Each coastal municipality in Broward County has adopted and enforces their local Sea Turtle Friendly Lighting Ordinance. These ordinances vary slightly, but follow the general recommendations outlined in the Model Ordinance. A list of common lighting types found in Broward County can be found in Appendix 5 and are more fully outlined in the Technical Report Supplement: Broward County Sea Turtle Conservation Program Lighting Survey 2014 Report (Kiel, 2015).

Lighting survey reports were submitted to the Broward County contract administrator and FWC ISM staff monthly. These reports were ultimately sent to code enforcers in each Broward County coastal municipality for targeted rectification and enforcement actions if necessary.

Strandings

A Sea Turtle Emergency Line is monitored year-round 24 hours a day in Broward County and most members of the BCSTCP are trained in sea turtle stranding response. The emergency line receives many calls throughout the year (Appendix 6), including turtle stranding calls. When a stranding call is received on the emergency line, a member of the sea turtle stranding team is dispatched with a stranding kit, which contains all of the necessary equipment (tag reader, measuring tape, data sheets, scalpel, forceps, camera, pens/pencils, spray paint, GPS unit, etc.) to document the event. Each stranding event is documented using a standardized form from FWC (Appendix 7), and similar information is collected whether the animal is alive or deceased. Some of these data include species, sex (if mature), morphometrics, injuries, presence of tags, etc. If the turtle has fibropapilloma tumors, an additional form is filled out (Appendix 8). Each stranding event is reported to the FWC Sea Turtle Stranding and Salvage Network Coordinator within 24 hours; depending on the state of the turtle, instructions are given on

transportation to a rehabilitation facility (live stranding) or salvage/burial (deceased). If possible, deceased turtles are marked with spray paint to indicate that the animal has been documented and then are buried on or off the beach. A summary of the BCSTCP stranding responses in 2017 can be found in Appendix 9.

Disorientation Events and Obstructed Nesting Attempts

Three volunteer organizations: STOP, SFAS, and STARS had a strong presence on Broward County beaches again this year. The programs monitored nest hatch outs at night and reported disorientation events separately from the BCSTCP. A disorientation event is defined as either an adult or hatchling sea turtle that does not orient or travel toward the sea, but instead will travel in a direction that is more than 45 degrees from the beach-ocean interface. Most of these events can be tied to a bright anthropogenic light source that may be misleading from what would naturally be the brightest point on the horizon (how the nesting mothers and hatchlings typically orient themselves). Historically, the brightest point on the horizon was the moon and stars over the ocean. The STOP, SFAS, and STARS groups monitor the majority of County beaches; however, their efforts are focused in the areas most impacted by anthropogenic lighting.

When an organization (BCSTCP, STOP, SFAS, or STARS) observed a hatchling disorientation event, the nest was marked with the date of hatch out on colored flagging tape to avoid report duplication among groups. In addition, a Marine Turtle Disorientation Report Form (Appendix 10) was filed for each disorientation event. Analyses were conducted using BCSTCP data only as well as all of the disorientation reports logged by all groups in Broward County. Adult disorientations were observed and reported only by the BCSTCP; Disorientation Forms were filed for these instances, but no analysis was performed on these data.

When a nesting female encountered an obstruction (escarpment, beach furniture, sea wall, rocks, etc.) that impacted her nesting attempt, a Marine Turtle Obstructed Nesting Report (ONA) Form was submitted to FWC (Appendix 11). An impact to the female's nesting attempt was characterized by the obstruction causing her to change direction, become entangled, etc.

Education and Outreach Initiatives

One of the leading missions of the BCSTCP is community outreach and education. In 2017, a total of 156 education and outreach events were held. Each event educated residents and visitors of Broward County about sea turtles. With all of these events, the BCSTCP was able to reach out to over 44,100 individuals (Appendix 12).

RESULTS

Sea Turtle Nesting Surveys

The 2017 sea turtle nesting surveys in Broward County started on March 1, 2017, and the first crawls of the season were a leatherback nest and false crawl, both discovered on March 25, 2017. A total of 7,927 emergences were documented for all of Broward County resulting in a record high 3,587 nests and 4,340 false crawls (Figure 4) or a 45.25% nesting success for all species (Figure 5). This is slightly above last year's nesting success at 43.64%, and is still below the five-year average nesting success for all species of 46.13%.

Following the general trend, leatherback turtles were the first species to nest in Broward County in 2017, followed by loggerhead turtles, and then green turtles (Figure 6).

Leatherback Sea Turtles (*Dermochelys coriacea*)

Overall Nesting Activity

Leatherback turtles are historically the least frequent nesting species in Broward County. This trend continued again for the 2017 season. A total of 13 crawls were recorded in all of Broward County resulting in 12 nests and 1 false crawl for a County-wide nesting success for leatherback turtles of 92.31% (Table 3). This represents a 7.93% increase in nesting success compared to 2016 and is 3.61% higher than the five-year average leatherback nesting success of 88.70% (Figure 7). Leatherback nesting has experienced a significant increase over the life of the program with an average increase of 0.67 nests per year from 1981-2017. Regression shows a highly significant positive trend ($F(1,35) = 13.79, P = 0.001$; Figure 8).

Temporal Patterns

The first leatherback nest was deposited on March 25, 2017 and the first leatherback false crawl was documented the same day. There were no days that had more than 1 nest laid for that day (Figure 6). The last leatherback false crawl was recorded on March 25, 2017 and the last nest was deposited on June 11, 2017.

Spatial Patterns

Leatherback crawls were recorded in all survey zones; however, Fort Lauderdale received the only false crawl. County-wide, leatherback turtles laid an average of 0.5 nests/mile (0.31 nests/km). The highest leatherback nesting density was seen in Hillsboro with 1.40 nests/mile (0.86 nests/km) and was lowest in Mizell-Eula State Park where no leatherback nests were documented (Table 4).

Incubation Periods

Incubation periods were determined for 7 leatherback nests left *in situ* on Broward County beaches (excluding Mizell-Eula State Park) in 2017. The overall 2017 season incubation periods for leatherbacks ranged from 61-77 days with a mean incubation period of 66.57 days.

Reproductive Success

Reproductive success was assessed for 7 leatherback nests left *in situ* in Broward County. The 7 nests resulted in 560 eggs and 289 hatchlings released for an emergence success of 51.61% (Table 5). This represents a nearly 10% lower emergence success than was observed in 2016 (60.80%). Fort Lauderdale Beach had the lowest hatchling emerged percentages at 41.40% and Pompano Beach had the highest percentage at 82.35%; however, the small sample sizes make it difficult to compare among beaches (Table 6).

Loggerhead Sea Turtles (*Caretta caretta*)

Overall Nesting Activity

Loggerhead nesting made up the majority of the nesting activity in Broward County in 2017. A total of 6,709 crawls were recorded for loggerhead turtles in all of Broward County: 2,898 nests and 3,811 false crawls, which resulted in a nesting success of 43.20% (Table 3). This is very similar to the loggerhead nesting success from last year (43.38%) but is ~2.5% lower than the five-year average of 45.64% (Figure 7). Loggerhead nesting has experienced a significant increase over the life of the program with an average increase of 35.98 nests per year from 1981-2017. Regression shows a highly significant positive trend ($F(1,35) = 29.17, P < 0.001$; Figure 8).

Temporal Patterns

The first loggerhead nest was deposited on April 18, 2017 and the first loggerhead false crawl was documented on April 19, 2017. Highest daily nesting was recorded on June 8, 2017 when 61 loggerhead nests were discovered in Broward County (Figure 6). The last loggerhead nest was deposited on September 6, 2017, and the last false crawl was recorded on September 13, 2017.

Spatial Patterns

Loggerhead nests and false crawls were recorded in all survey zones with an average of 121.26 nests/mile (75.08 nests/km) across the entire survey area. Hillsboro experienced the highest loggerhead nesting with 214.42 nests/mile (131.71 nests/km) and Hollywood

showed the lowest loggerhead nesting density with 31.72 nests/mile (19.57 nests/km; Table 4).

Incubation Periods

Incubation periods were determined for 1,731 loggerhead nests left *in situ* on Broward County Beaches (excluding Mizell-Eula State Park) in 2017. Incubation periods ranged from 41- 72 days with a mean incubation period of 50.76 days.

Reproductive Success

Reproductive success was investigated in 1,693 *in situ* loggerhead nests across Broward County (excluding Mizell-Eula State Park) in 2017. In these evaluated nests 175,886 eggs were laid resulting in 121,369 hatchlings released for an emergence success of 69.00% (Table 5). This is nearly 400 fewer nests evaluated than during the 2016 season, but represents nearly a 12% higher emergence success than last year (57.3%).

Table 7 shows the fate of each egg deposited in the evaluated loggerhead nests left *in situ*, relocated, and nests outfitted with restraining cages. The highest emergence success in nests left *in situ* were those evaluated in Fort Lauderdale with an emergence success of 73.52%; the lowest emergence success of *in situ* nests was in Hillsboro Beach at 61.90%.

Green Sea Turtles (*Chelonia mydas*)

Overall Nesting Activity

Green turtles are historically the second most frequent nesters in Broward County. This trend continued again for the 2017 nesting season. A total of 1,193 crawls were recorded for green turtles in all of Broward County, which is the highest green crawl count in program history. A record breaking 665 nests and 528 false crawls resulted in a County-wide green turtle nesting success of 55.74% (Table 3). This represents a 10% increase in nesting success compared to 2016 and is 3.77% lower than the five-year average green turtle nesting success of 51.97% (Figure 7). Like the other species, green nesting has experienced a significant increase over the life of the program with an average increase of 9.6 nests per year from 1981-2017. Regression shows a highly significant positive trend ($F(1,35) = 36.21, P < 0.001$; Figure 8).

Temporal Patterns

The first green turtle nest was deposited on May 30, 2017 and the first green turtle false crawl was documented on May 9, 2017. Highest daily nesting was recorded on July 11, 2017 when 21 green nests were discovered that morning in Broward County (Figure 6). The last green turtle nest was deposited on September 20, 2017, and the last false crawl was recorded on September 16, 2017.

Spatial Patterns

Green turtle nests and false crawls were recorded in all survey zones with a County-wide green turtle average nesting density of 27.82 nests/mile (17.23 nests/km). The highest green nesting density was in Hillsboro with 110.23 nests/mile (67.71 nests/km), and the lowest was in Hollywood with 1.72 nests/mile (1.06 nests/km; Table 4).

Incubation Periods

Incubation periods were determined for 282 green turtle nests left *in situ* on Broward County Beaches (excluding Mizell-Eula State Park) in 2017. Incubation periods ranged from 41-76 days with a mean incubation period of 51.04 days.

Reproductive Success

Reproductive success was evaluated for 258 green turtle nests that were left *in situ* in 2017. There were 29,289 eggs deposited in the evaluated nests resulting in 22,675 hatchlings released for an emergence success of 77.42% (Table 5). The 2017 season had the highest green turtle nesting on record for the BSTCP and therefore had more nests evaluated (66 in 2016), but the emergence success was about 2% higher than that recorded in 2016.

Table 8 shows the fate of each egg in evaluated green turtle nests broken down by beach location, *in situ*, and relocated nests. The highest emergence success for *in situ* nests was found on Fort Lauderdale Beach at 84.04% (72 nests evaluated). The lowest emergence success of *in situ* nests was 62.18%, observed in Hollywood Beach.

Beach Renourishment Projects

Broward County Segment II Project

The Broward County Segment II Project (R36-R41; R51-R72) placed approximately 607,000 cubic yards of upland sourced sand from January–April 2016. More sand was placed in November–December 2016 to reach the goal of placing 706,700 cubic yards of sand across 4.9 miles of beach.

Nesting Success

Within the project area, there were 633 loggerhead nests and 853 false crawls documented for a nesting success rate of 42.6%. Green turtles laid 123 nests in the fill area and 90 false crawls for a nesting success of 57.7%. There were 3 leatherback nests and 0 false crawls for a nesting success of 100% in the project area (Table 9).

Reproductive Success

The Broward County Segment II Project had 466 loggerhead nests that were evaluated for reproductive success. These nests resulted in 49,156 eggs laid and 38,694 hatchlings released for an emergence success of 78.72%. There were 69 green turtle nests evaluated resulting in 8,115 eggs and 6,760 hatchlings released for an emergence success of 83.30%. There were 3 leatherback nests evaluated resulting in 263 eggs and 154 hatchlings released for an emergence success of 58.56% (Table 10).

FCCE Truck Haul Project

This is the fourth year of post-project monitoring (construction completed in 2013) for the FCCE Truck Haul Project at Pompano Beach (R26-R53). This project impacted one of the longest extents of beach of any of the recent projects with 115,000 cubic yards of sand being placed across 5.1 miles of critically eroded coastline.

Nesting Success

The fill area had 557 loggerhead nests and 603 false crawls for a loggerhead nesting success in the fill zone of 48.02%. Green turtles laid 31 nests and 45 false crawls for a nesting success of 40.79%. Leatherbacks laid 1 nest and 0 false crawls for a nesting success of 100% in the project area (Table 9).

Reproductive Success

The FCCE Truck Haul Project had 396 loggerhead nests that were evaluated for reproductive success. These nests resulted in 42,181 eggs and 29,154 hatchlings released for an emergence success of 69.12%. There were 21 green turtle nests evaluated for reproductive success resulting in 2,405 eggs and 1,761 hatchlings released for an emergence success of 73.22%. There was 1 leatherback nest evaluated for reproductive success resulting in 85 eggs and 70 hatchlings released for an emergence success of 82.35% (Table 10).

Hillsboro/Deerfield Beach Nourishment Project

The Hillsboro/Deerfield Beach Nourishment Project (R6-R8) was a small renourishment project that placed approximately 375,000 cubic yards of sand across 7,175 linear feet of shoreline miles. This project concluded on April 11, 2011 but in 2015, an amendment to this project permitted the placement of an additional 50,000 cubic yards of truck haul fill from Broward County Borrow Area 1 in the same 7,175 linear feet of shoreline.

Nesting Success

The Hillsboro/Deerfield Beach Nourishment Project accounted for 38 loggerhead nests and 53 false crawls for a nesting success of 41.76%. Green turtles laid 20 nests and made 9 false crawls in the project area and leatherbacks had no nests and made no false crawls in the project area (Table 9).

Reproductive Success

The Hillsboro/Deerfield Beach Nourishment Project had 23 loggerhead nests that were evaluated for reproductive success. The 23 nests resulted in 2,417 eggs with 1,693 hatchlings released for an emergence success of 70.05%. There were 9 green turtle nests evaluated for reproductive success in the project area resulting in 1,094 eggs, and 896 hatchlings release for an emergence success of 81.81% (Table 10).

Hillsboro Inlet Maintenance and Sand Bypass Project

The Hillsboro Inlet Maintenance and Sand Bypass Project in Hillsboro Beach (R25-R26) is a small maintenance and sand bypass project at the Hillsboro Inlet and moves sand as necessary across a 0.21 mile stretch of beach.

Nesting Success

The Hillsboro Inlet Maintenance and Sand Bypass Project impacted 1 loggerhead nest and 9 false crawls resulting in a loggerhead nesting success in this project area of 10%. Green turtles laid 1 nest but no false crawls in the project area resulting in a green nesting success of 100%. There were no leatherback crawls in the area this season (Table 9).

Reproductive Success

The Hillsboro Inlet Maintenance and Sand Bypass Project had 1 loggerhead nest evaluated for reproductive success. This nest resulted in 140 eggs and 108 hatchlings released for an emergence success of 77.14%. One green nest was evaluated for reproductive success resulting in 168 eggs and 82 hatchlings released for an emergence success of 48.81% (Table 10).

Relocation

A total of 68 nests (63 loggerhead, 5 green) were relocated throughout the 2017 nesting season (Figure 9). This accounted for 2.00% of all nests laid in Broward County. Of these 68 nests, 19 were relocated mid-incubation due to nest chamber washout or egg exposure, 30 were relocated because they were laid below the high tide line, and the remaining 19 nests were relocated because they were laid in a “donor” zone as specified by FWC.

Incubation Period

Incubation periods were determined for 55 relocated loggerhead nests (8 relocated mid-incubation due to washover/washout). Relocated loggerhead nests had an incubation range of 45-57 days with a mean incubation period of 50.60 days. Incubation periods were calculated for 4 relocated green nests (1 relocated mid-incubation due to washover/washout). Incubation periods for greens ranged from 49-52 days with an average of 48.50 days.

Reproductive Success

Reproductive success was calculated for 59 relocated nests (54 loggerhead, 5 green). The 54 loggerhead nests resulted in 5,806 eggs with 3,211 hatchlings released for an emergence success of 55.30% (Table 5). The 5 green turtle nests resulted in 649 eggs with 374 hatchlings released for an emergence success of 57.63%.

Disorientation Events

The BCSTCP surveyors reported 218 (81 adult, 137 hatchling) disorientation events across Broward County on morning surveys (Figure 10). Seventy-eight of these disoriented nests were in the Fort Lauderdale survey zone and an additional 70 disoriented nests were in Pompano survey zone (Figure 11). Together these two survey zones accounted for 67.89% of the disorientation events reported by BCSTCP staff this season. The 2017 season saw 10 more disorientation events than the 2016 season and was much higher than the five-year Broward County average of 153.4 events (Figure 10).

To gain a more comprehensive understanding of the number of hatchling disorientation events in the entire County, all disorientation reports submitted to FWC by all sea turtle monitoring/volunteer groups (BCSTCP, STOP, SFAS, STARS) in Broward County (except Mizell-Eula State Park) were examined. A total of 763 hatchling disorientation events were documented out of 2,178 nests where a hatch out was observed, yielding a 35.03% disorientation rate (Table 11); however, variation existed among beaches within the County. Sea Ranch Lakes experienced the highest hatchling disorientation rate at 75.00% (6 nests disoriented out of 8 observed hatch outs). Additionally, Hollywood, Fort Lauderdale, Lauderdale-By-The-Sea, and Pompano all experienced 31% disorientation rates or higher. Dania Beach had the lowest hatchling disorientation rate with 1 out of 21 (4.76%) documented hatch outs disorienting (Table 11, Figure 11).

Predation and Poaching

In 2017, 156 nests (or 4.59% of all nests) in Broward County (excluding Mizell-Eula State Park) experienced predation. This is slightly lower than the 2016 season that had an overall predation rate of 5.50% and is 2.86% lower than the five-year predation average percentage of 7.45% (Figure 12). Broward County as a whole has shown little change in predation rates from 2005-2017. A slight rise in predation in the 2013 and 2014 seasons was not continued during the 2015, 2016, or 2017 season, but fluctuating numbers suggest that

continued monitoring of predation rates in this area would be beneficial. Foxes are the primary predators of turtle nests in Broward County, but raccoons and several unknown bird species were also documented preying on nests. The Fort Lauderdale survey zone experienced the lowest predation impact with no predation events. The Hillsboro survey zone experienced the highest predation rates with 10.76% of nests experiencing predation (Figure 13). This is down about 5% from the 2016 season, which saw a 15.86% predation rate and is still considerably lower than the 25% predation rate documented in Hillsboro in 2014. Since Hillsboro hosts the highest nesting density in Broward County, this elevated predation impact over other survey zones may warrant some degree of nest protection in future years, though the decrease in predation in the 2017 is a positive sign.

In addition to predation impacts, 2 nests in Broward County were impacted by human disturbance/poaching/vandalism (0.06% of all nests laid). This is down from the 2016 season, which saw 0.27% of nests impacted. Luckily, the observed nest vandalism included events such as stake removal or cage tampering; no evidence of poaching was observed.

Restraining Cages

In the designated “restraining cage” zones, a total of 75 restraining cages were constructed on loggerhead turtle nests: 45 in Fort Lauderdale, 30 in Hollywood.

Incubation Period

Sixty-three of the 75 nests that received hatchling-restraining cages were excavated. The first cage was constructed June 4, 2017 on Fort Lauderdale Beach and the last was constructed October 3, 2017 on Hollywood Beach. Incubation period for caged nests ranged from 45 days to 57 days with a mean incubation period of 49.90 days. This is very similar to the wider dataset of *in situ* loggerhead nests, which had incubation periods ranging from 41-72 days with a mean incubation period of 50.80 days in 2017.

Reproductive Success

Sixty-three caged nests were excavated and analyzed for reproductive success. Twelve of the 75 caged nests could not be excavated due to washout and/or loss of cage/stakes that required reestablishment (egg chambers ultimately could not be located). A total of 6,713 eggs were deposited with 3,904 hatchlings released for an emergence success rate of 58.16% across all inventoried caged nests (Tables 5 and 6).

Washover and Washout Events

A total of 1,350 nests were impacted by washover (excluding Mizell-Eula State Park). Of these 1,350 nests, 473 were washed out completely (clutch completely or partially lost). A total of 39.71% of all nests throughout Broward County (excluding Mizell-Eula State Park) experienced washover at some point over the 2017 season. This is very similar to the 2016 season, which had 1,406 (42.76% of nests) nests impacted; this year was also higher than the five-year average of 34.45% of nests impacted (Figure 14). Hurricane Irma and King Tides were responsible for 45.48% (n=614) of the washover and 88.16% (n=417) of the washout events in 2017.

Strandings

The BCSTCP responded to 50 marine turtle stranding events from January 1–December 31, 2017. Of these, 26 were live strandings (3 turtles were picked up alive, but either died in transport to a rehabilitation facility or during rescue) and 24 were dead stranded turtles (Appendix 9). Stranding numbers increased by 2 in 2017 compared to the 2016 season (Appendix 13).

Of the 49 strandings, 8 were impacted by fishing hooks (all 8 were live strandings and were able to be transported to a rehabilitation facility to remove the hooks and fishing line).

Obstructed Nesting Attempts

Morning surveys documented 682 ONAs: 479 were loggerhead crawls and 203 green turtle crawls. Of the 682 ONAs, 338 resulted in false crawls and 344 resulted in nests. Turtles encountered various obstructions (sometimes multiple obstructions) including escarpments (324), beach furniture (175), seawalls (108), dune crossovers (17), rock outcroppings (15), boats (14), cabanas (13), rock revetments (9), umbrellas (6), and tents (1). Turtles also encountered fences, garbage cans, construction walls, lifeguard stands, posts, stairs, piers, signs, trees, benches, storage bins, roads, pipes, kayak racks, etc. (combined total of 93 interactions).

DISCUSSION

Yearly Nesting Trends

The 2017 nesting season set a new record as the highest nest count in program history. All three species of nesting turtles in Broward County have shown significant increases in nest deposition over the history of the BCSTCP starting in 1981. Loggerheads are on an increasing trend of +36.0 nests per year since 1981; however, there was a 10-year period of decline from 1997-2007. Since 2007, there has been an increase in loggerhead nesting activity and the rate of increase is higher than the overall program trend. Green turtles have seen a steady positive historic trend in nesting in Broward County. Leatherback nesting is also following an increasing historical trend (Figure 8). Recent historical Broward County nesting data (5 years) has demonstrated patterns of high and low nesting seasons that alternate annually. Both loggerheads and greens followed this trend in 2017. The 2016 season experienced a large increase of loggerhead nesting numbers relative to the 2015 nesting season. Following this oscillating pattern, a lower loggerhead year was expected in 2017. Green sea turtles demonstrate a far more extreme oscillation between high and low nesting seasons. The 2016 season experienced a low nesting season for greens, and a high green nesting season for 2017 was expected and confirmed with the highest green turtle nesting on record. Leatherbacks traditionally demonstrate this oscillating nesting pattern between seasons however it is the least consistent based on historical leatherback nesting data. The 2016 leatherback nesting season experienced a slight decline in nesting numbers relative to the 2015 season, however it was still relatively high. The 2017 experienced another drop in leatherback nesting suggesting that Broward County will likely have a busier leatherback season in 2018. Although it contradicts

predictions, this result is not surprising as similar patterns have been documented in Broward County between seasons 2002 to 2003 and 2010 to 2011.

Seasonal Nesting Patterns

The seasonal nesting pattern was consistent with what is normally found in Broward County: the first nesters to arrive were the leatherbacks, followed by the loggerheads and then the green turtles. Nest deposition over the season followed a normal distribution with the height of the season falling in June and July, which is similar to historic nesting patterns.

Green turtle nesting in 2017 was considerably higher than in 2016 and started earlier and ended later than the 2016 season. The first green nest was deposited on May 30 this year compared to June 13 in 2016. The last nest was deposited on September 20 this year compared to September 7 in 2016.

Countywide Nest Distribution

Nest distributions this season closely resembled patterns that have been seen in Broward County for many years with the highest nesting densities in Hillsboro/Deerfield Beaches, followed by Fort Lauderdale Beach, Pompano Beach, Mizell-Eula State Park and the lowest nesting activity on Hollywood Beach. In addition, there was very little crawl/nest activity directly adjacent to most jetties and inlets. These types of beach armoring constructions disrupt the natural water flow and sand movement and often result in increased beach erosion near the structures, impacting sea turtle nesting (Mosier and Witherington, 2000; Rizkalla and Savage, 2011).

Hillsboro Beach has one of the lowest human population densities and amount of artificial lighting of any of Broward County's beaches. Additionally, a sea turtle hatchery facility was once located near the Hillsboro Beach Club. The hatchery was maintained through the 2005 nesting season and received nests from "donor" zones that were brightly lit by artificial lighting (Burney and Ouellette, 2005). These factors may play some role in the current high-density nesting observed on Hillsboro Beach (Brothers and Lohmann, 2015; Lohmann et al., 1997). However, the reason still remains unknown. Hollywood Beach was a long time "donor" zone since it is one of the brightest areas in Broward County. Female sea turtles return to their natal beaches when they are ready to deposit nests of their own (Lohmann et al., 1997), which may explain the underutilization of Hollywood beaches for sea turtle nesting in recent years. Broward County may be experiencing some impact of this long-term movement of nests into the Hillsboro Beach area; this may be a question that warrants further investigation in the future.

Nest Relocation

Historically, hatcheries were used quite extensively in Broward County as a management tool to protect marine turtles. An active hatchery facility was maintained near the Hillsboro Beach Club until 2005 (Burney and Ouellette, 2005). Hatchery facilities provide a sound management tool in heavily impacted coastal communities where nests left *in situ* will likely experience very high rates of disorientation, predation, washout, etc. However, the hatchery model is not without its complications. The sex of marine turtle hatchlings is

dependent on sand temperature during incubation (Standora and Spotila, 1985). A beach with all nests left *in situ* will experience a range of temperatures due to variation in nest placement in relation to the high tide line, shading from dune vegetation, etc.; likewise, different nest chamber depths will likely experience different temperatures during development (Abella et al., 2008, Van et al., 2006). When all or most nests are relocated into a hatchery facility, this may eliminate some of the natural temperature variation found when nests are left *in situ*. Also, when nests are packed densely together in a hatchery facility they become more vulnerable to disease and disease transmission, predation, and storm events (Izadjoo et al., 1987). In 2004, Hurricanes Frances and Jeanne had significant negative impacts on the hatchery nest facilities in Broward County (Burney and Ouellette, 2004).

Relocated sea turtle nests generally experience lower emergence success than *in situ* nests because the eggs are moved and placed into an artificial chamber and some eggs/embryos may be damaged in transport/handling (Moody, 1996). This was demonstrated in 2017 as the *in situ* loggerhead emergence success (67.71%) was significantly higher than the relocated loggerhead emergence success of 55.93%. In a hatchery system, some nests may travel a long distance in buckets before they are placed in their new man-made nests, increasing the likelihood of damage to the embryos. The final year of the hatchery facilities in Broward County resulted in loggerhead nests with a release success of 53.30% for relocated nests (N = 1151; Burney and Ouellette, 2005). In comparison, the 2017 season resulted in a relocated release success of 55.93% (N = 53 nests). Broward County has moved towards a more “hands off” management strategy, relocating less nests due to non-compliant lighting. The final year of the hatchery facilities in the County relocated 56.04% of all nests, compared to just 2.00% in 2017. The five-year average for nest relocation is currently 2.82%. As lighting compliance improves in Broward County, the more “hands off” management strategy is strongly recommended. Future nesting, relocation, and reproductive success data will help determine the most effective suite of management tools for the dynamic and highly utilized beaches of Broward County.

Restraining Cages

Hatchling-restraining cages were found to be an effective short-term mitigation action in areas of bright anthropogenic beachfront lighting to minimize loss of sea turtle hatchlings that would likely disorient in these areas. The cages also provided an effective educational tool in the field with signage and allowed the BCSTCP team to speak to beachgoers about turtle friendly lighting and why the restraining cages were being used in certain areas. While effective as a temporary mitigation action, hatchling-restraining cages are logistically difficult (time and labor) for program staff to ensure hatchlings are not restrained for too long. Considering these challenges, working towards rectifying the underlying lighting issues at the source is recommended as a long-term management solution in these areas.

Disorientation Reports

Disorientation reports provide a mechanism to document nests that experience adult or hatchling disorientation. Broward County has four organizations documenting these events each season: the BCSTCP, STOP, SFAS, and STARS. Having multiple groups recording disorientation events makes it difficult to ensure standardized methodology is being

implemented County-wide that would make disorientation reporting most effective as a management tool. However, all hatchling disorientation reports filed in Broward County this year were used to provide a more succinct and complete look at the impact of coastal lighting on hatchling sea turtles. These disorientation reports and monthly lighting reports show a negative correlation between sea turtle nesting activities and non-compliant anthropogenic lighting. The results of this comprehensive analysis are being used to target future outreach efforts.

Challenges Encountered

Both the nesting and hatching success of Broward County sea turtle nests were impacted by weather driven factors such as Hurricane Irma, and King Tide events. The Atlantic hurricane season was quite intense this year, spawning some of the strongest and largest hurricanes on record for the area; however, only Hurricane Irma directly impacted Broward County. Due to Hurricane Irma, morning surveys were ceased beginning on September 8 and did not commence again until September 13, 2017. Broward County beaches sustained considerable flooding/overwash resulting in a loss (washout) of 377 nests (51%), that were on the beach during the storm impact, and an additional 195 nests needed to be reestablished after the storm waters receded. The beaches experienced considerable sand loss and sand movement (including roadways along the beach being under inches-feet of sand in many places). Luckily the storm hit later in the season (after peak season), significantly reducing the potential extent of nest damage. Additionally, a King Tide event (October 2-10, 2017) impacted Broward County beaches at the end of the season, which brought high waters and heavy surf resulting in increased beach erosion, escarpment formation, and washout of some remaining nests.

A small degree of vandalism was observed throughout the season that resulted in damage to nest stakes as well as restraining cages. There were no poaching attempts documented.

Conclusions and Recommendations

Management of endangered nesting sea turtles in Florida is a monumental task. The current “hands-off” approach being used by FWC is working very well to provide the highest nesting and hatching success for the beaches in Broward County. Hopefully as nest numbers continue to rise in this area, this approach will be even more effective and provide less overall impact on the local nesting female population and hatchlings.

The restraining cages currently being used in some zones in Broward County provide a good short-term management strategy for addressing areas of high concern with regard to artificial lighting and light fixtures. These areas experience high rates of hatchling disorientation and the cages help mitigate the negative impacts by allowing sea turtle professionals to ensure the hatchlings safely enter the water; however, this is not a feasible long-term solution to these issues. Continued efforts working with code enforcement in each municipality to generate targeted education and enforcement efforts with regard to turtle friendly lighting should be of the utmost priority.

The extreme tide and weather events that occurred during the 2017 season may have resulted in a slightly lower overall productivity for the season; however, the high rate of nesting activity in Broward County and across Florida this year indicates that local sea

turtle populations are continuing their overall positive trend, leaving local scientists cautiously optimistic about the status of the nesting turtle populations in Broward County.

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TABLES & FIGURES

Table 1: Summary of the sea turtle nesting beach survey zones in Broward County, Florida, USA.

BEACH	BEACH LENGTH (miles)	BOUNDARIES	FDEP SURVEY MARKER #
Hillsboro-Deerfield	4.3	Palm Beach Co. line to Hillsboro Inlet	R1-24
Pompano Beach including Lauderdale-By-The-Sea	4.8	Hillsboro Inlet to Commercial Blvd.	R25-50
Fort Lauderdale	6.6	Commercial Blvd. to Port Everglades Inlet	R51-85
Von D. Mizell-Eula Johnson State Park	2.4	Port Everglades Inlet to Dania Beach fence	R86-96
Hollywood-Hallandale including Dania	5.8	Dania Beach fence to Miami Dade Co. line	R97-128

Table 2: Summary of treatment zones by R-monument.

Zone	Donor	<i>In Situ</i> & Recipient	<i>In Situ</i> Only	Restraining Cage
Description	All nests were relocated from this area to the nearest "recipient" zones.	All nests left in place; nests from "donor" zones may be relocated to this area. Cages should not be used.	All nests left in place; nests from "donor" zones may not be relocated in these zones; restraining cages may be used with approval by FWC.	All nests left in place; a restraining cage was installed on every other nest.
R-Monuments	R24 - Hillsboro Inlet R85 - Port Everglades	R6-R24 R26-R34 R39-R50 R51-R53 R58-R64 R80-R84 R102-R107 R124-R128	R1-R6 R25-R26 R34-R39 R50-R51 R53-R58 R64-R74 *R75-R77 R78-R80 R84-R84.7 R97.5-R102 *R107-R124	*R74-R78 *R107-R124

* All restraining cage zones are *in situ only*

Table 3: A summary of the total nests, false crawls (FC) and nesting success (NS) by species and beach.

Beach	Leatherback			Loggerhead			Green		
	<i>Nests</i>	<i>FC</i>	<i>NS</i>	<i>Nests</i>	<i>FC</i>	<i>NS</i>	<i>Nests</i>	<i>FC</i>	<i>NS</i>
Hillsboro	6	0	100.00%	922	1155	44.39%	474	319	59.77%
Pompano	1	0	100.00%	572	642	47.12%	32	46	41.03%
Ft Lauderdale	4	1	80.00%	1054	1325	44.30%	128	109	54.01%
Mizell-Eula	0	0	N/A	166	454	26.77%	21	46	31.34%
Hollywood	1	0	100.00%	184	235	43.91%	10	8	55.56%
OVERALL	12	1	92.31%	2898	3811	43.20%	665	528	55.74%

Table 4: A summary of the total nests laid and nesting densities by species and beach.

Beach	Leatherback			Loggerhead			Green		
	<i>Total Nests</i>	<i>Beach Length</i>	<i>Nests per mile</i>	<i>Total Nests</i>	<i>Beach Length</i>	<i>Nests per mile</i>	<i>Total Nests</i>	<i>Beach Length</i>	<i>Nests per mile</i>
Hillsboro	6	4.3	1.40	922	4.3	214.42	474	4.3	110.23
Pompano	1	4.8	0.21	572	4.8	119.17	32	4.8	6.67
Ft Lauderdale	4	6.6	0.61	1054	6.6	159.70	128	6.6	19.39
Mizell-Eula	0	2.4	0.00	166	2.4	69.17	21	2.4	8.75
Hollywood	1	5.8	0.17	184	5.8	31.72	10	5.8	1.72
OVERALL	12	23.9	0.50	2898	23.9	121.26	665	23.9	27.82

Table 5: Emergence success for all species by nest treatment.

Species	Evaluated Nests	Unevaluated Nests	Total Eggs	Hatchlings Released	Emergence Success (%)
<i>In situ</i>					
Leatherback	7	5	560	289	51.61
Loggerhead	1693	901	175886	121369	69.00
Green	258	374	29289	22675	77.42
Total	1958	1280	205735	144333	70.15
Relocated					
Loggerhead	54	9	4965	3211	64.67
Green	5	1	568	374	65.85
Total	59	10	5533	3585	64.79
Restraining Cage					
Loggerhead	63	12	6713	3904	58.16
Total	63	12	6713	3904	58.16
Overall					
Leatherback	7	5	560	289	51.61
Loggerhead	1810	922	187564	128484	68.50
Green	263	375	29857	23049	77.20
Total	2080	1302	217981	151822	69.65

Table 6: Excavation information for all evaluated leatherback nests. See text for details.

Location	Evaluated Nests	Total Eggs	Emerged (%)	LIN (%)	DIN (%)	Live Pip (%)	Dead Pip (%)	VD (%)	NVD (%)
<i>In situ Nests</i>									
Hillsboro Beach	2	161	55.28	1.86	4.97	0.00	13.66	9.94	16.15
Pompano Beach	1	85	82.35	3.53	1.18	0.00	3.53	5.88	7.06
Ft Lauderdale Beach	4	314	41.40	5.73	1.59	0.00	3.50	33.44	20.06
Overall <i>In situ</i>	7	560	51.61	4.29	2.50	0.00	6.43	22.50	16.96

Table 7: Excavation information for all evaluated loggerhead nests. See text for details.

Location	Evaluated Nests	Total Eggs	Emerged (%)	LIN (%)	DIN (%)	Live Pip (%)	Dead Pip (%)	VD (%)	NVD (%)
<i>In situ Nests</i>									
Hillsboro Beach	532	52420	61.90	2.03	1.74	0.27	4.62	23.59	8.16
Pompano Beach	393	41697	69.77	1.97	1.81	0.23	3.69	17.49	7.25
Ft Lauderdale Beach	665	70906	73.52	1.56	1.41	0.19	3.48	13.58	8.00
Hollywood Beach	103	10863	70.87	2.42	1.82	0.42	3.46	14.73	9.11
Overall <i>In situ</i>	1693	175886	69.00	1.85	1.63	0.24	3.87	17.56	7.94
Relocated Nests									
Hillsboro Beach	11	942	72.61	3.08	3.40	0.21	3.50	7.01	13.38
Pompano Beach	12	1243	56.80	8.21	3.30	0.97	4.75	17.78	16.25
Ft Lauderdale Beach	31	2780	65.50	12.27	2.73	2.55	8.02	11.73	11.80
Overall Relocated	54	4965	64.67	9.51	3.00	1.71	6.34	12.35	13.21
Caged Nests									
Ft Lauderdale Beach	37	3931	52.45	3.46	2.11	0.48	6.41	30.42	8.60
Hollywood Beach	26	2782	66.21	2.62	1.33	0.83	5.93	17.47	9.06
Overall Caged	63	6713	58.16	3.11	1.79	0.63	6.21	25.06	8.79

Table 8: Excavation information for all evaluated green turtle nests. See text for details.

Location	Evaluated Nests	Total Eggs	Emerged (%)	LIN (%)	DIN (%)	Live Pip (%)	Dead Pip (%)	VD (%)	NVD (%)
<i>In situ Nests</i>									
Hillsboro Beach	162	18021	75.15	2.72	1.49	0.42	1.49	16.15	4.48
Pompano Beach	21	2405	73.22	1.75	2.08	0.04	1.87	15.38	7.44
Ft Lauderdale Beach	72	8514	84.04	1.33	0.85	0.20	1.80	9.57	3.75
Hollywood Beach	3	349	62.18	1.15	0.29	0.00	0.29	29.80	7.45
Overall <i>In situ</i>	258	29289	77.42	2.22	1.34	0.32	1.60	14.34	4.55
<i>Relocated Nests</i>									
Hillsboro Beach	1	112	53.57	24.11	2.68	0.89	2.68	38.39	2.68
Pompano Beach	1	168	48.81	25.00	2.38	0.00	11.90	11.90	25.00
Ft Lauderdale Beach	2	237	83.97	6.33	0.42	0.00	0.84	11.81	2.95
Hollywood Beach	1	51	64.71	15.69	3.92	15.69	0.00	31.37	0.00
Overall Relocated	5	568	65.85	4.75	0.53	0.18	0.53	7.57	0.53

Table 9: A summary of the total crawls and nesting success (NS) by species in relation to County-sponsored beach renourishment projects.

	Leatherback			Loggerhead			Green		
	<i>Nests</i>	<i>FC</i>	<i>NS</i>	<i>Nests</i>	<i>FC</i>	<i>NS</i>	<i>Nests</i>	<i>FC</i>	<i>NS</i>
Deerfield	0	0	N/A	38	53	41.76%	20	9	68.97%
Hillsboro Inlet Bypass	0	0	N/A	1	9	10.00%	1	0	100%
FCCE	1	0	100%	557	603	48.02%	31	45	40.79%
Segment II	3	0	100%	633	853	42.60%	123	90	57.75%
OVERALL	4	0	100%	1229	1518	44.74%	175	144	54.86%

Table 10: Reproductive success of loggerhead, green and leatherback turtles in relation to beach renourishment projects.

Project	Evaluated Nests	Unevaluated Nests	# Eggs	Hatchlings Released	Emerged (%)
Deerfield					
Loggerhead	23	15	2417	1693	70.05
Green	9	11	1094	895	81.81
Hillsboro Inlet					
Loggerhead	1	0	140	108	77.14
Green	1	0	168	82	48.81
FCCE					
Leatherback	1	0	85	70	82.35
Loggerhead	396	161	42181	29154	69.12
Green	21	10	2405	1761	73.22
Segment II					
Leatherback	3	0	263	154	58.56
Loggerhead	466	167	49156	38694	78.72
Green	69	58	8115	6760	83.30

Table 11: A summary of the hatchling disorientation (DIS) reports by municipality as reported by BCSTCP, STOP, SFAS, and STARS.

Municipality	Hatch DIS	Hatch Total	% Hatch DIS
Hallandale	4	24	16.67%
Hollywood	30	94	31.91%
Dania	1	21	4.76%
Fort Lauderdale	478	804	59.45%
Lauderdale-By-The-Sea	89	224	39.73%
Sea Ranch Lakes	6	8	75.00%
Pompano	114	257	44.36%
Hillsboro	36	700	5.14%
Deerfield	5	46	10.87%
Total (excludes State Park)	763	2178	35.03%

Figure 1: Location of Broward County, FL, USA

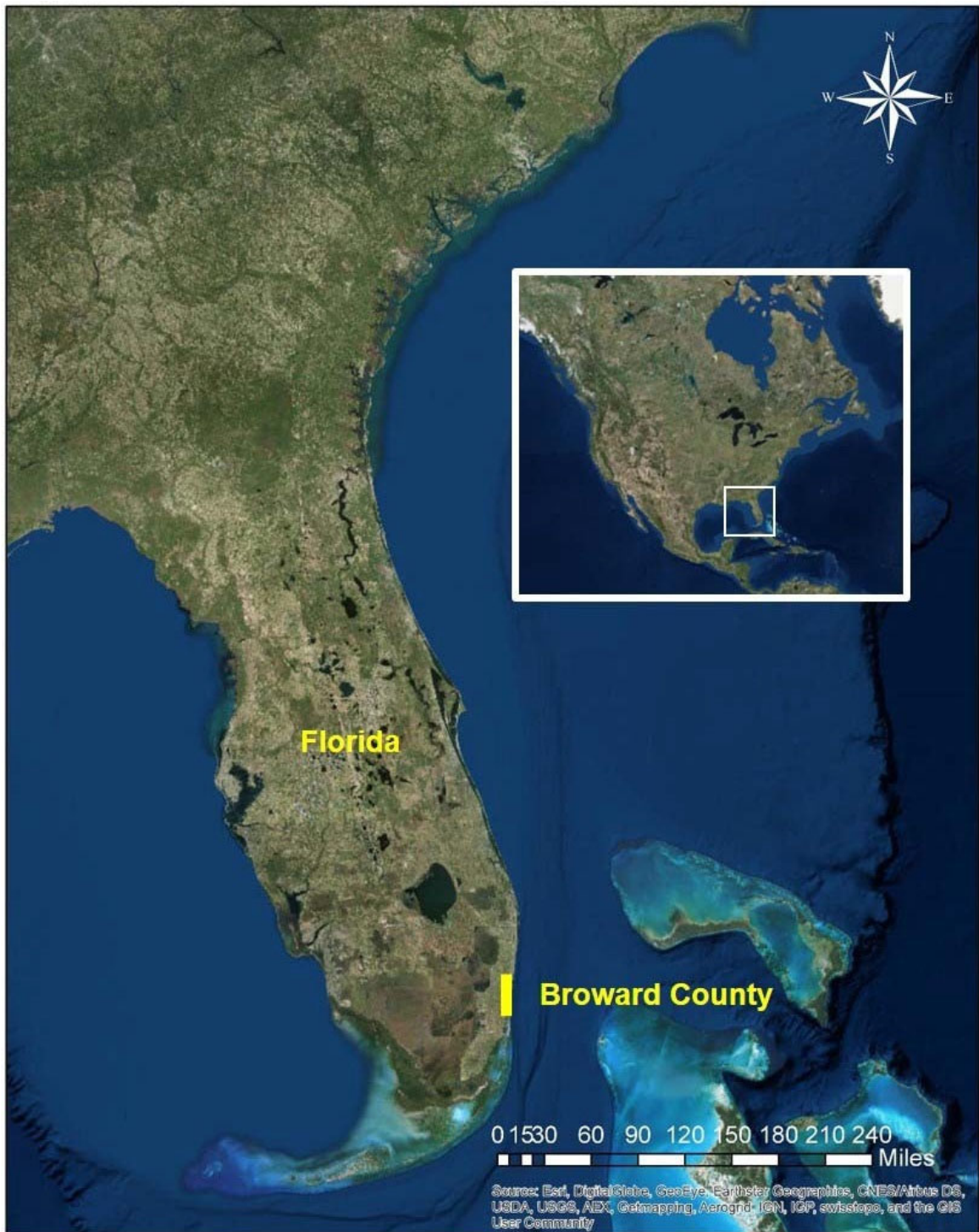


Figure 2: Boundaries of 2017 Sea Turtle Survey Zones

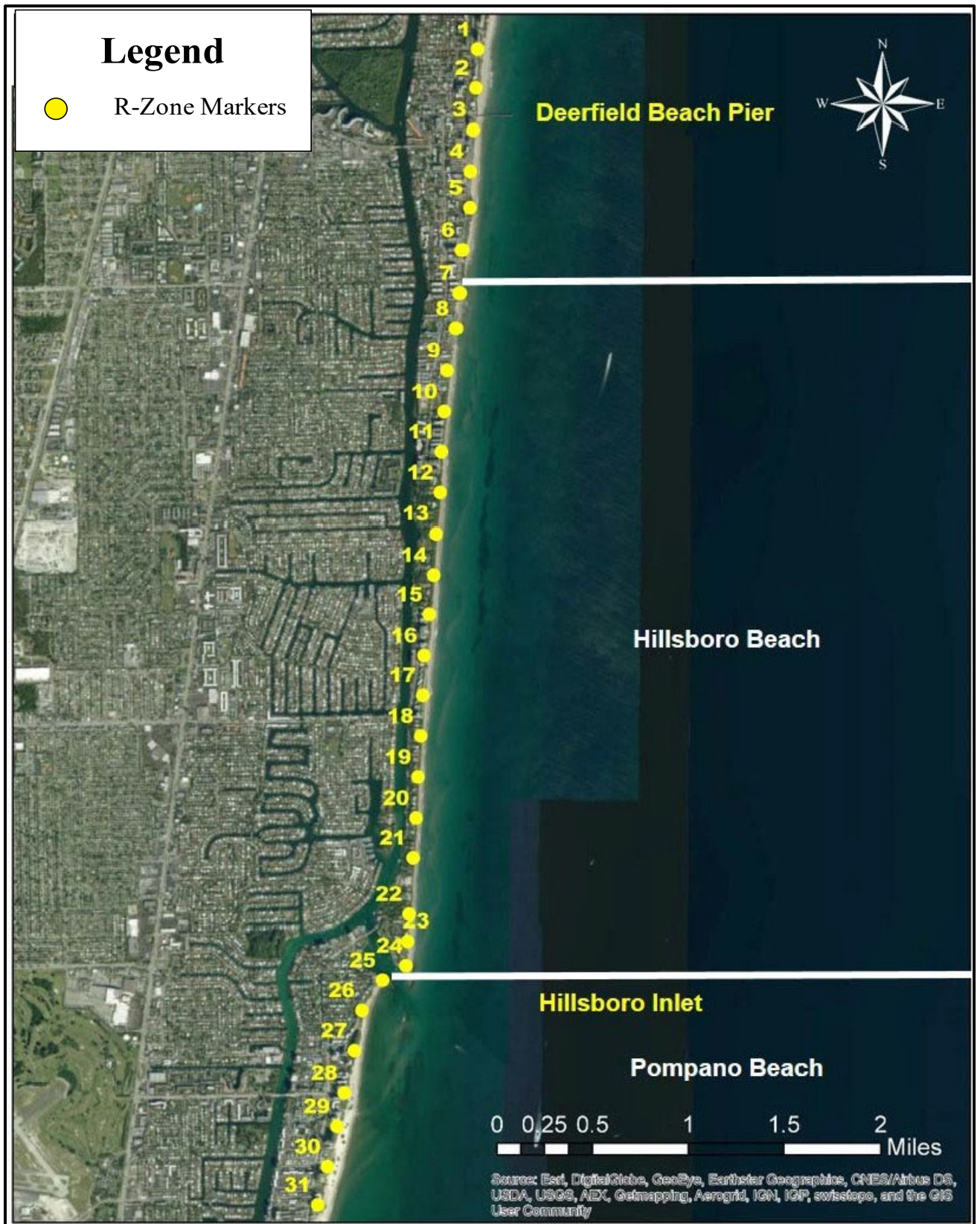


Figure 2: Boundaries of 2017 Sea Turtle Survey Zones

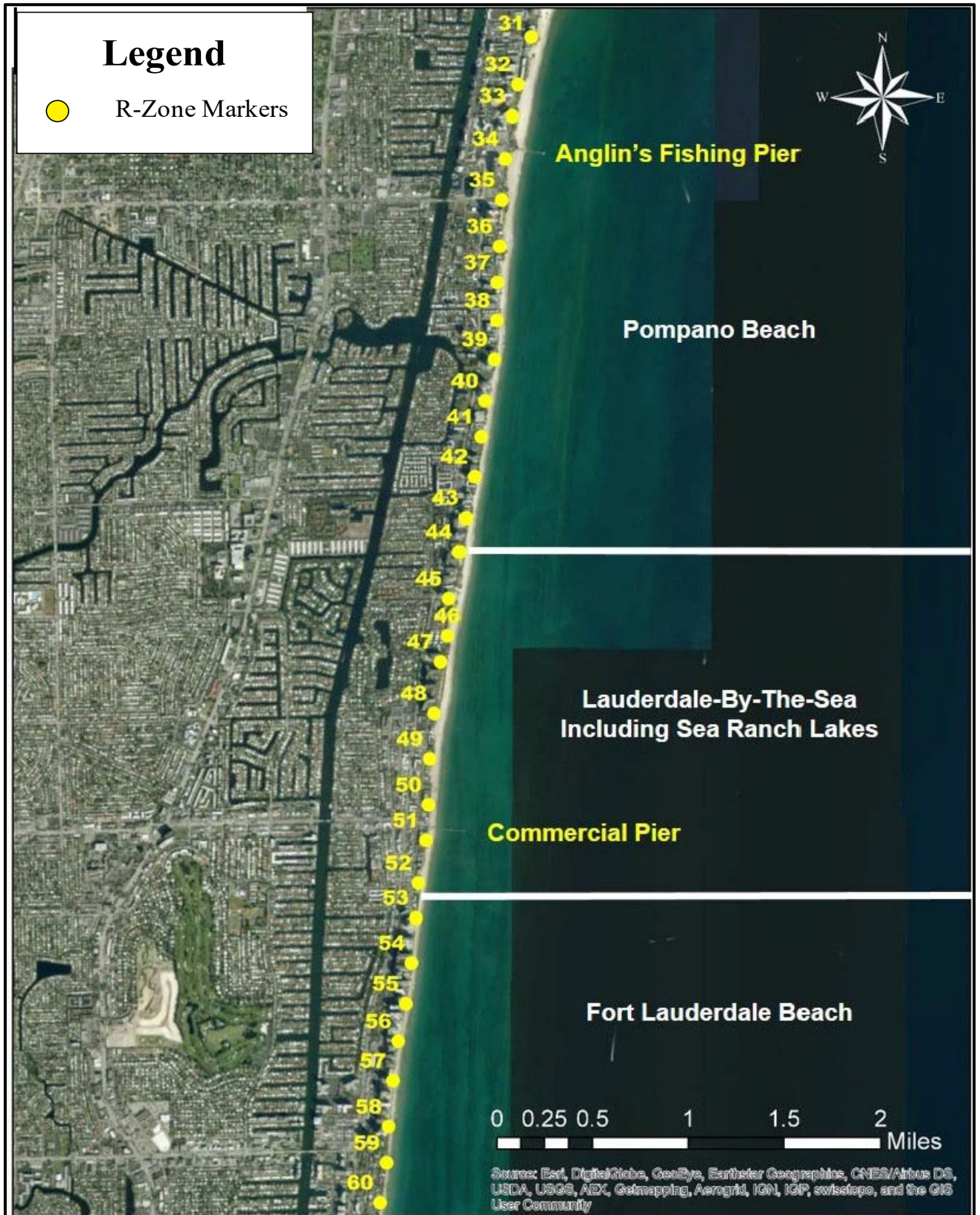


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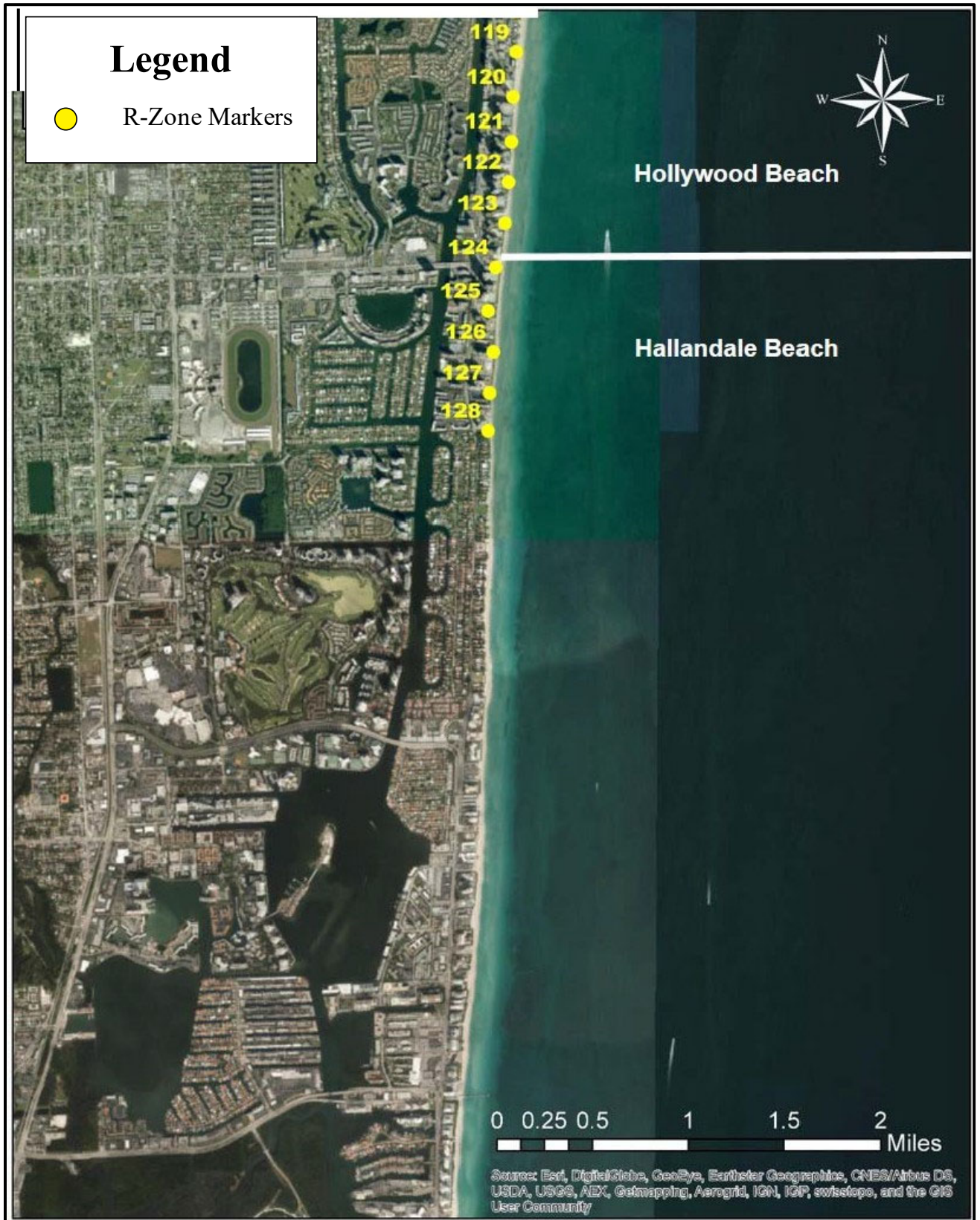


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones



Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

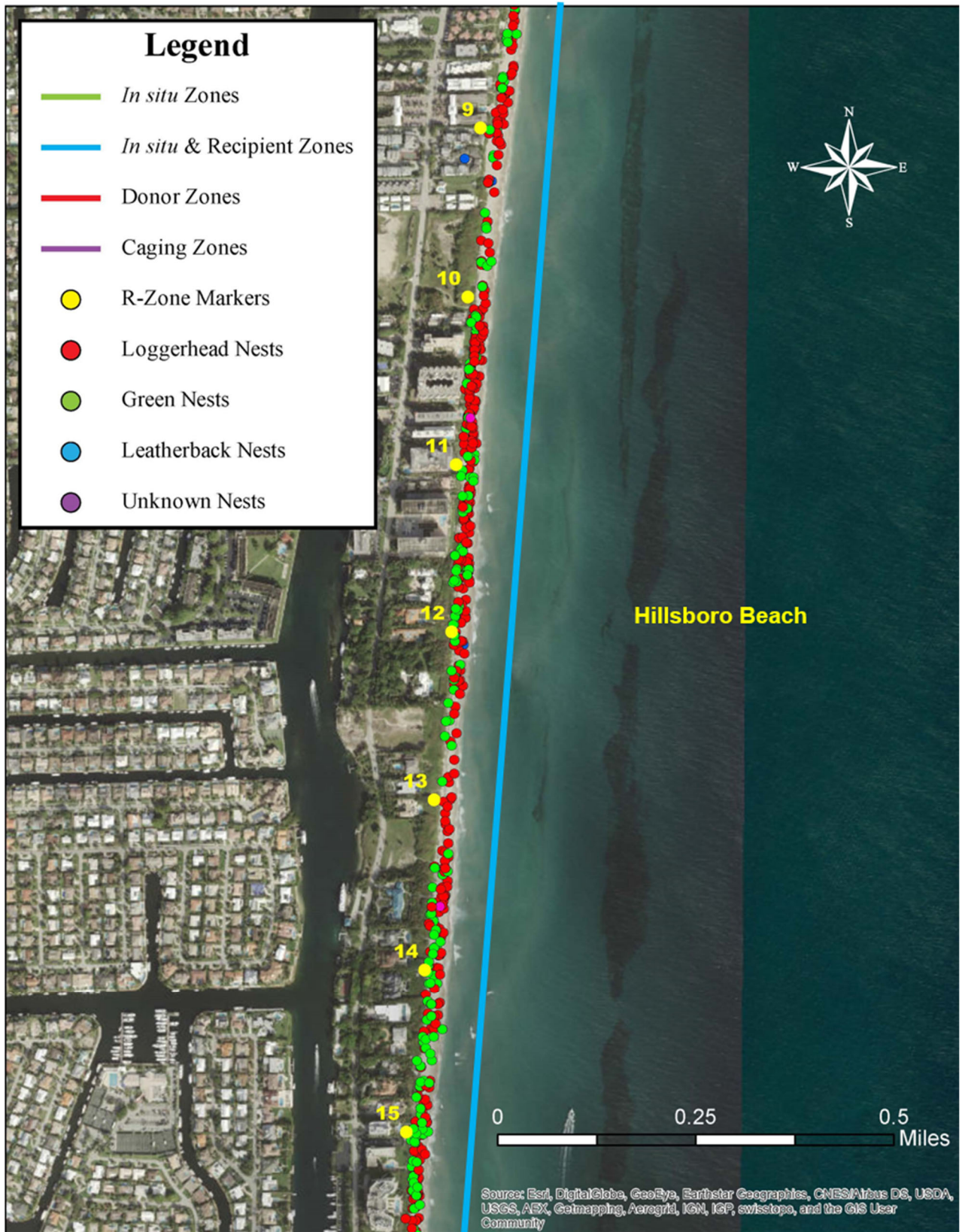


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones



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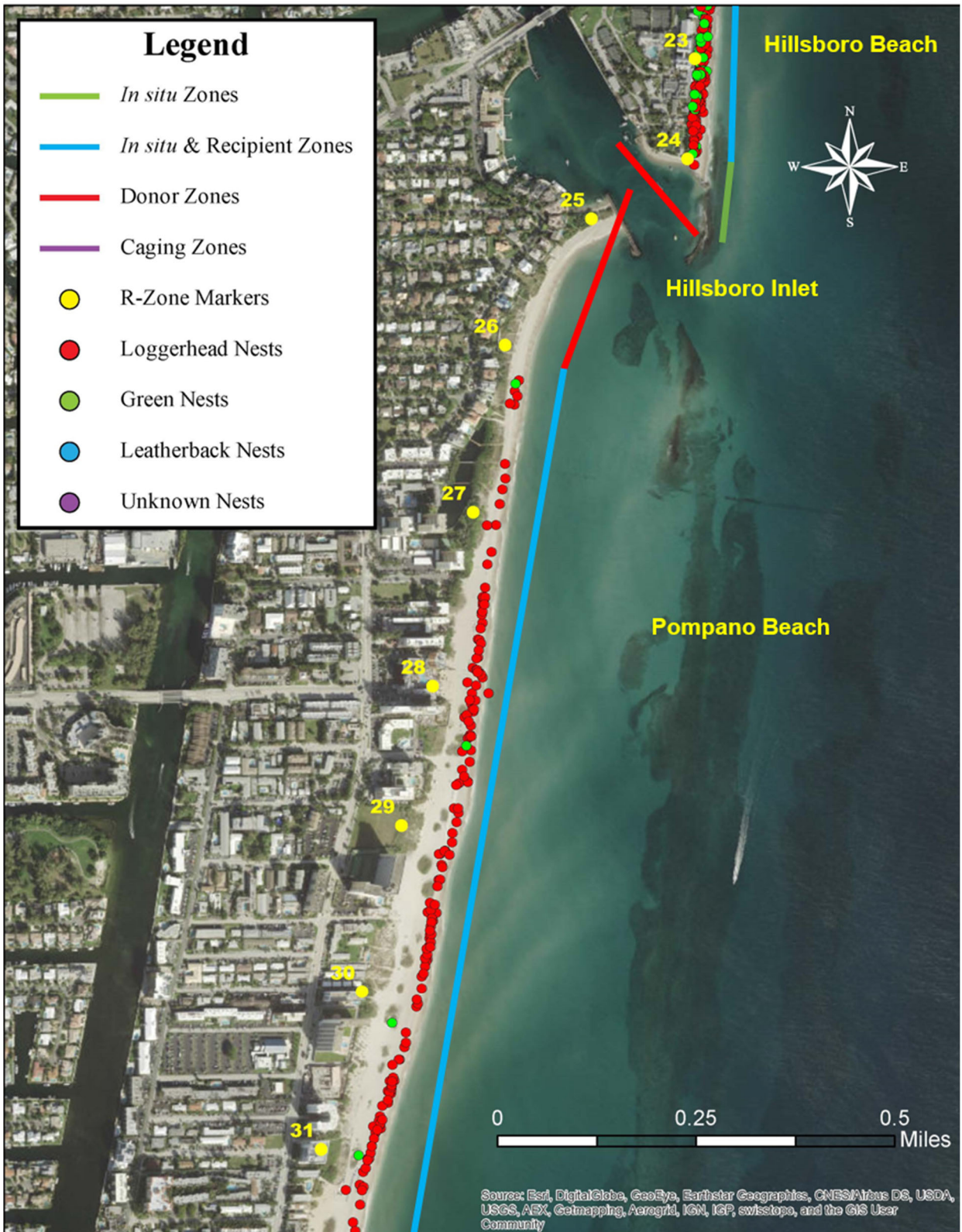


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

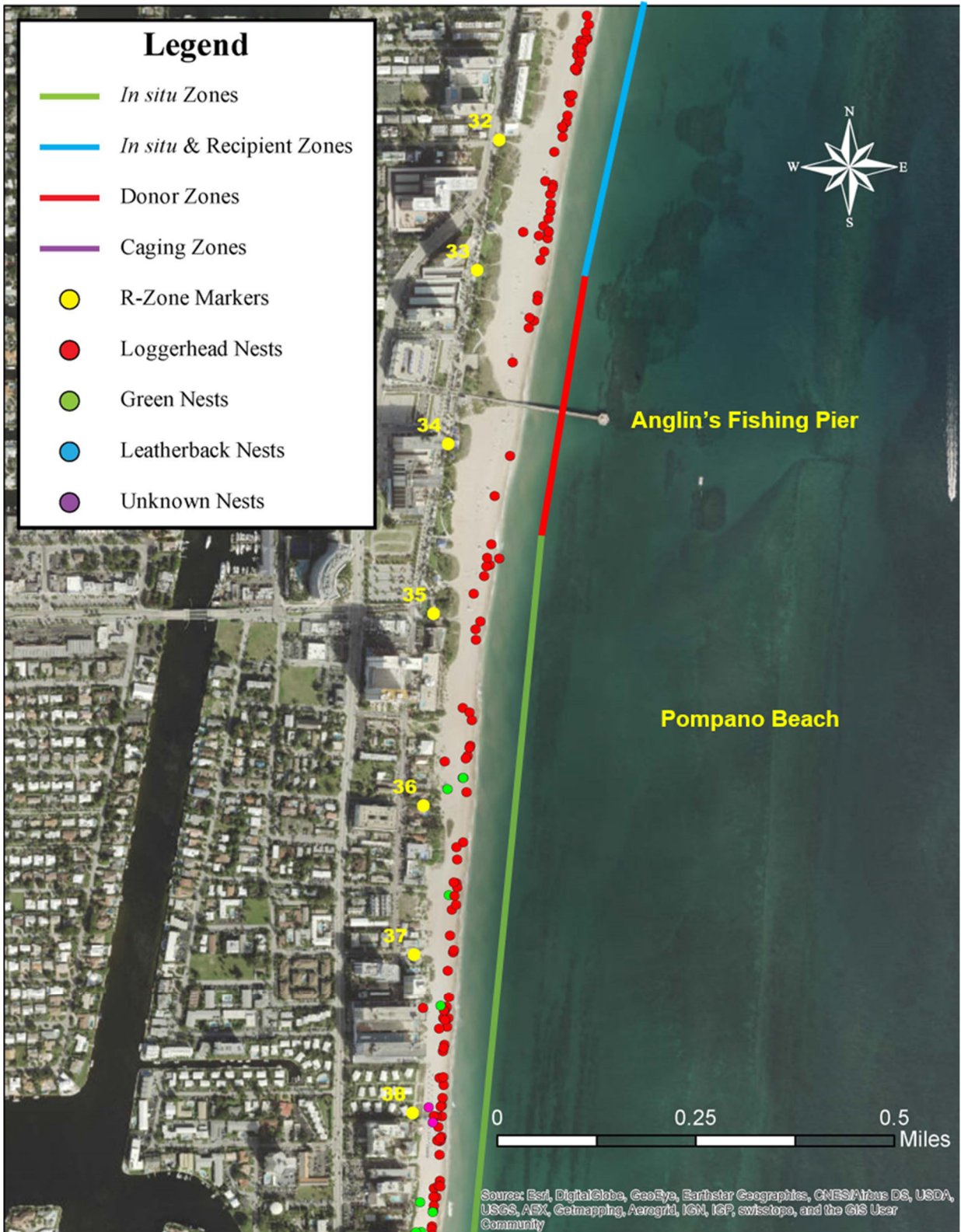


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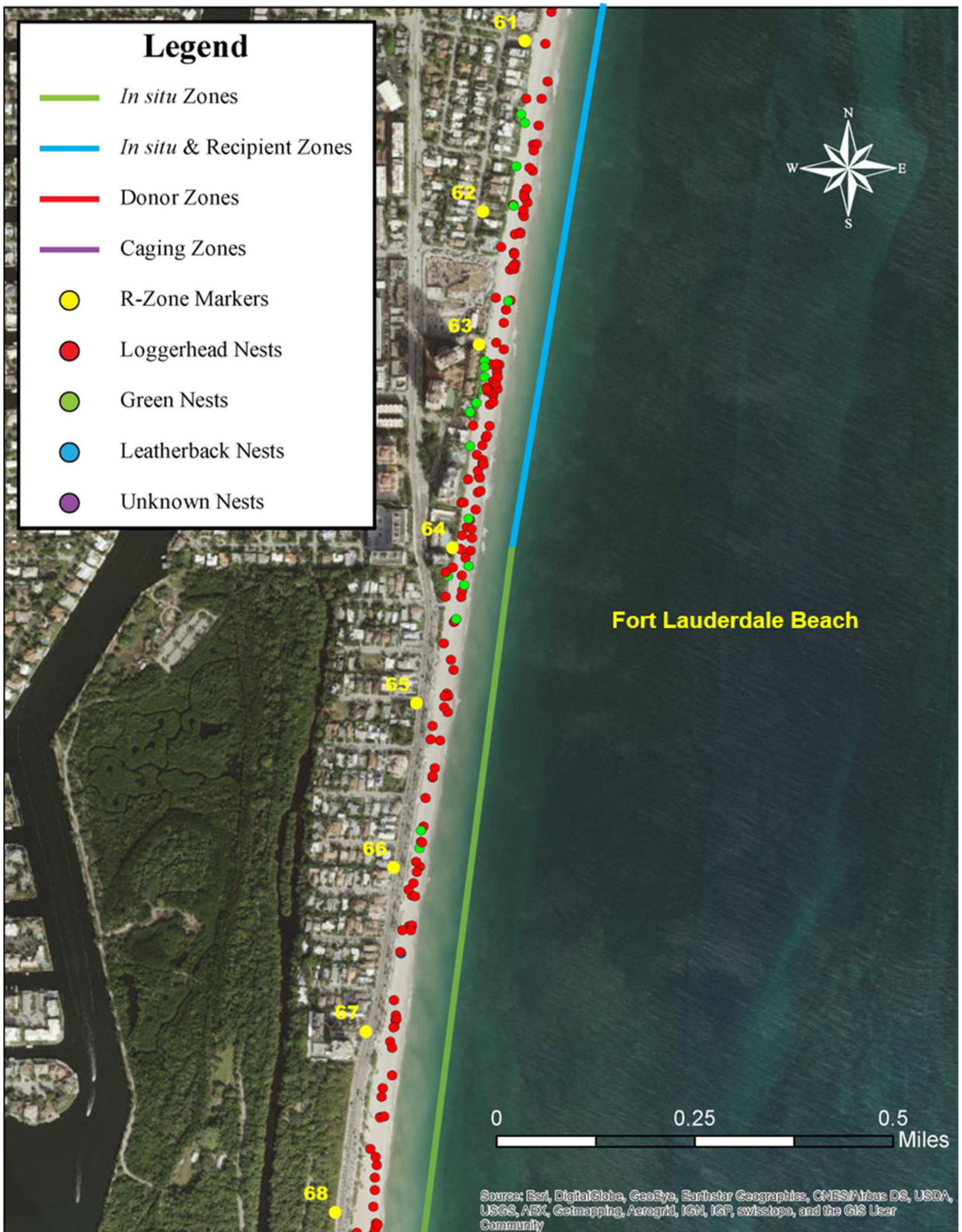


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

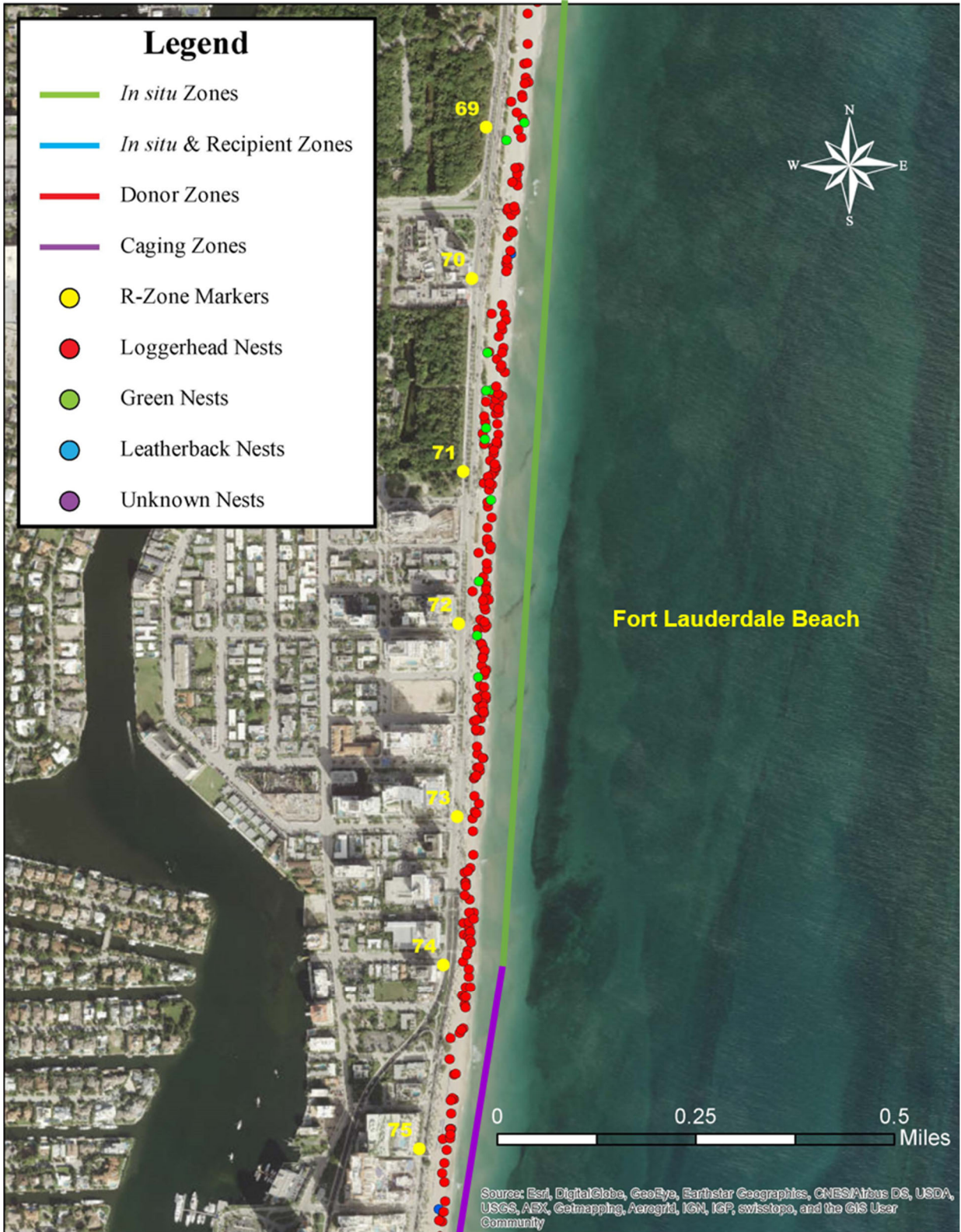


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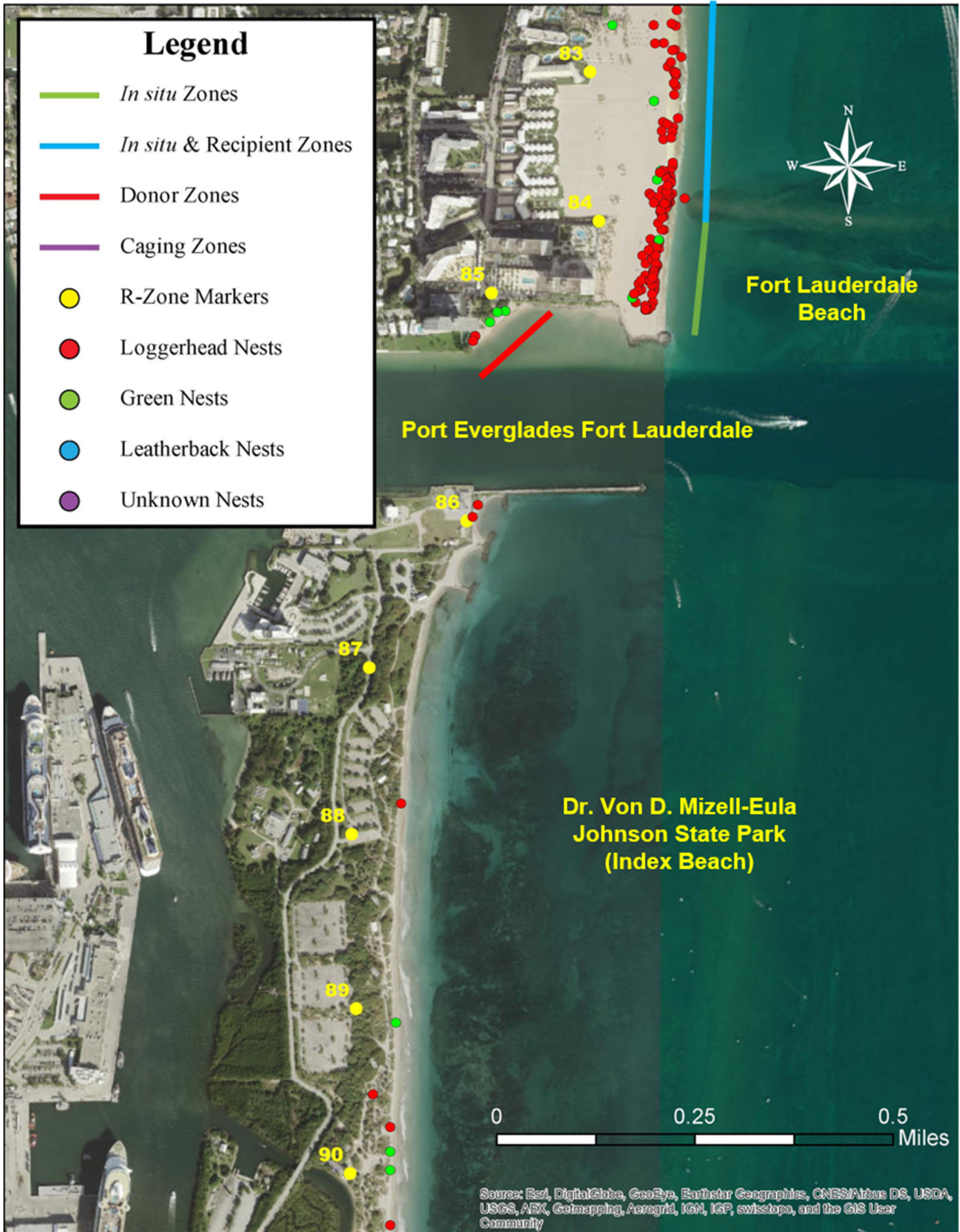


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

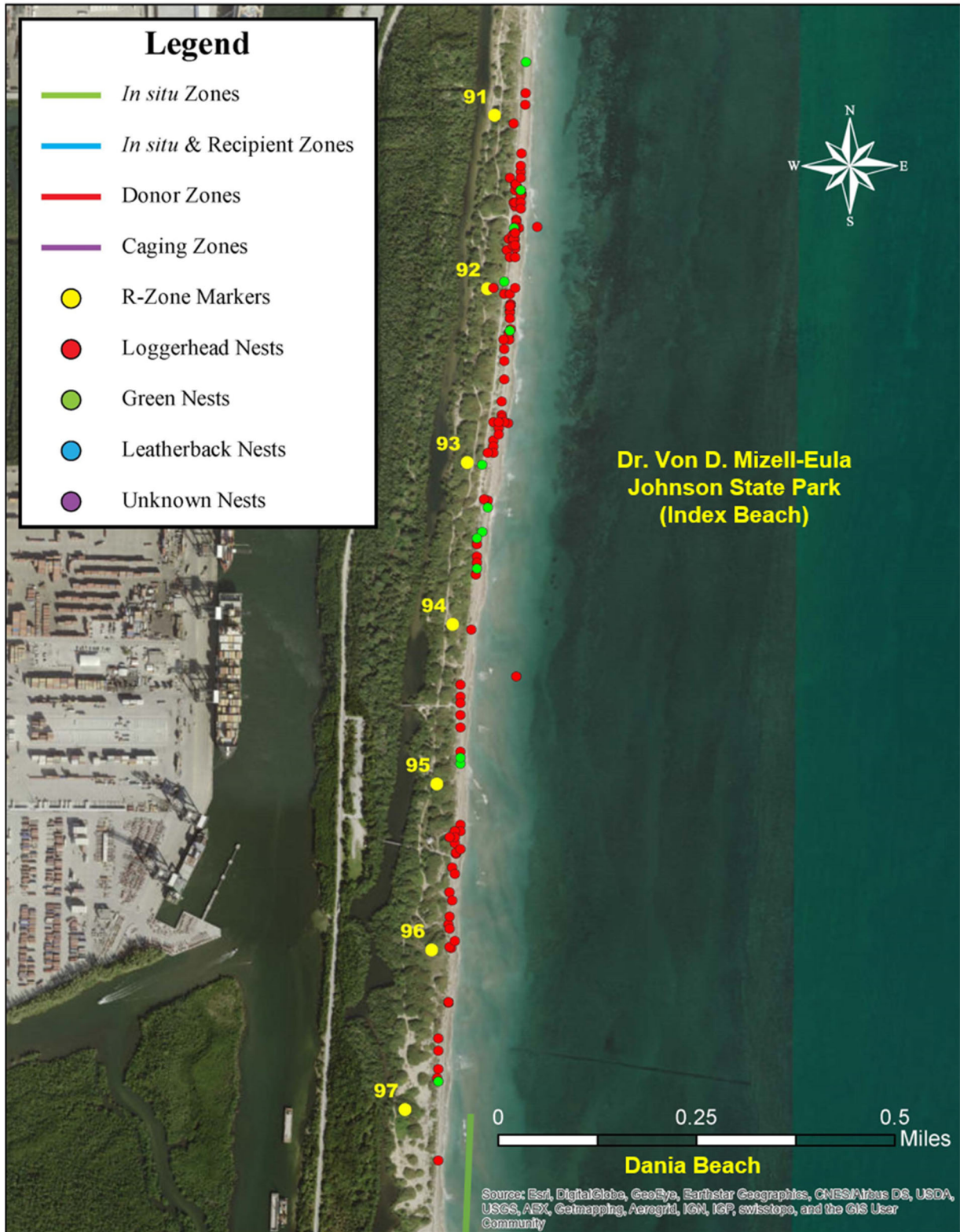


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

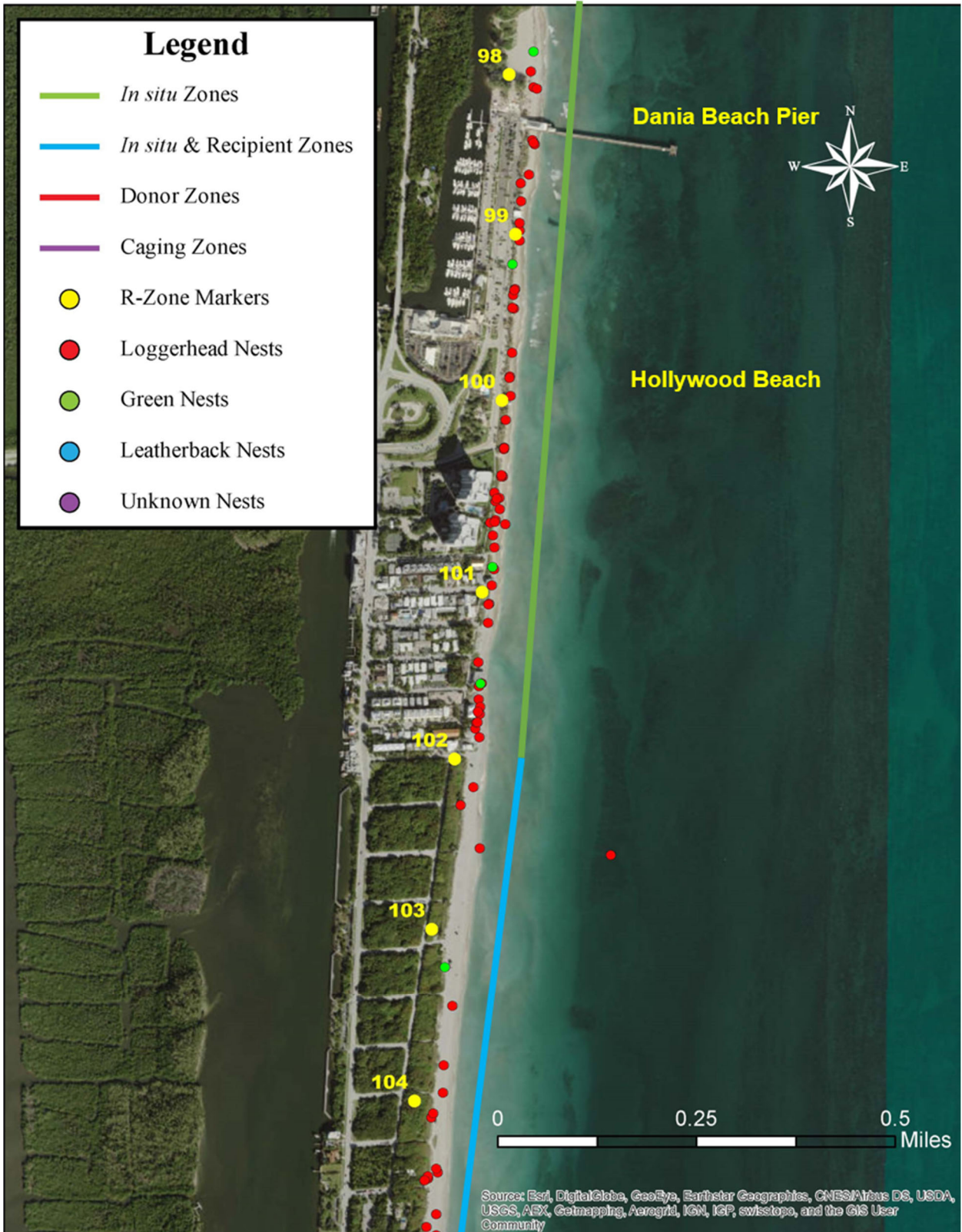


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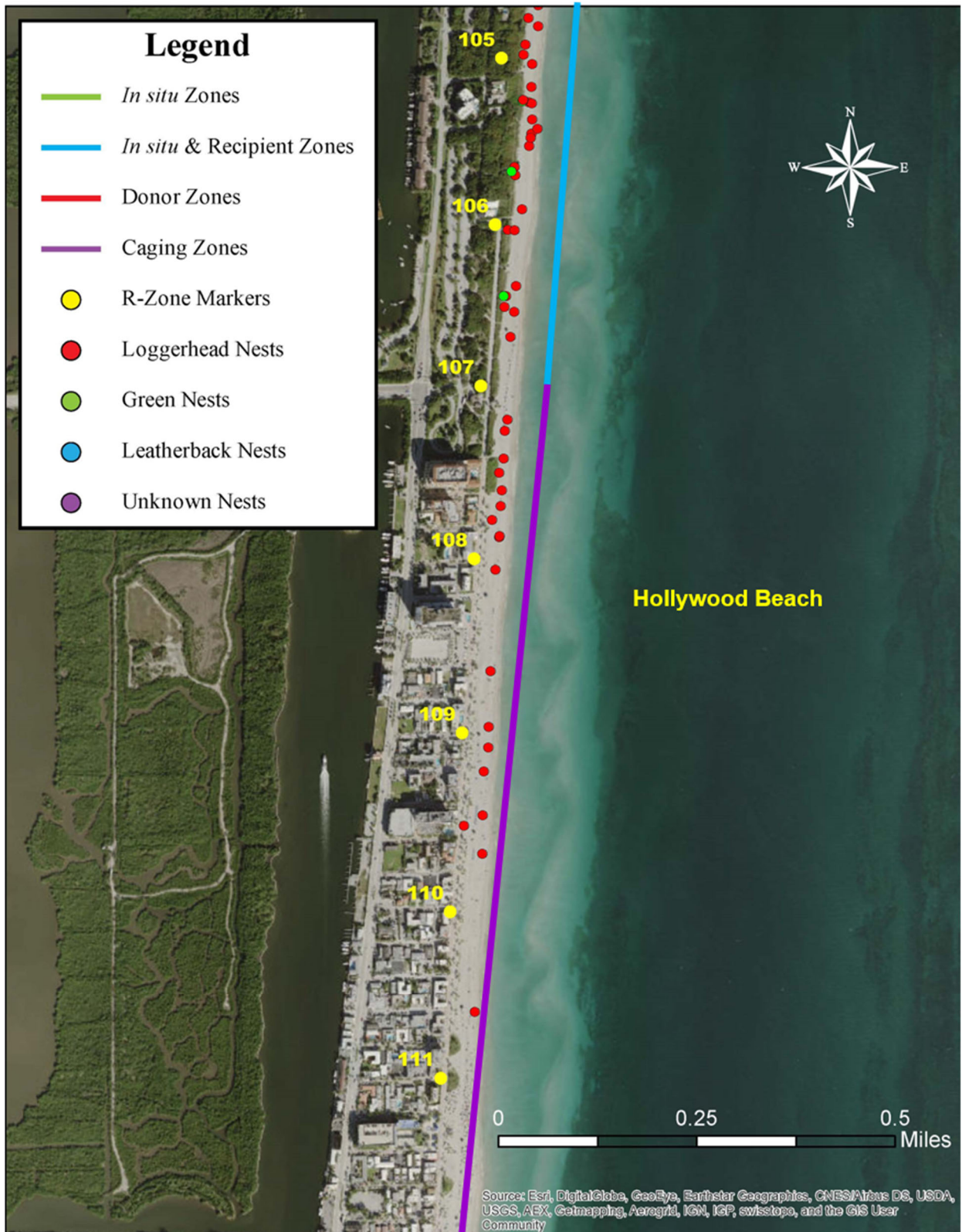


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

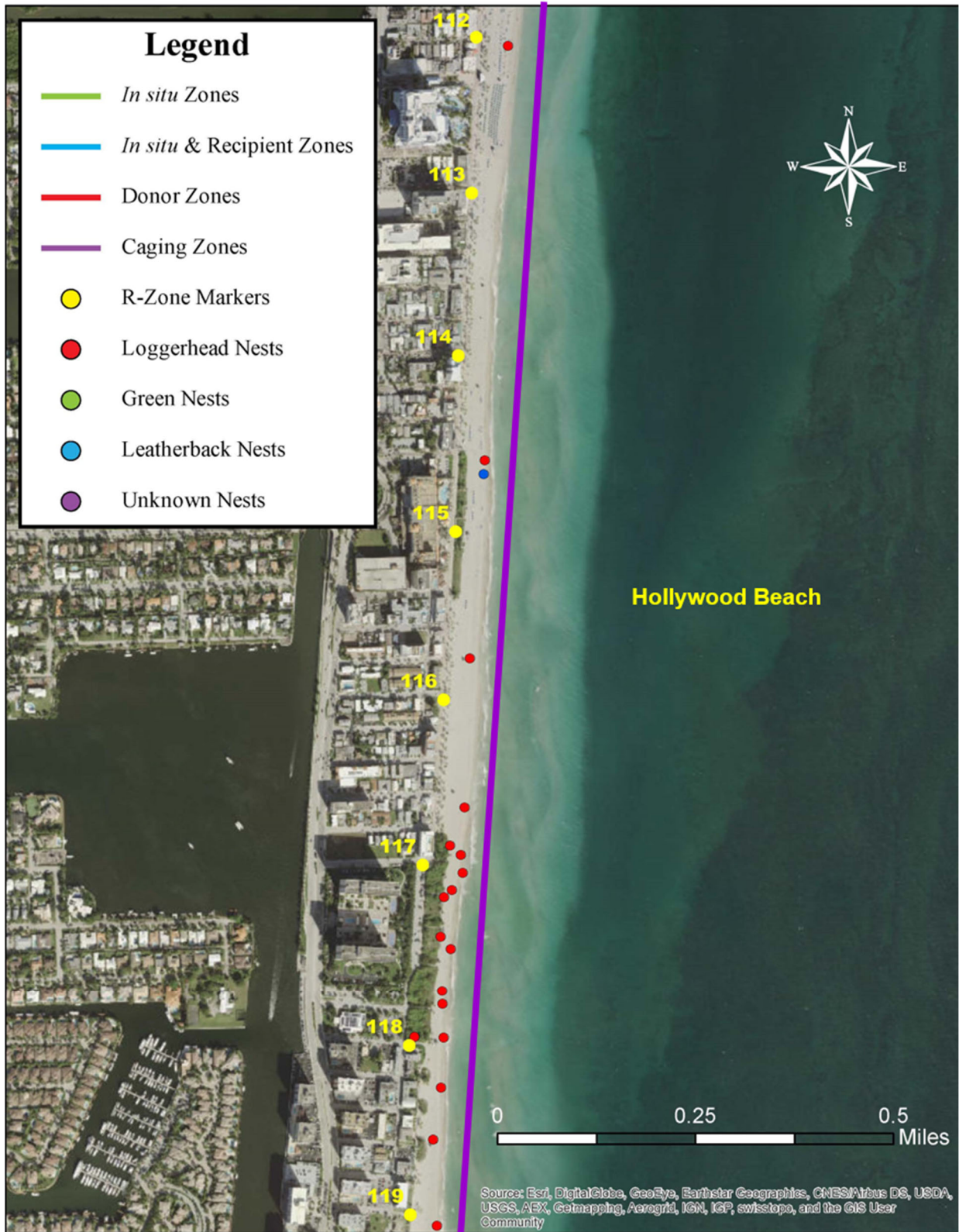


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones

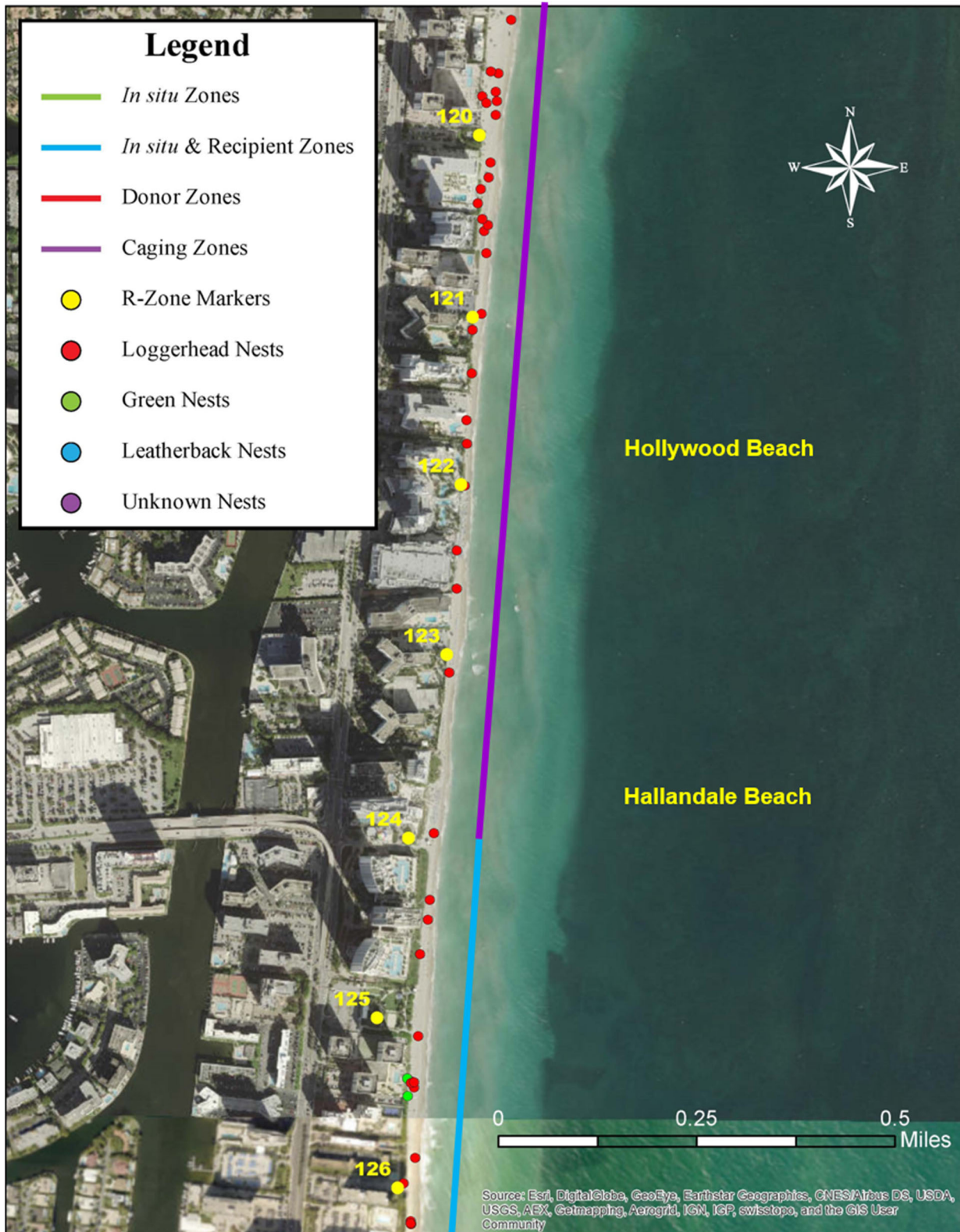


Figure 3: Locations of 2017 Turtle Crawls and Treatment Zones



Figure 4: Historical crawl totals for all species combined for Broward County (2000-2017). Nests are designated by blue bars and false crawls are designated by red bars. Solid lines indicate trend lines for nesting (blue) and false crawls (red).

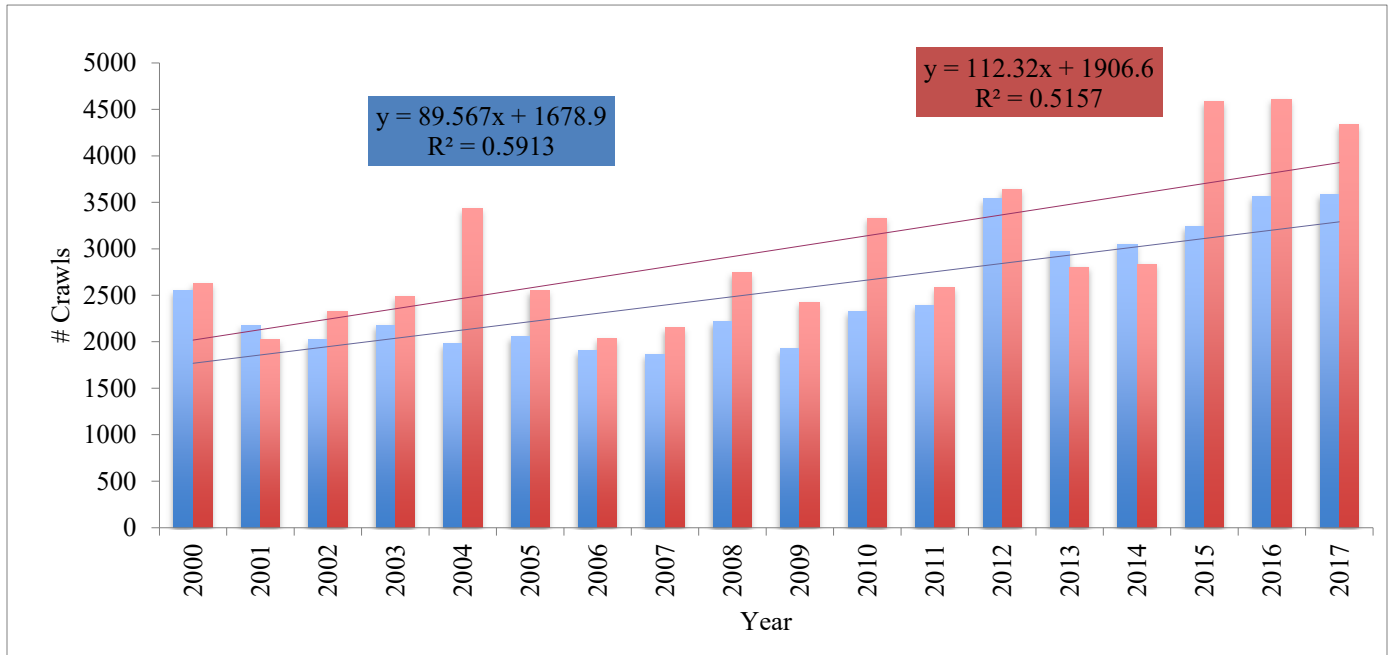


Figure 5: Historical nesting success, all species combined for Broward County (2000-2017). Five-year average is indicated by the solid black line.

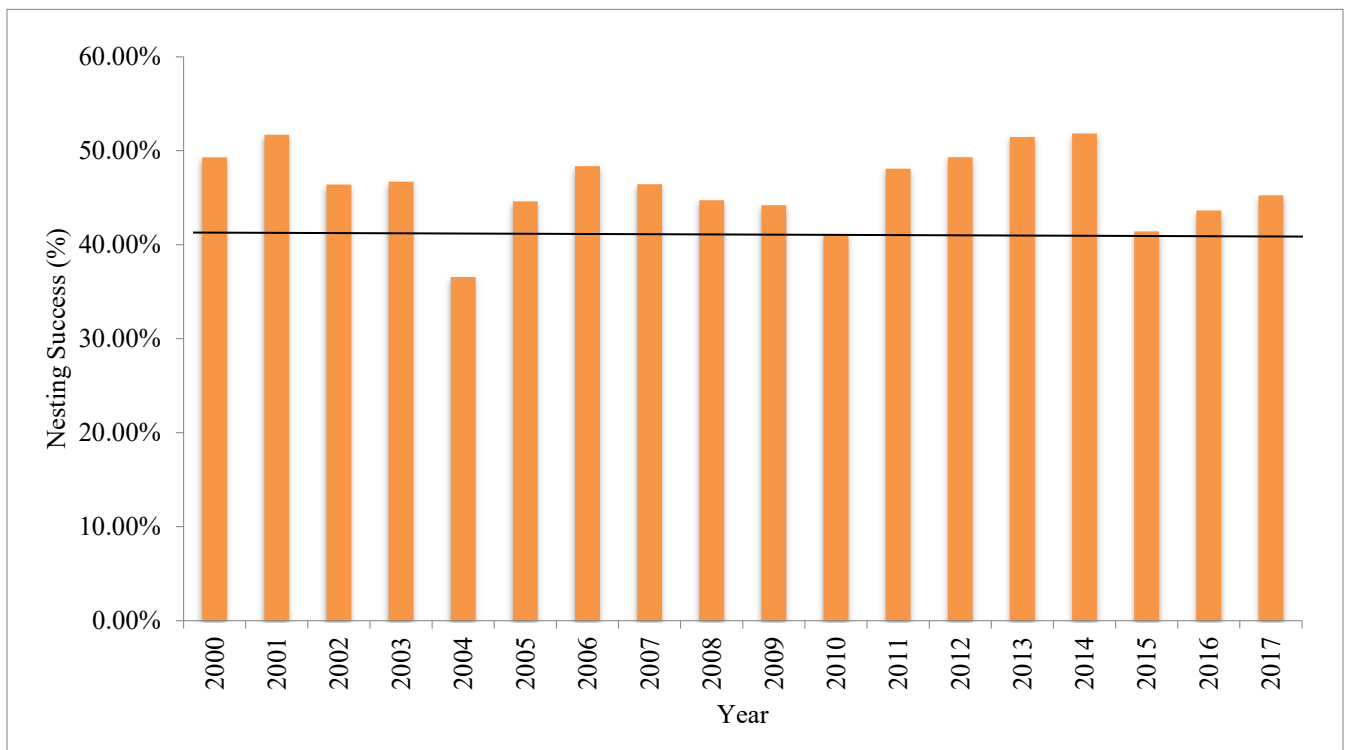


Figure 6: Number of nests laid per day in Broward County, by species.

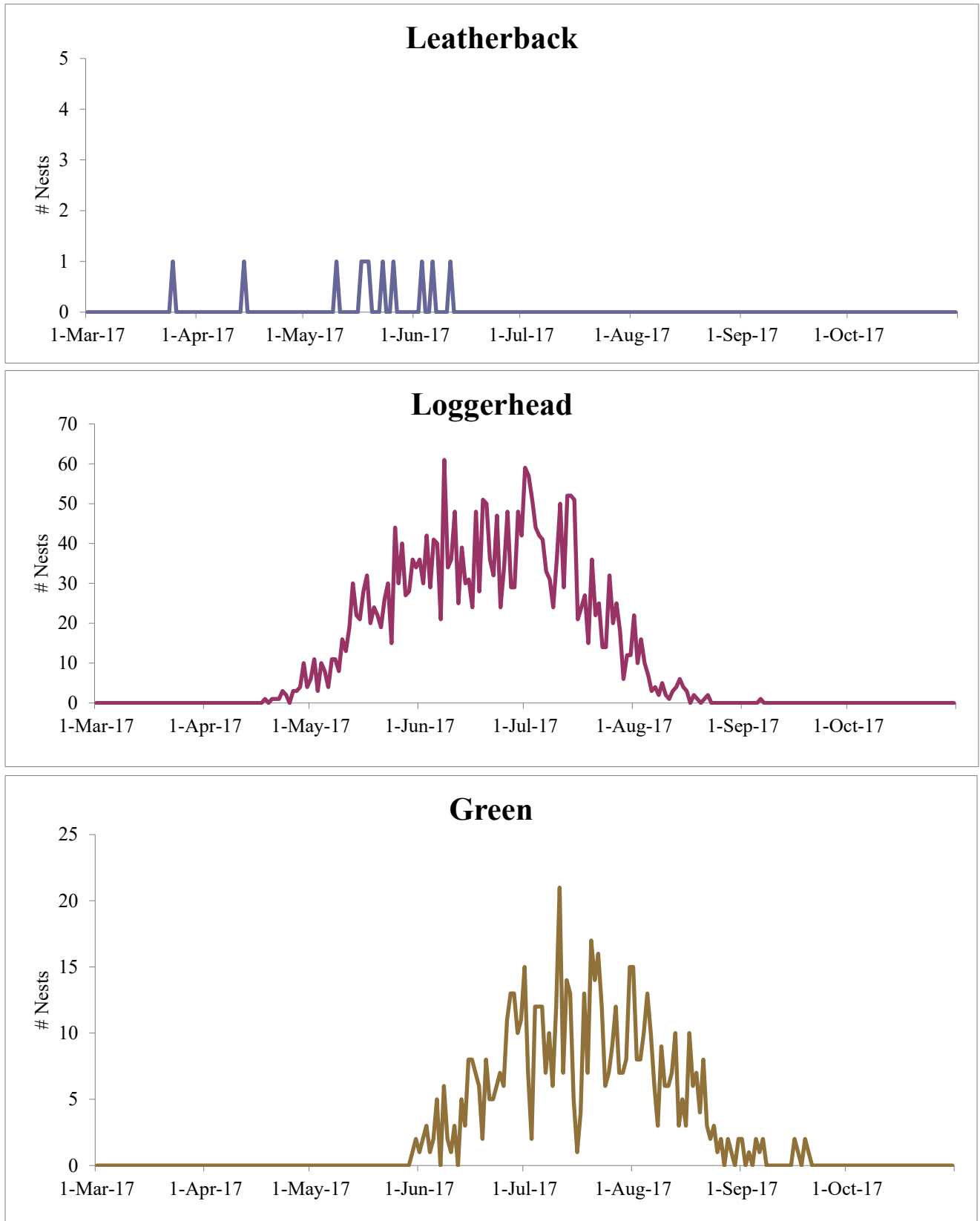


Figure 7: Historical nesting success in Broward County by species from 2000-2017. Five-year average is indicated by the solid black line.

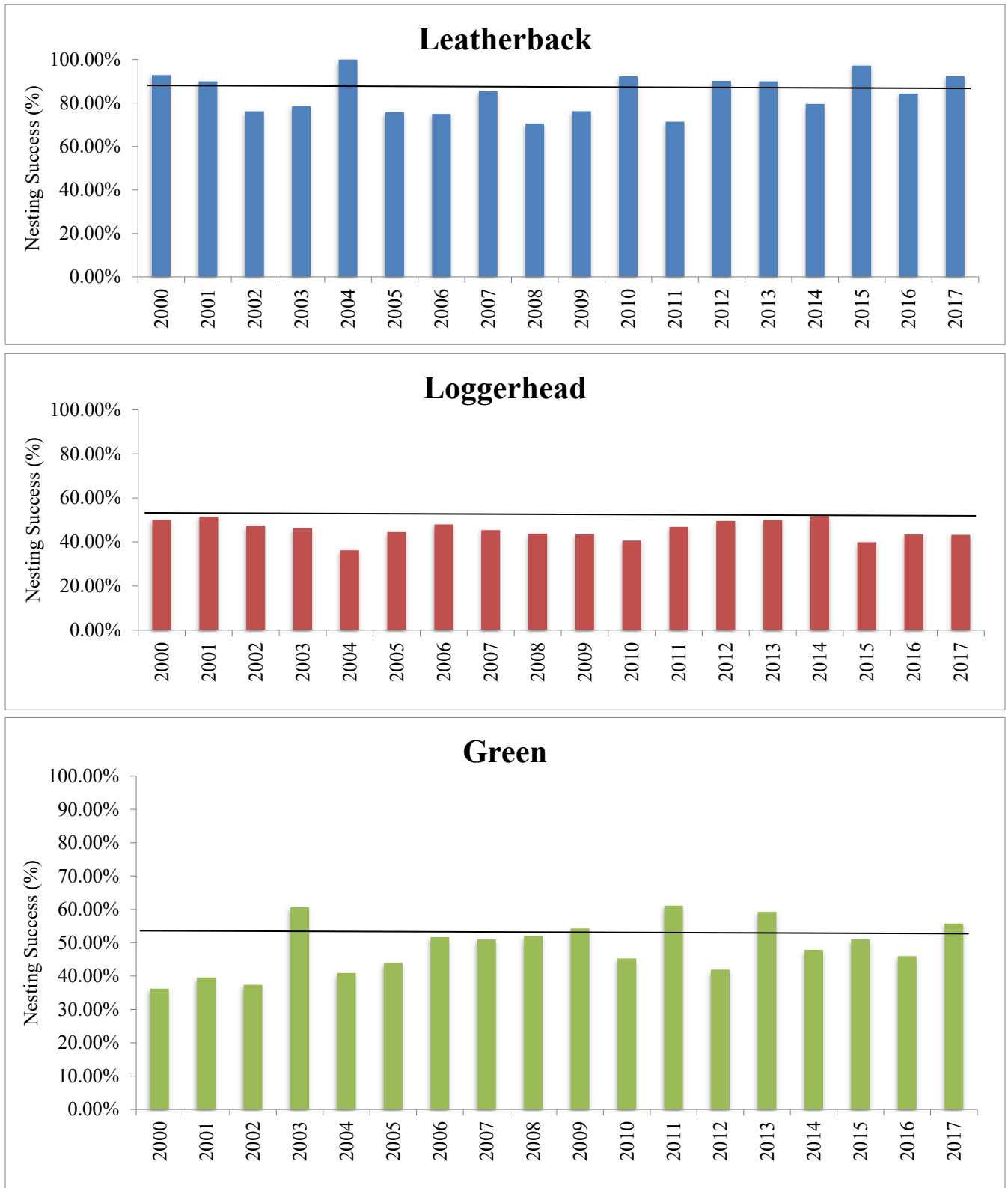


Figure 8: Historical nest activity (number of nests) in Broward County by species from 1981-2017. Solid lines indicate trend lines of nest activity.

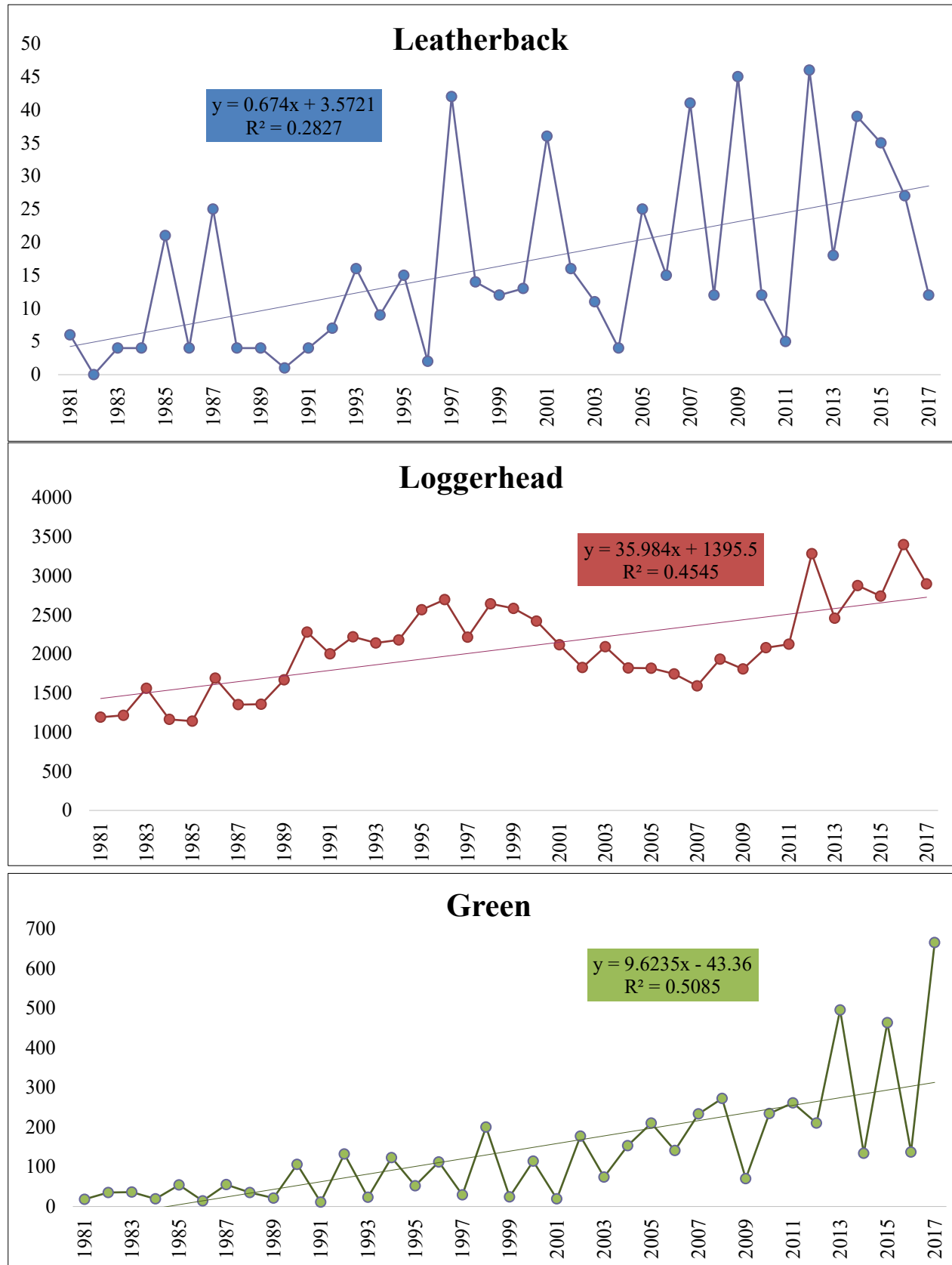


Figure 9: Historical nest relocation activity in Broward County (excluding Mizell-Eula State Park) 2005-2017. Solid lines indicate trend lines of nest relocation activity.

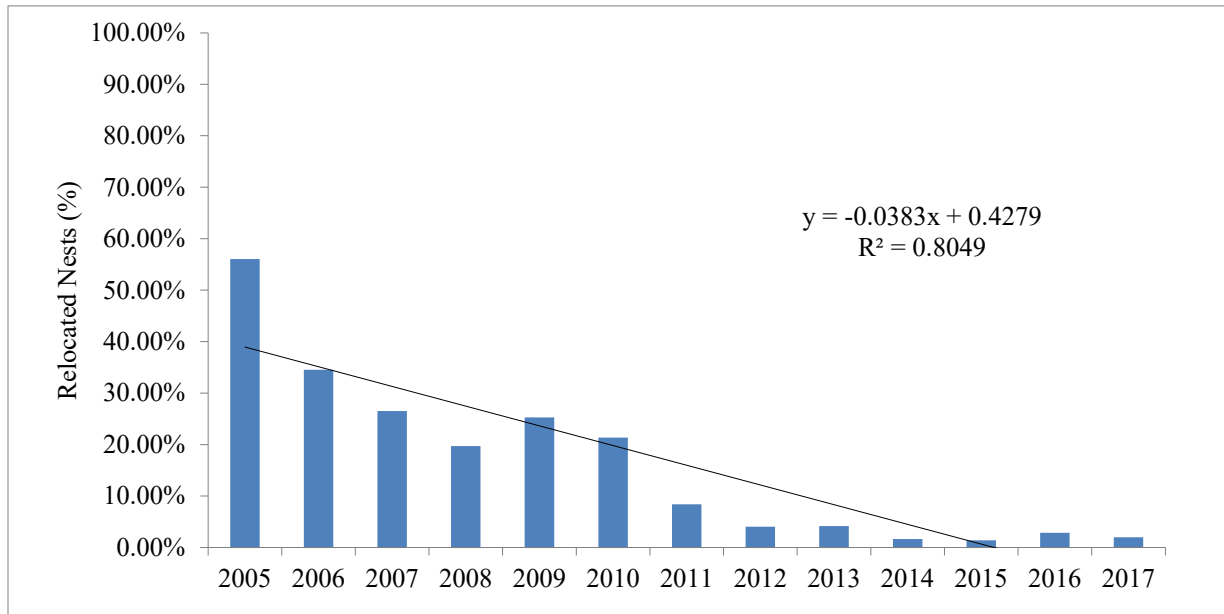


Figure 10: Historical disorientation reporting (adult and hatchling disorientations) by the BCSTCP in Broward County (excluding Mizell-Eula State Park) 2009-2017 reported by the solid purple line. The solid black line indicates the five-year average.

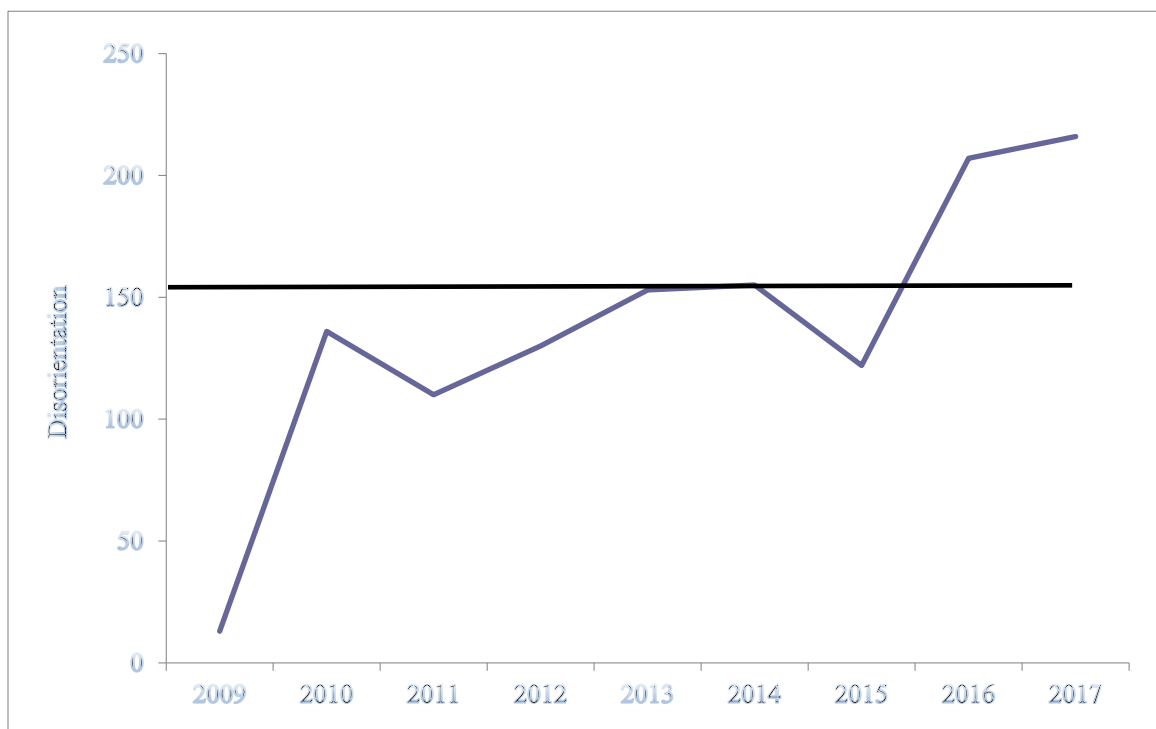


Figure 11: All hatchling disorientation reports by municipality recorded in 2017, as reported by BCSTCP, STOP, SFAS, and STARS.

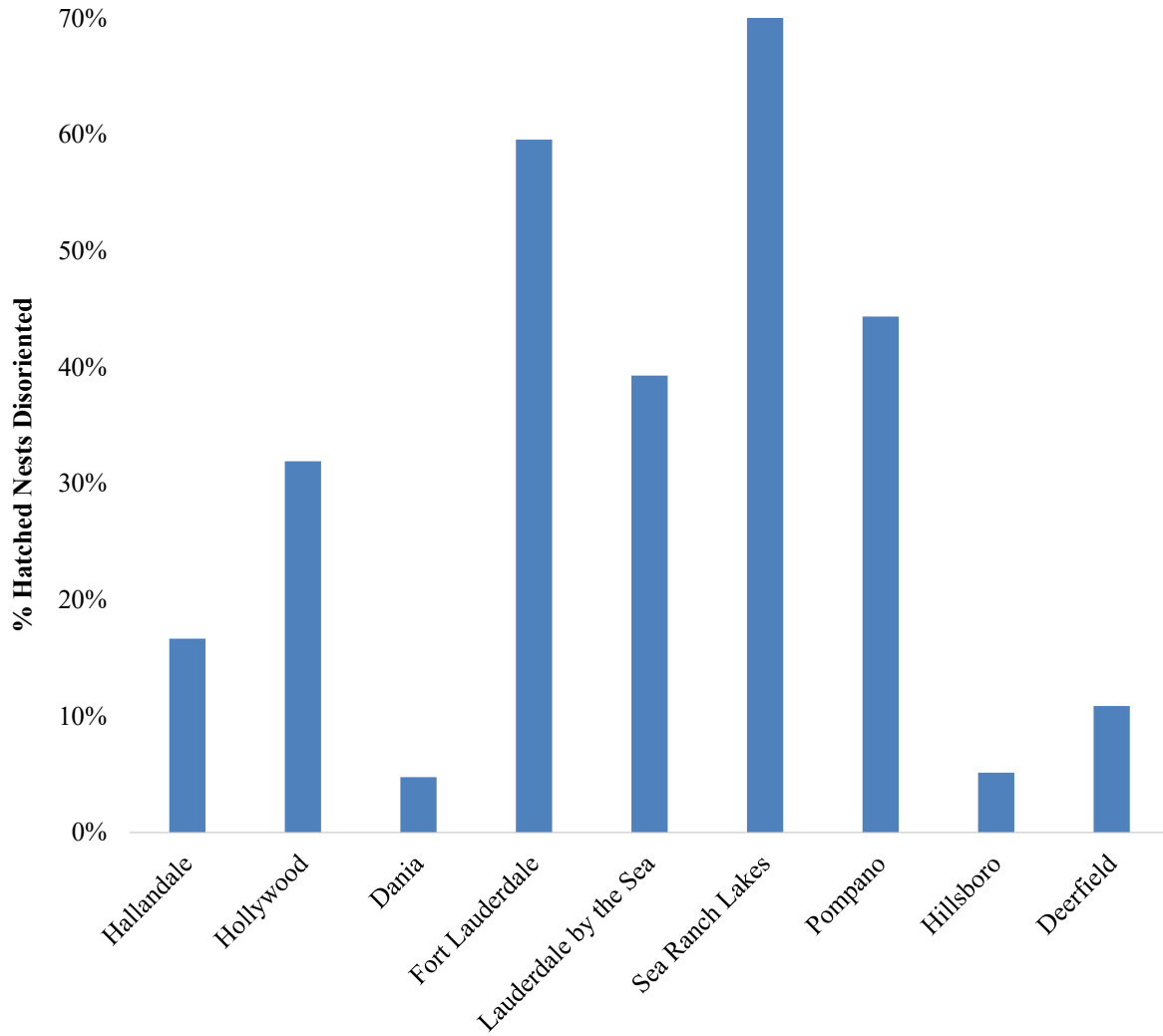


Figure 12: Percentage of nests that experienced predation in Broward County, all species and survey zones combined, 2005-2017. Solid lines indicate trend lines of nest predation.

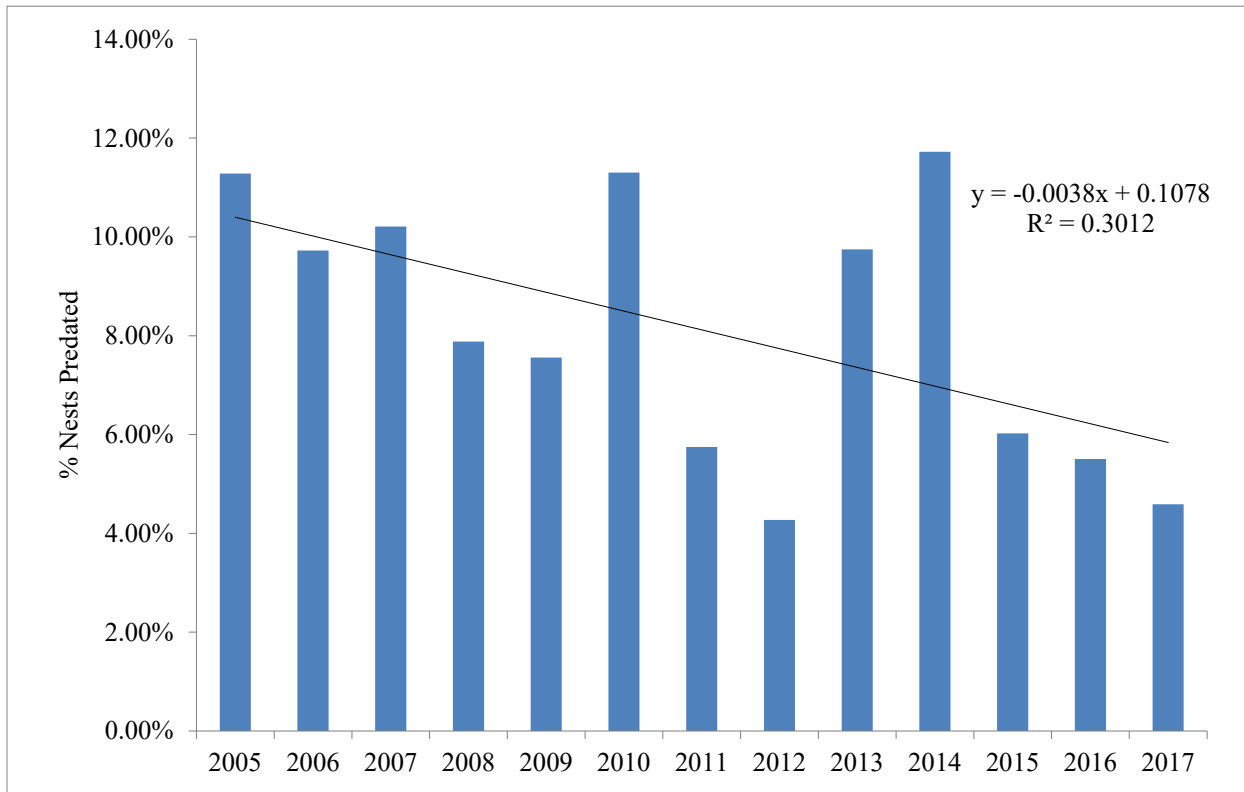


Figure 13: Percentage of nests that experienced predation in the Hillsboro survey zone, all species combined, 2005-2017. Solid lines indicate trend lines of nest predation.

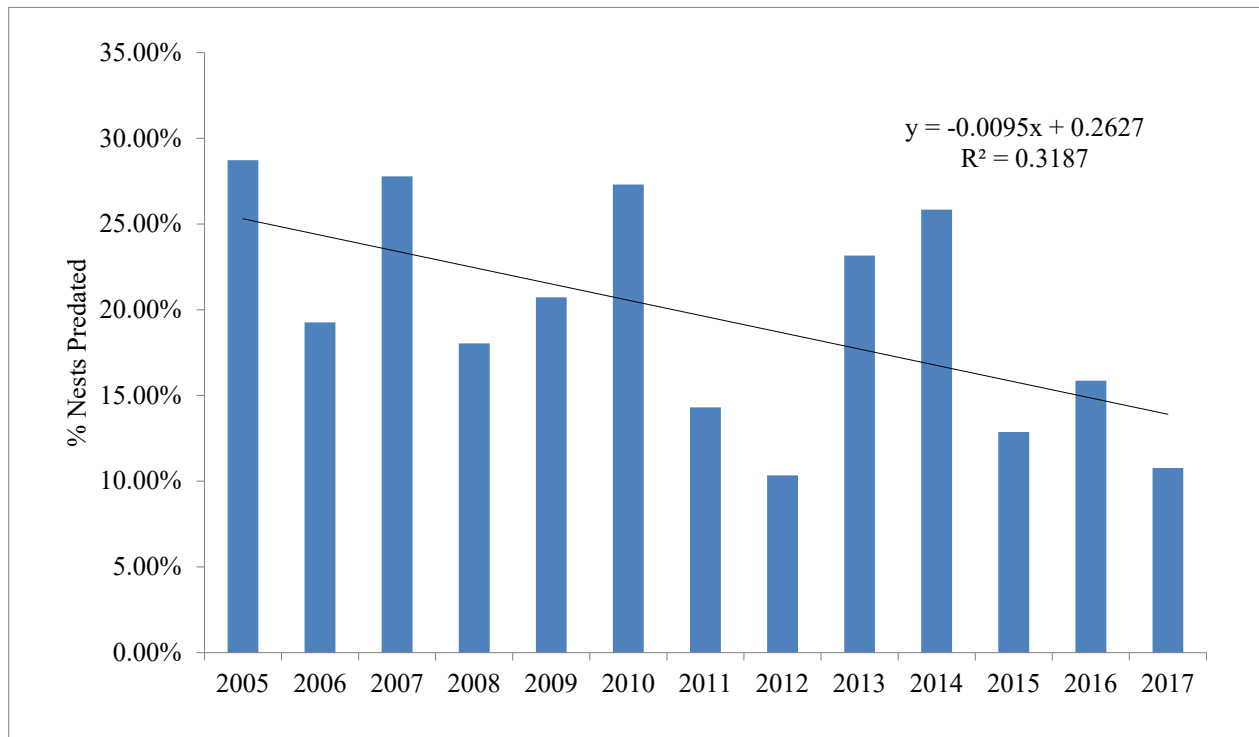
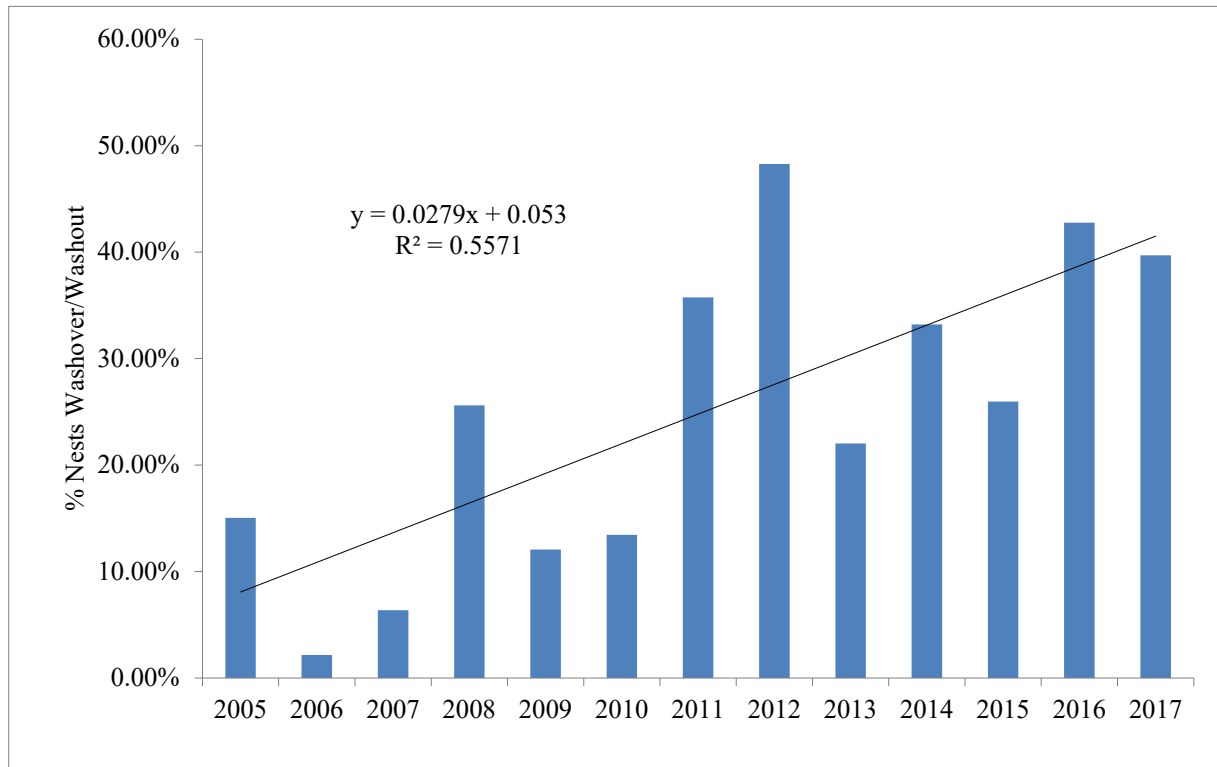



Figure 14: Historical nest washover/inundation in Broward County (excluding Mizell-Eula State Park), all species combined, 2005-2017. Solid lines indicate trend lines of nest washover/inundation.



Appendix 1: FWC sea turtle nesting reports for 2017 season.

Hillsboro/Deerfield:

	FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION FISH AND WILDLIFE RESEARCH INSTITUTE ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017		
1. PRINCIPAL PERMIT HOLDER INFORMATION			
Principal Permit Holder:	Curtis Slagle	Permit No:	214
Organization:	Broward County Sea Turtle Conservation Program		
Address:	8000 North Ocean Drive		
	Dania Beach, FL 33004		
County:	Broward	Email Address:	cs1858@nova.edu
Day Telephone:	(954) 383-2072	Night Telephone:	
Qualified Individual (if different from above)	N/A		
Beach Name:	Deerfield/Hillsboro Beaches		
Point of Contact & Phone #	N/A	Email Address for Point of Contact: (if different from above)	N/A
2. GENERAL SURVEY INFORMATION			
Survey Boundary Description			
Beginning Survey Boundary:	Palm Bch/Broward Co Line (26.32100, -80.07447)		
Ending Survey Boundary:	Hillsboro Inlet (26.25817, -80.08043)		
Beach Length: KM (miles):	7 km (4.4 miles)	Was this the same survey area as last year?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
IF NO, in the space below please enter the new boundary description (be specific & use landmarks that can be found on a map), new survey length, AND why the survey area changed:			
N/A			
Start Date of Survey (mm/dd/yy):	03/01/17	End Date of Survey (mm/dd/yy):	10/31/17
Number of Days Per Week Surveyed:	7		
Total # of Days Surveyed in 2017 (this is the total # of days between start and end dates MINUS any missed days):	240		
If you did not survey 7 days per week throughout the nesting season, please describe your survey schedule (how many days per week, what days of the week). It is recommended to adhere to a fixed schedule if 7 days/week is not possible (e.g., 5 days/week every week), and these days would preferably be consecutive.			
N/A			
If you did not survey 7 days per week, how were tracks counted on the day that surveys resumed after a missed day?			
N/A			
How many people were involved in surveying your nesting beach this season?	25		

3. NESTING BEACH MANAGEMENT INFORMATION			
Do you collect GPS data for your nests?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, are these data saved (electronic and/or paper files)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
How many nests were Relocated this season? (Note: inventory data for all relocated nests must be submitted on the NPA spreadsheet)	16	Of these, how many were for construction projects, e.g., beach renourishment?	0
List other reasons for nest relocation:	Below High Tide Line and Exposed Eggs		
Do you mark nests for inventory to determine hatching success?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If YES, how many nests were inventoried in 2017? (Note: data for all inventoried nests must be submitted on the NPA spreadsheet)	712		
4. FATE OF NEST INFORMATION (for marked and unmarked nests)			
Do you actively look for and record predation events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Regarding mammalian predation events, what proportion of the events do you likely record?	<input checked="" type="checkbox"/> All <input type="checkbox"/> Most <input type="checkbox"/> Some <input type="checkbox"/> Few		
How many nests were negatively affected by predators (other than humans) PRIOR to hatching? Note: this includes both partially and completely predated nests. It does NOT include nests affected by roots or other nesting sea turtles.	152		
List all non-human predators that were documented predated nests this season:	Fox; Raccoon; Bird; Unknown Predator		
If predator control methods other than screening/caging were employed, please describe below:	N/A		
How many nests were negatively affected by another nesting sea turtle PRIOR to hatching?	0		
How many nests were negatively affected by roots (i.e., damaged eggs, impeded hatchling emergence)?	1		
How many nests were negatively affected by erosion, accretion, inundation, and storm-related events PRIOR to hatching? Note: this <u>does not</u> include stake loss or washed over.	211		
Please give details:	1 Nest Endured Accretion; 210 Nests Washed Out (Mostly due to Hurricane Irma and King Tides)		
How many nests were taken or disturbed by humans (Example: nest dug into, eggs removed, etc.)? Note: this <u>does not</u> include stake removal.	0		
Please give details:	N/A		
If human disturbances occurred, were they reported to law enforcement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
How many disorientation events occurred on this survey area in 2017?	47		
Have all disorientation reports been submitted to FWC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
I certify the above information to be true and accurate to the best of my knowledge. Date:	11/28/2017		



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
FISH AND WILDLIFE RESEARCH INSTITUTE
ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017

1. PRINCIPAL PERMIT HOLDER INFORMATION

Principal Permit Holder: Curtis Slagle	Permit Number: 214
Qualified Individual (if different from above)	N/A
Beach Name: Deerfield/Hillsboro Beaches	

2. GENERAL NESTING DATA

Include ALL nests on this survey area (Marked, Unmarked, Misidentified & nests that were completely predated before morning surveys)	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
Total # of Nests	922	474	6	0	0
Total # of Non-Nesting Emergences (False Crawls)	1155	319	0	0	0
Date (mm/dd/yy) of First Documented Nest	04/18/17	05/30/17	04/14/17		
Date (mm/dd/yy) of Last Documented Nest	09/06/17	09/20/17	06/11/17		
Total # of Nests Prior to 15 May:	70	0	2	0	0
Total # of Nests After 31 Aug:	2	11	0	0	0
Comments:	N/A				

In the spaces below, please provide information on the INITIAL nest treatment (see "Instructions" worksheet for treatment categories). For example, if the initial treatment was left in place with no protection, it should be included in "(a) # of Nests left in place without additional protection" even if you later relocate the nest due to erosion.

Record the number of nests by category and species for all nests Left In Place (where the turtle deposited the clutch).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS LEFT IN PLACE (a + b + c + d)	916	473	6	0	0
Nest Treatments					
(a) # of Nests left in Place without Additional Protection	916	473	6	0	0
(b) # of Nests left in Place with Self-Releasing Flat Screen	0	0	0	0	0
(c) # of Nests left in Place with Self-Releasing Cage	0	0	0	0	0
(d) # of Nests left in Place with Restraining Cage	0	0	0	0	0

Record the number of nests by category and species for all Relocated nests (clutch is removed from its original site of deposition and reburied at another site).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS RELOCATED (e + f + g + h)	6	1	0	0	0
Nest Treatments					
(e) # of Relocated Nests without Additional Protection	6	1	0	0	0
(f) # of Relocated Nests with Self-Releasing Flat Screen	0	0	0	0	0
(g) # of Relocated Nests with Self-Releasing Cage	0	0	0	0	0
(h) # of Relocated Nests with Restraining Cage	0	0	0	0	0


Additional Comments for the 2017 Season

Beach Name:

Deerfield/Hillsboro Beaches

<p>Nesting Beach Management Information (e.g., predation, storms, poaching, etc.)</p>	<p>Hillsboro Beach continues to be predated (primarily foxes) at a rate of ~10%</p> <p>King Tide impacted 32 nests in some fashion (washed out, washed over, etc.)</p> <p>Hurricane impacted 264 nests in some fashion (washed out, washed over, etc.)</p>
<p>General Nesting Data (e.g., nests, false crawl/s)</p>	<p>331 ONA reports filed</p> <p>41 missed nests were discovered, 17 were associated with false crawls</p>
<p>Nest Success Data</p>	<p>712 nests were inventoried; 696 nests were not inventoried</p>
<p>Miscellaneous Comments Regarding Data</p>	<p>N/A</p>

Pompano/Lauderdale-By-The-Sea:

		FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION FISH AND WILDLIFE RESEARCH INSTITUTE ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017	
1. PRINCIPAL PERMIT HOLDER INFORMATION			
Principal Permit Holder:	Curtis Slagle	Permit No:	214
Organization:	Broward County Sea Turtle Conservation Program		
Address:	8000 North Ocean Drive		
	Dania Beach, FL 33004		
County:	Broward	Email Address:	cs1858@nova.edu
Day Telephone:	(954) 383-2072	Night Telephone:	
Qualified Individual (if different from above)	N/A		
Beach Name:	Pompano/Lauderdale-by-the-Sea		
Point of Contact & Phone #	N/A	Email Address for Point of Contact: (if different from above)	N/A
2. GENERAL SURVEY INFORMATION			
Survey Boundary Description			
Beginning Survey Boundary:	Hillsboro Inlet (26.25801, -80.08185)		
Ending Survey Boundary:	Commerical Blvd. Pier (26.18948, -80.09466)		
Beach Length: KM (miles):	7.7 km (4.8 miles)	Was this the same survey area as last year?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>IF NO, in the space below please enter the new boundary description (be specific & use landmarks that can be found on a map), new survey length, AND why the survey area changed:</p>			
N/A			
Start Date of Survey (mm/dd/yy):	03/01/17	End Date of Survey (mm/dd/yy):	10/31/17
Number of Days Per Week Surveyed:	7		
Total # of Days Surveyed in 2017 (this is the total # of days between start and end dates MINUS any missed days):	240		
<p>If you did not survey 7 days per week throughout the nesting season, please describe your survey schedule (how many days per week, what days of the week). It is recommended to adhere to a fixed schedule if 7 days/week is not possible (e.g., 5 days/week every week), and these days would preferably be consecutive.</p>			
N/A			
<p>If you did not survey 7 days per week, how were tracks counted on the day that surveys resumed after a missed day?</p>			
N/A			
How many people were involved in surveying your nesting beach this season?	25		

3. NESTING BEACH MANAGEMENT INFORMATION			
Do you collect GPS data for your nests?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, are these data saved (electronic and/or paper files)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
How many nests were Relocated this season? (<i>Note: inventory data for all relocated nests must be submitted on the NPA spreadsheet</i>)	15	Of these, how many were for construction projects, e.g., beach renourishment?	4
List other reasons for nest relocation:	Below High Tide Line, Donor Zone, and Exposed Eggs		
Do you mark nests for inventory to determine hatching success?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If YES, how many nests were inventoried in 2017? (<i>Note: data for all inventoried nests must be submitted on the NPA spreadsheet</i>)	429		
4. FATE OF NEST INFORMATION (for marked and unmarked nests)			
Do you actively look for and record predation events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Regarding mammalian predation events, what proportion of the events do you likely record?	<input checked="" type="checkbox"/> All	<input type="checkbox"/> Most	<input type="checkbox"/> Some <input type="checkbox"/> Few
How many nests were negatively affected by predators (other than humans) PRIOR to hatching? <i>Note: this includes both partially and completely predated nests. It does NOT include nests affected by roots or other nesting sea turtles.</i>	1		
List all non-human predators that were documented predated nests this season:	Unknown Predator		
If predator control methods other than screening/caging were employed, please describe below:	N/A		
How many nests were negatively affected by another nesting sea turtle PRIOR to hatching?	0		
How many nests were negatively affected by roots (i.e., damaged eggs, impeded hatchling emergence)?	0		
How many nests were negatively affected by erosion, accretion, inundation, and storm-related events PRIOR to hatching? <i>Note: this does not include stake loss or washed over.</i>	73		
Please give details:	73 Nests Washed Out (Mostly due to Hurricane Irma and King Tides)		
How many nests were taken or disturbed by humans (Example: nest dug into, eggs removed, etc.)? <i>Note: this does not include stake removal.</i>	0		
Please give details:	N/A		
If human disturbances occurred, were they reported to law enforcement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
How many disorientation events occurred on this survey area in 2017?	70		
Have all disorientation reports been submitted to FWC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
I certify the above information to be true and accurate to the best of my knowledge. Date:	11/28/2017		



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
FISH AND WILDLIFE RESEARCH INSTITUTE
ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017

1. PRINCIPAL PERMIT HOLDER INFORMATION

Principal Permit Holder:	Curtis Slagle	Permit Number:	214
Qualified Individual (if different from above)	N/A		
Beach Name:	Pompano/Lauderdale-by-the-Sea		

2. GENERAL NESTING DATA

Include ALL nests on this survey area (Marked, Unmarked, Misidentified & nests that were completely predated before morning surveys)	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
Total # of Nests	572	32	1	0	0
Total # of Non-Nesting Emergences (False Crawls)	642	46	0	0	0
Date (mm/dd/yy) of First Documented Nest	04/21/17	06/02/17	06/03/17		
Date (mm/dd/yy) of Last Documented Nest	08/18/17	08/16/17	06/03/17		
Total # of Nests <i>Prior</i> to 15 May:	41	0	0	0	0
Total # of Nests <i>After</i> 31 Aug:	0	0	0	0	0
Comments:	N/A				

In the spaces below, please provide information on the INITIAL nest treatment (see "Instructions" worksheet for treatment categories). For example, if the initial treatment was left in place with no protection, it should be included in "(a) # of Nests left in place without additional protection" even if you later relocate the nest due to erosion.

Record the number of nests by category and species for all nests Left In Place (where the turtle deposited the clutch).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS LEFT IN PLACE (a + b + c + d)	561	31	1	0	0
Nest Treatments	(a) # of Nests left in Place without Additional Protection	561	31	1	0
	(b) # of Nests left in Place with Self-Releasing Flat Screen	0	0	0	0
	(c) # of Nests left in Place with Self-Releasing Cage	0	0	0	0
	(d) # of Nests left in Place with Restraining Cage	0	0	0	0

Record the number of nests by category and species for all Relocated nests (clutch is removed from its original site of deposition and reburied at another site).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS RELOCATED (e + f + g + h)	11	1	0	0	0
Nest Treatments	(e) # of Relocated Nests without Additional Protection	11	1	0	0
	(f) # of Relocated Nests with Self-Releasing Flat Screen	0	0	0	0
	(g) # of Relocated Nests with Self-Releasing Cage	0	0	0	0
	(h) # of Relocated Nests with Restraining Cage	0	0	0	0


Additional Comments for the 2017 Season

Beach Name:

Pompano/Lauderdale-by-the-Sea

Nesting Beach Management Information (e.g., predation, storms, poaching, etc.)	King Tide impacted 1 nest in some fashion (washed out, washed over, etc.) Hurricane impacted 77 nests in some fashion (washed out, washed over, etc.)
General Nesting Data (e.g., nests, false crawls)	79 ONA reports filed 11 missed nests were discovered, 7 were associated with false crawls
Nest Success Data	429 nests were inventoried; 167 nests were not inventoried
Miscellaneous Comments Regarding Data	N/A

Fort Lauderdale:

		FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION FISH AND WILDLIFE RESEARCH INSTITUTE ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017	
1. PRINCIPAL PERMIT HOLDER INFORMATION			
Principal Permit Holder:	Curtis Slagle	Permit No:	214
Organization:	Broward County Sea Turtle Conservation Program		
Address:	8000 North Ocean Drive		
	Dania Beach, FL 33004		
County:	Broward	Email Address:	cs1858@nova.edu
Day Telephone:	(954) 383-2072	Night Telephone:	
Qualified Individual (if different from above)	N/A		
Beach Name:	Ft Lauderdale Beach		
Point of Contact & Phone #	N/A	Email Address for Point of Contact: (if different from above)	N/A
2. GENERAL SURVEY INFORMATION			
Survey Boundary Description			
Beginning Survey Boundary:	Commerical Blvd. Pier (26.18948, -80.09466)		
Ending Survey Boundary:	Port Everglades Inlet (26.09508, -80.10500)		
Beach Length: KM (miles):	10.6 km (6.6 miles)	Was this the same survey area as last year?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>IF NO, in the space below please enter the new boundary description (be specific & use landmarks that can be found on a map), new survey length, AND why the survey area changed:</p>			
N/A			
Start Date of Survey (mm/dd/yy):	03/01/17	End Date of Survey (mm/dd/yy):	10/31/17
Number of Days Per Week Surveyed:	7		
Total # of Days Surveyed in 2017 (this is the total # of days between start and end dates MINUS any missed days):	240		
<p>If you did not survey 7 days per week throughout the nesting season, please describe your survey schedule (how many days per week, what days of the week). <u>It is recommended to adhere to a fixed schedule</u> if 7 days/week is not possible (e.g., 5 days/week every week), and these days would preferably be consecutive.</p>			
N/A			
<p>If you did not survey 7 days per week, how were tracks counted on the day that surveys resumed after a missed day?</p>			
N/A			
How many people were involved in surveying your nesting beach this season?	25		

3. NESTING BEACH MANAGEMENT INFORMATION			
Do you collect GPS data for your nests?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, are these data saved (electronic and/or paper files)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
How many nests were Relocated this season? (<i>Note: inventory data for all relocated nests must be submitted on the NPA spreadsheet</i>)	37	Of these, how many were for construction projects, e.g., beach renourishment?	0
List other reasons for nest relocation:	Below High Tide Line, Donor Zone, and Exposed Eggs		
Do you mark nests for inventory to determine hatching success?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If YES, how many nests were inventoried in 2017? (<i>Note: data for all inventoried nests must be submitted on the NPA spreadsheet</i>)	812		
4. FATE OF NEST INFORMATION (for marked and unmarked nests)			
Do you actively look for and record predation events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Regarding mammalian predation events, what proportion of the events do you likely record?	<input checked="" type="checkbox"/> All <input type="checkbox"/> Most <input type="checkbox"/> Some <input type="checkbox"/> Few		
How many nests were negatively affected by predators (other than humans) PRIOR to hatching? <i>Note: this includes both partially and completely predated nests. It does NOT include nests affected by roots or other nesting sea turtles.</i>	0		
List all non-human predators that were documented predated nests this season:	N/A		
If predator control methods other than screening/caging were employed, please describe below:	N/A		
How many nests were negatively affected by another nesting sea turtle PRIOR to hatching?	1		
How many nests were negatively affected by roots (i.e., damaged eggs, impeded hatchling emergence)?	4		
How many nests were negatively affected by erosion, accretion, inundation, and storm-related events PRIOR to hatching? <i>Note: this does not include stake loss or washed over.</i>	171		
Please give details:	1 Nest Endured Accretion; 171 Nests Washed Out (Mostly due to Hurricane Irma and King Tides)		
How many nests were taken or disturbed by humans (Example: nest dug into, eggs removed, etc.)? <i>Note: this does not include stake removal.</i>	0		
Please give details:	N/A		
If human disturbances occurred, were they reported to law enforcement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
How many disorientation events occurred on this survey area in 2017?	78		
Have all disorientation reports been submitted to FWC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
I certify the above information to be true and accurate to the best of my knowledge. Date:	11/28/2017		



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
FISH AND WILDLIFE RESEARCH INSTITUTE
ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017

1. PRINCIPAL PERMIT HOLDER INFORMATION

Principal Permit Holder:	Curtis Slagle	Permit Number:	214
Qualified Individual (if different from above)	N/A		
Beach Name:	Ft Lauderdale Beach		

2. GENERAL NESTING DATA

Include ALL nests on this survey area (Marked, Unmarked, Misidentified & nests that were completely predated before morning surveys)	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
Total # of Nests	1054	128	4	0	0
Total # of Non-Nesting Emergences (False Crawls)	1325	109	1	0	0
Date (mm/dd/yy) of First Documented Nest	04/20/17	05/31/17	03/25/17		
Date (mm/dd/yy) of Last Documented Nest	08/22/17	09/16/17	06/06/17		
Total # of Nests Prior to 15 May:	69	0	1	0	0
Total # of Nests After 31 Aug:	0	2	0	0	0
Comments:	N/A				

In the spaces below, please provide information on the INITIAL nest treatment (see "Instructions" worksheet for treatment categories). For example, if the initial treatment was left in place with no protection, it should be included in "(a) # of Nests left in place without additional protection" even if you later relocate the nest due to erosion.

Record the number of nests by category and species for all nests Left In Place (where the turtle deposited the clutch).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS LEFT IN PLACE (a + b + c + d)	1026	126	4	0	0
Nest Treatments					
(a) # of Nests left in Place without Additional Protection	1026	126	4	0	0
(b) # of Nests left in Place with Self-Releasing Flat Screen	0	0	0	0	0
(c) # of Nests left in Place with Self-Releasing Cage	0	0	0	0	0
(d) # of Nests left in Place with Restraining Cage	0	0	0	0	0

Record the number of nests by category and species for all Relocated nests (clutch is removed from its original site of deposition and reburied at another site).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS RELOCATED (e + f + g + h)	28	2	0	0	0
Nest Treatments					
(e) # of Relocated Nests without Additional Protection	28	2	0	0	0
(f) # of Relocated Nests with Self-Releasing Flat Screen	0	0	0	0	0
(g) # of Relocated Nests with Self-Releasing Cage	0	0	0	0	0
(h) # of Relocated Nests with Restraining Cage	0	0	0	0	0


Additional Comments for the 2017 Season

Beach Name:

Ft Lauderdale Beach

Nesting Beach Management Information (e.g., predation, storms, poaching, etc.)	King Tide impacted 8 nests in some fashion (washed out, washed over, etc.) Hurricane impacted 200 nests in some fashion (washed out, washed over, etc.)
General Nesting Data (e.g., nests, false crawls)	221 ONA reports filed 8 missed nests were discovered, 3 were associated with false crawls
Nest Success Data	812 nests were inventoried; 374 nests were not inventoried
Miscellaneous Comments Regarding Data	N/A

Hollywood/Hallandale:

		FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION FISH AND WILDLIFE RESEARCH INSTITUTE ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017	
1. PRINCIPAL PERMIT HOLDER INFORMATION			
Principal Permit Holder:	Curtis Slagle	Permit No.:	214
Organization:	Broward County Sea Turtle Conservation Program		
Address:	8000 North Ocean Drive		
	Dania Beach, FL 33004		
County:	Broward	Email Address:	cs1858@nova.edu
Day Telephone:	(954) 383-2072	Night Telephone:	
Qualified Individual (if different from above)	N/A		
Beach Name:	Hollywood/Hallandale Beaches		
Point of Contact & Phone #	N/A	Email Address for Point of Contact: (if different from above)	N/A
2. GENERAL SURVEY INFORMATION			
Survey Boundary Description			
Beginning Survey Boundary:	3.9 km S of Port Everglades Inlet (26.06043, -80.11138)		
Ending Survey Boundary:	Broward/Miami-Dade Co Line (25.97518, -80.11828)		
Beach Length: KM (miles):	9.4 km (5.8 miles)	Was this the same survey area as last year?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>IF NO, in the space below please enter the new boundary description (be specific & use landmarks that can be found on a map), new survey length, AND why the survey area changed:</p>			
N/A			
Start Date of Survey (mm/dd/yy):	03/01/17	End Date of Survey (mm/dd/yy):	10/31/17
Number of Days Per Week Surveyed:	7		
Total # of Days Surveyed in 2017 (this is the total # of days between start and end dates MINUS any missed days):	240		
<p>If you did not survey 7 days per week throughout the nesting season, please describe your survey schedule (how many days per week, what days of the week). It is recommended to adhere to a fixed schedule if 7 days/week is not possible (e.g., 5 days/week every week), and these days would preferably be consecutive.</p>			
N/A			
<p>If you did not survey 7 days per week, how were tracks counted on the day that surveys resumed after a missed day?</p>			
N/A			
How many people were involved in surveying your nesting beach this season?	25		

3. NESTING BEACH MANAGEMENT INFORMATION			
Do you collect GPS data for your nests?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, are these data saved (electronic and/or paper files)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
How many nests were Relocated this season? (<i>Note: inventory data for all relocated nests must be submitted on the NPA spreadsheet</i>)	1	Of these, how many were for construction projects, e.g., beach renourishment?	0
List other reasons for nest relocation:	Predation Approved by FWC		
Do you mark nests for inventory to determine hatching success?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If YES, how many nests were inventoried in 2017? (<i>Note: data for all inventoried nests must be submitted on the NPA spreadsheet</i>)	133		
4. FATE OF NEST INFORMATION (for marked and unmarked nests)			
Do you actively look for and record predation events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Regarding mammalian predation events, what proportion of the events do you likely record?	<input checked="" type="checkbox"/> All <input type="checkbox"/> Most <input type="checkbox"/> Some <input type="checkbox"/> Few		
How many nests were negatively affected by predators (other than humans) PRIOR to hatching? <i>Note: this includes both partially and completely predated nests. It does NOT include nests affected by roots or other nesting sea turtles.</i>	3		
List all non-human predators that were documented predated nests this season:	Raccoon; Unknown Predators		
If predator control methods other than screening/caging were employed, please describe below:	N/A		
How many nests were negatively affected by another nesting sea turtle PRIOR to hatching?	0		
How many nests were negatively affected by roots (<i>i.e., damaged eggs, impeded hatching emergence</i>)?	0		
How many nests were negatively affected by erosion, accretion, inundation, and storm-related events PRIOR to hatching? <i>Note: this does not include stake loss or washed over.</i>	20		
Please give details:	20 Nests Washed Out (Mostly due to Hurricane Irma and King Tides)		
How many nests were taken or disturbed by humans (Example: nest dug into, eggs removed, etc.)? <i>Note: this does not include stake removal.</i>	0		
Please give details:	N/A		
If human disturbances occurred, were they reported to law enforcement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
How many disorientation events occurred on this survey area in 2017?	23		
Have all disorientation reports been submitted to FWC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
I certify the above information to be true and accurate to the best of my knowledge. Date:	11/28/2017		



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
FISH AND WILDLIFE RESEARCH INSTITUTE
ANNUAL REPORT FOR THE STATEWIDE NESTING BEACH SURVEY, 2017

1. PRINCIPAL PERMIT HOLDER INFORMATION

Principal Permit Holder:	Curtis Slagle	Permit Number:	214
Qualified Individual (if different from above)	N/A		
Beach Name:	Hollywood/Hallandale Beaches		

2. GENERAL NESTING DATA

Include ALL nests on this survey area (Marked, Unmarked, Misidentified & nests that were completely predated before morning surveys)	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
Total # of Nests	184	10	1	0	0
Total # of Non-Nesting Emergences (False Crawls)	235	8	0	0	0
Date (mm/dd/yy) of First Documented Nest	04/29/17	06/20/17	05/18/17		
Date (mm/dd/yy) of Last Documented Nest	08/19/17	08/24/17	05/18/17		
Total # of Nests Prior to 15 May:	5	0	0	0	0
Total # of Nests After 31 Aug:	0	0	0	0	0
Comments:	N/A				

In the spaces below, please provide information on the INITIAL nest treatment (see "Instructions" worksheet for treatment categories). For example, if the initial treatment was left in place with no protection, it should be included in "(a) # of Nests left in place without additional protection" even if you later relocate the nest due to erosion.

Record the number of nests by category and species for all nests Left In Place (where the turtle deposited the clutch).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS LEFT IN PLACE (a + b + c + d)	184	9	1	0	0
Nest Treatments (a) # of Nests left in Place without Additional Protection	184	9	1	0	0
(b) # of Nests left in Place with Self-Releasing Flat Screen	0	0	0	0	0
(c) # of Nests left in Place with Self-Releasing Cage	0	0	0	0	0
(d) # of Nests left in Place with Restraining Cage	0	0	0	0	0
Record the number of nests by category and species for all Relocated nests (clutch is removed from its original site of deposition and reburied at another site).	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)	<i>E. imbricata</i> (Hawksbill)	<i>L. kempii</i> (Kemp's Ridley)
TOTAL # OF NESTS RELOCATED (e + f + g + h)	0	1	0	0	0
Nest Treatments (e) # of Relocated Nests without Additional Protection	0	1	0	0	0
(f) # of Relocated Nests with Self-Releasing Flat Screen	0	0	0	0	0
(g) # of Relocated Nests with Self-Releasing Cage	0	0	0	0	0
(h) # of Relocated Nests with Restraining Cage	0	0	0	0	0

Additional Comments for the 2017 Season

Beach Name:

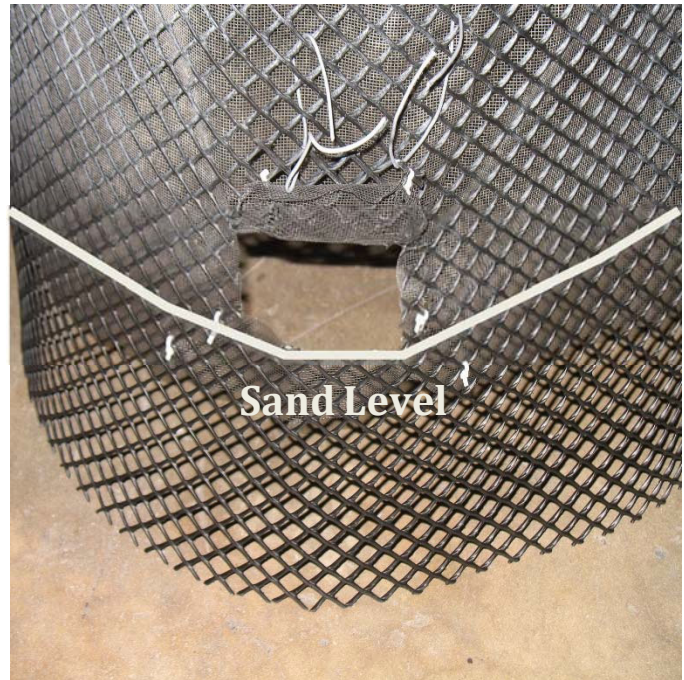
Hollywood/Hallandale Beaches

Nesting Beach Management Information (e.g., predation, storms, poaching, etc.)	King Tide impacted 1 nest in some fashion (washed out, washed over, etc.) Hurricane impacted 31 nests in some fashion (washed out, washed over, etc.)
General Nesting Data (e.g., nests, false crawls)	52 ONA reports filed 3 missed nests were discovered, 2 were associated with false crawls
Nest Success Data	133 nests were inventoried; 62 nests were not inventoried
Miscellaneous Comments Regarding Data	N/A

Appendix 2: Sea turtle nest sign. Size: 5.5"x8.5".



Appendix 3A: Sea turtle hatchling restraining cage design with escape door. Size: ~24” height x 24” diameter.



Appendix 3B: Restraining cage informational sign. Size: 8.5”x11”.



Appendix 5: Lighting survey examples of light fixtures.

Cobra: Bright streetlights, look like a cobra head.



Acorn: Streetlights that resemble acorns, sometimes turtle-friendly with amber bulb.



Floodlight: Very bright, usually attached to corners of buildings.



Carriage: Typically used as streetlights, light looks like would be on horse drawn carriage.



Globe: Circular, typically used as streetlights, sometimes half globes are seen.



NEMA: Extremely bright streetlight.



Bell: Typically streetlights that look like a bell.



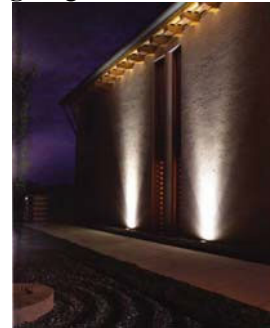
Wall mount: Anything that is mounted to a wall of a building that is not described elsewhere.



Ceiling mounted: Anything that is mounted to a ceiling that is not described elsewhere.



Up-lighting: Lights that are directed upward.



Bollards: A lot are turtle friendly if fitted properly; most are pathway lights attached to ground.



Landscape: Directed towards trees or vegetation.



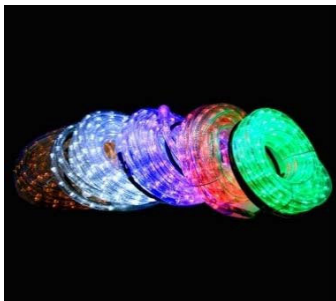
Spotlights: Very bright, direct light towards something specific.



Interior: Any lights that are inside and on.



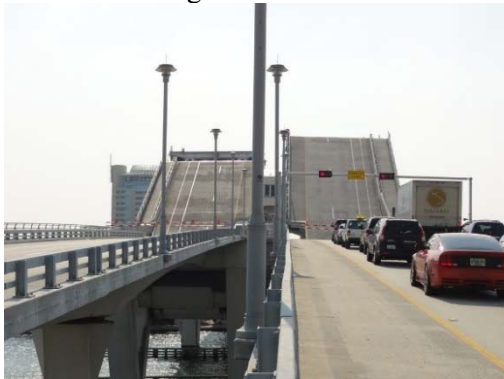
Rope lighting: Multiple small lights attached to a rope.



Posted: Any other lights on a pole not specifically known.



UFO: Streetlights that resemble UFOs.



Canister: Light housed in a canister; considered turtle-



friendly if it is pointing directly down.

Pool lights: Lights that are underwater.



Neon: Lights that show are neon colors.



Signage: Signs that are lit up.



Fluorescent: Extremely bright lights, usually seen in car garages.



Step lights: Small lights that illuminate steps of a stairway.



Walkway lights: Lights that illuminate a walkway.



Appendix 6: Summary of 2017 sea turtle emergency line use.

Call Subject	Number of Calls
Live Strandings	36
Dead Strandings	23*
Strandings Outside of Broward County	3
Nest Locations	27
Exposed Eggs	6
Hatchling Pick-Up	34
Caging Inquires	13
Lighting Concerns	8
Non-Emergency Sea Turtle Inquires	113**
Other Wildlife Emergencies	17
Spam	218
Overall	498

*1Includes multiple calls for same turtles

**4 mating pairs reported

Appendix 7: Example FWC sea turtle stranding report.

SEA TURTLE STRANDING AND SALVAGE NETWORK – STRANDING REPORT

OBSERVER'S NAME AND CONTACT INFORMATION: First John M.I. Last Doe E-mail johndoe@aol.com Affiliation Broward County Sea Turtle Conservation Program <hr/> (Area code) Phone number 555-555-5555	STRANDING DATE: Year 2017 Month 02 Day 05 Turtle number by day 01 <hr/> <i>State coordinator must be notified within 24 hrs; this was done by</i> <input type="checkbox"/> phone (561)575-5407 <input checked="" type="checkbox"/> email <input type="checkbox"/> fax (561)743-6228 <input type="checkbox"/> FWC Wildlife Alert Hotline 1-888-404-3922
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SPECIES: (check one)

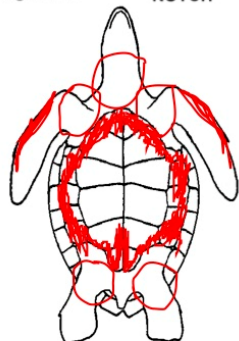
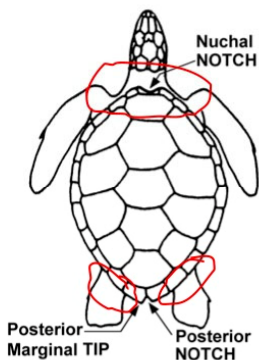
CC = Loggerhead
 CM = Green turtle
 DC = Leatherback
 EI = Hawksbill
 LK = Kemp's ridley
 LO = Olive ridley
 UN = Unidentified

Check unidentified if not positive. Do not guess.

Photos taken? Yes No
 Species verified by state coordinator? Yes No

SEX: (check one)

Immature, undetermined
 Female Male
 How was sex determined?
 Necropsy
 Tail length (adult only)
 Length of tail beyond carapace _____ cm/in



STRANDING LOCATION: Offshore (Atlantic or Gulf beach) Inshore (bay, river, sound, inlet, etc)
 State Florida _____ County Broward
 Descriptive location (be specific) Found behind Diplomat Resort on beach
 3555 S Ocean Dr, Hollywood 33019

 Latitude 25.991670 (approx.) Longitude -80.117021 (approx.)

CONDITION: (check one)

0 = Alive
 1 = Fresh dead
 2 = Moderately decomposed
 3 = Severely decomposed
 4 = Dried carcass
 5 = Skeleton, bones only

TAGS: Contact state coordinator before disposing of any tagged animal!!

Flipper tags present at stranding? Yes No
 If so, has CMTTP been notified? Yes No
Check all 4 flippers. If found at stranding, record tag number(s)/tag location/return address
 NSF _____

 PIT tag scan? Yes No
Check all 4 flippers. If PIT tag found at stranding record id/tag location
 NSF _____

 Checked for living tag? Yes No
 If found, record location (scute number & side)
 NSF _____

TUMOR DOCUMENTATION:

Fibropapilloma-like tumors present? Yes No
 FP documentation form attached? Yes No

FINAL DISPOSITION: (check one)

1 = Left on beach where found; painted? Yes* No(5)
 2 = Buried: on beach / off beach; carcass painted before buried? Yes* No
 3 = Salvaged: all / part(s), what/why? _____

 4 = Pulled up on beach/dune; painted? Yes* No
 6 = Alive, released
 7 = Alive, taken to rehab. facility, where? _____

 8 = Left floating, not recovered; painted? Yes* No
 9 = Other, explain _____

**If painted, what color?* _____

CARAPACE MEASUREMENTS: (see drawing)

Using calipers Choose unit

Straight length (NOTCH-TIP) _____ cm/in
 Minimum length (NOTCH-NOTCH) _____ cm/in
 Straight width (Widest Point) _____ cm/in

Using non-metal measuring tape Choose unit

Curved length (NOTCH-TIP) 44.0 cm
 Minimum length (NOTCH-NOTCH) 43.0 cm
 Curved width (Widest Point) 38.5 cm

Weight actual / est. 77 lb

Mark wounds or abnormalities on diagrams at left and describe below (note tar or oil, gear or debris entanglement, propeller damage, epibiota, papillomas, emaciation, etc.). **Please note if no wounds or abnormalities were found.** If released, note if new tags were applied.

No external wounds found. circles on diagram indicate location of paps. significant quantity of tumors. filled in areas on diagram indicate location of leech eggs

Appendix 8: Example FWC fibropapilloma documentation form.

FIBROPAPILLOMA DOCUMENTATION FORM

Please complete for every turtle exhibiting fibropapillomas and submit with the STSSN report form.

Observer: John Doe Stranding Date: 20170205

Stranding Number by Day: 01 Species: CM

1. Please select sites where tumors are present:

- Left Eye Right Eye Inside Mouth Neck
 Base Front Flippers Base Rear Flippers Along Front Flippers Along Rear Flippers
 Around Tail On Carapace On Plastron Other _____

2. How many fibropapillomas are less than 1 cm in diameter? (select one)

- 0 1 - 5 greater than 5

3. How many fibropapillomas are between 1 cm and 4 cm in diameter? (select one)

- 0 1 - 5 greater than 5

4. How many fibropapillomas are between 4 cm and 10 cm in diameter? (select one)

- 0 1 - 3 greater than 3

5. How many fibropapillomas are greater than 10 cm? (select one)

- 0 1 - 3 greater than 3

6. Do you believe that vision was blocked by fibropapillomas? (select all that apply)

- No Yes, in Left Eye Yes, in Right Eye Yes, in Both Eyes

7. Please describe the size and exact location of any fibropapillomas inside the mouth.

NSF

Please be sure to take photographs showing all ventral and dorsal surfaces. Please also take one "head-on" photograph of the turtle. If there is a fibropapilloma inside the mouth, please take a photograph of it. If the turtle is not a green turtle, or if it has a fibropapilloma inside the mouth, please salvage the turtle and contact the FWC turtle staff through a text message to SeaTurtleStaff@myfwc.com or by calling the FWC Wildlife Alert Hotline at 1-888-404-3922.

Appendix 9: Summary of sea turtle strandings.

The BCSTCP responded to 49 stranding events from January 1–December 31, 2017. Of the 49 stranding events, 23 turtles were dead upon arrival (14 *Chelonia mydas*, 7 *Caretta caretta*, 2 *Eretmochelys imbricata*). Of the dead stranding responses, 10 turtles suffered from boat strikes, 1 from entanglement, 1 from a predator attack, 1 had fibropapillomatosis, and 10 unknown cause of death. Twenty-six strandings were in response to live turtles (11 *Caretta caretta*, and 15 *Chelonia mydas*). Eight live turtles were accidentally hooked by fishermen, 3 were lethargic, 1 was struck by a boat, 1 was entrapped under a fishing pier during nesting, 2 were predator attacks (post-hatchlings), 1 was entangled in fishing line wrapped around a swimming buoy, 9 were washbacks, and 1 was an undetermined injury. Four live turtles were transported to Miami Seaquarium in Miami, Florida and 18 were taken to Gumbo Limbo Nature Center in Boca Raton, Florida for treatment and rehabilitation. Two live stranded turtles (post-hatchling & washback) died in transport to a rehabilitation facility and another live stranded turtle died during rescue (entanglement). One live turtle that was trapped under the fishing pier during nesting sustained no injuries and so was released immediately.

Appendix 10: Example FWC marine turtle disorientation report.

CJS 16 09 18 01 BRO
 Permit Holder Initials Year Month Day Dis. # by Day County Code

FWC MARINE TURTLE DISORIENTATION REPORT

If you have any questions, please contact FWC at the Tequesta Field Laboratory (561) 882-5975

Fax reports to: (561) 743-6228 or Email reports to: SeaTurtleLighting@MyFWC.com

Send reports to: Disorientation Reports, FWC, 19100 SE Federal Highway, Tequesta, FL 33469

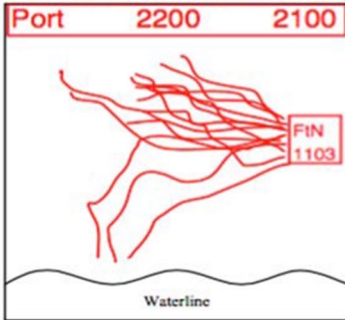
Marine Turtle Permit #: 215 Date of Incident: 9/18/16
 Observer's Name: Curtis Slagle
 Telephone (include area code): 954-262-3672 E-mail address: cs1858@nova.edu

Location of Disorientation Event: (address, beach name and/or nearest landmark): 2100 S Ocean Lane

City: Fort Lauderdale County: Broward
 Local nest ID#: 1130 Zone nest was located in: 84
 Nest GPS Coordinates (use decimal degrees: i.e., Lat 26.845412 Long -80.458796):
 Latitude: 26.096155 Longitude: -80.104932

SPECIES: (check one) <input checked="" type="checkbox"/> Cc = Loggerhead <input type="checkbox"/> Cm = Green Turtle <input type="checkbox"/> Dc = Leatherback <input type="checkbox"/> Un = Unidentified <input type="checkbox"/> O = Other	TYPE OF EVENT: (check one) <input type="checkbox"/> Adult – Nesting Emergence <input type="checkbox"/> Adult – False Crawl <input checked="" type="checkbox"/> Hatchling	NEST TREATMENT: (check all used) <input type="checkbox"/> Restraining Cage <input type="checkbox"/> Self-releasing Screen/Cage <input type="checkbox"/> Light Barrier (i.e., silt screen) <input checked="" type="checkbox"/> Relocated
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Incident was documented during: (check one) Morning Survey Night Survey Daytime



Was the incident photographed? YES NO
 Was the source nest found? YES NO
 Was the nest excavated? YES NO
 If "YES" report date of excavation: 9/21/16

Number of turtles disoriented: <input type="checkbox"/> 1 <input type="checkbox"/> 2-10 <input type="checkbox"/> 11-50 <input checked="" type="checkbox"/> >50	Disoriented turtles reaching the water: <input type="checkbox"/> All <input checked="" type="checkbox"/> Some <input type="checkbox"/> None <input type="checkbox"/> Not investigated
Were any disoriented turtles found dead? <input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO If "YES" indicate the number:	

Addresses/landmarks turtle(s) disoriented towards: Port Everglades & 2200 S Ocean Lane, Fort Lauderdale

Were probable/possible light source(s) identified? YES NO
 If "NO" indicate why: (check one) No lights present Too many lights Other:

Indicate categories of light(s) identified as probable/possible lighting sources: (check all that apply)

<input type="checkbox"/> parking lot	<input checked="" type="checkbox"/> street light	<input checked="" type="checkbox"/> condominium (interior)
<input type="checkbox"/> dune crossover	<input type="checkbox"/> single family home (interior)	<input checked="" type="checkbox"/> condominium (exterior)
<input type="checkbox"/> restaurant/bar	<input type="checkbox"/> single family home (exterior)	<input checked="" type="checkbox"/> sky glow/urban glow
<input type="checkbox"/> pier	<input type="checkbox"/> sign	<input checked="" type="checkbox"/> other: Port Everglades

Additional comments (use back if necessary):

Local authority provided a copy of this report: City County FWC Other:

Signature of Observer _____ Date 9/18/16

FWC Revised 6/92, 11/96, 9/97, 1/99, 3/01, 1/02, 1/08, 5/12

Appendix 11: Example FWC obstructed nesting attempt form.

FWC MARINE TURTLE OBSTRUCTED NESTING ATTEMPT (ONA) REPORT FORM

If you have any questions please contact FWC at the Tequesta Field Laboratory (561) 575-5407
Fax reports to: (561) 743-6228 or Email reports to: SeaTurtleLighting@MvFWC.com
Send reports to: ONA Reports, FWC, 19100 SE Federal Highway, Tequesta, FL 33455

Turtle Permit #: 214 Date of Incident: MAY-1-17

Observer's Name: Abby Nease

Telephone (include area code): 954-262-3672 E-mail address: cs1858@nova.edu

Species: Loggerhead Green Leatherback Other: _____

Crawl resulted in: Nest False Crawl

Location of nest or false crawl (address, beach name and/or nearest landmark): 901 Hillsboro Mile
in front of dining hall

GPS Coordinates of nest or false crawl location:

(in the WGS projection in decimal degrees i.e., Lat 26.845412 Long -80.458796):

Latitude 26.260174 Longitude -80.480431

City: Hillsboro County: Broward

Local nest ID#: 110 Zone nest/false crawl was located in: 23

Obstruction(s) encountered: (please circle)

- | | | | | |
|-----------------------------------------------------|-------------------------------------------|------------------------------------------------|-------------------------------------------|---------------------------------------------------|
| <input checked="" type="checkbox"/> Beach furniture | <input type="checkbox"/> Dune Crossover | <input type="checkbox"/> Escarpment | <input type="checkbox"/> Rock Outcropping | <input type="checkbox"/> Special Events Equipment |
| <input type="checkbox"/> Boat | <input type="checkbox"/> Groins | <input type="checkbox"/> Marine Debris | <input type="checkbox"/> Rock Revetment | <input type="checkbox"/> Tent |
| <input type="checkbox"/> Cabana | <input type="checkbox"/> Geotube/Sandbags | <input type="checkbox"/> Nourishment Equipment | <input type="checkbox"/> Seawall | <input type="checkbox"/> Umbrella |

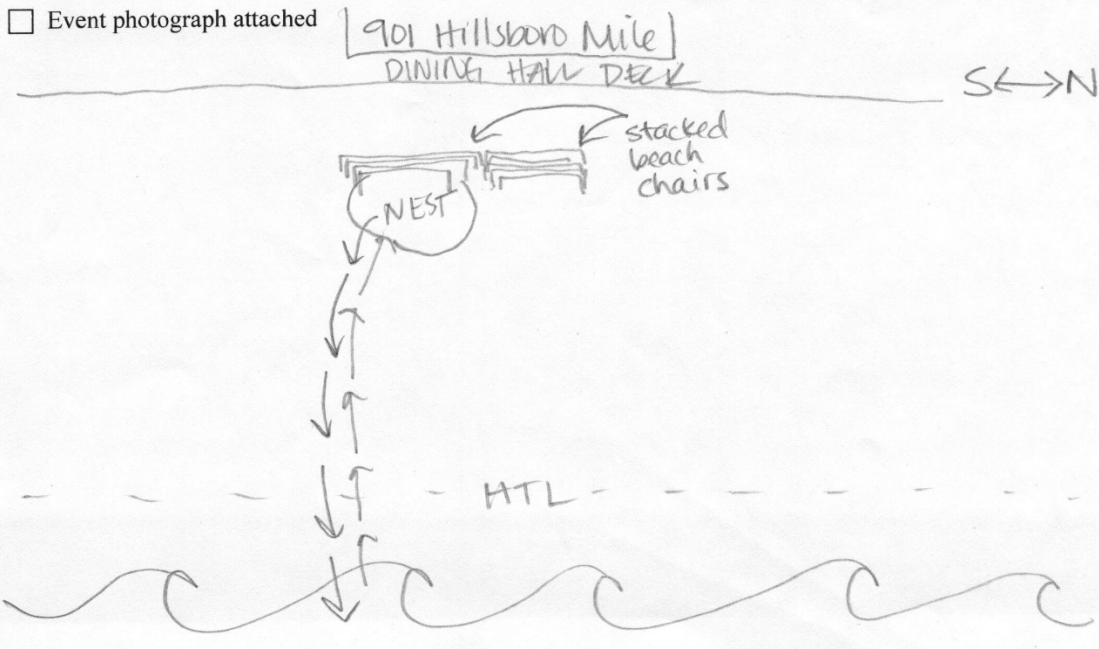
Other Obstruction (please describe):

Describe Event: turtle crawled west, hit beach chairs, nested, returned to the ocean.

Abby Nease
Signature of Observer

MAY-1-17
Date

Event photograph attached



Appendix 12: Summary of education and outreach activities.

One of the goals of the BCSTCP is to provide engaging educational/outreach opportunities to the general public and students. In doing so, the program brings awareness to individuals, businesses, beach users, and coastal residents and nurtures stewardship towards a more suitable environment for these important animals. Educational flyers were distributed throughout the season to interested parties on the beach, at turtle talks, classroom/school visits, and hatchling releases.

In 2017, the BCSTCP conducted a total of 158 education/outreach events connecting with over 44,000 individuals.

- Turtle talks (45 presentations, ~3,300 participants)
 - American Heritage Science Adventure Camp
 - Aventura Waterways K-8 Center (Career Day)
 - Aventura Waterways K-8 Center Truck Day
 - CBGlades Christian Academy Preschool
 - Cooper City Elementary Eco Club
 - Dania Beach YMCA
 - Flamingo Elementary (Career Day)
 - Fort Lauderdale Garden Club
 - Fox Trail Elementary (Career Day)
 - Girl Scouts of South Florida
 - Glades Middle School (Career Day)
 - Green Children's House
 - Hillsboro Club
 - Hola Mundo Beach Camp
 - Hollywood Academy of Arts and Sciences Middle School (Career Day)
 - Karen Slattery ERCCD FAU
 - Kids Lets Go Fishing
 - La Scuola
 - Lauderdale Lakes Library
 - Marblue Montessori Academy Camp
 - Marriott's Beach Place Towers
 - McNab Elementary (Career Day)
 - National Energy & Utility Affordability Coalition NSU Alvin Sherman Library
 - NSU Alvin Sherman Library
 - NSU Halmos College Welcome Week
 - NSU Uschool Summer Camp
 - Pioneer Middle School
 - Renaissance Hotels Global Day of Discovery
 - Riverglades Elementary (Career Day)
 - Sawgrass Nature Center
 - Sheridan Park Elementary School (Career Day)
 - United Community Options
 - Westminster Academy

- Turtle talks followed by public hatchling release (67 presentations; ~3,300 participants)
 - Anne Kolb Nature Center
 - Beaux Arts group
 - Boy Scouts of America
 - BCSTCP Public release
 - Broward County Coral group
 - Charity Guild group
 - Dania Beach YMCA
 - DEEP Foundation Inc.
 - Girl Scouts of America
 - Hillsboro Club
 - Hillsboro Police Department
 - Mayor's Gala group
 - Memorial Milers
 - Miami Nature Playschool
 - NSU Fellows Society
 - NSU Finance Department
 - NSU Law Department
 - NSU Levan Ambassador's Board
 - NSU Nature Club
 - NSU President's Associate
 - NSU University School
 - Pompano Dive Center
 - PRIDESTAFF
 - Shalom Preschool
 - Stocked on Salt
 - U.S. Coral Reef Task Force
 - Virginia Shuman Young Elementary
 - Various family groups

- Table events (26 events, ~37,500 participants)
 - Bethune Elementary Earth Night
 - Broward College Earth Day
 - Broward Sierra Club Earth Day
 - Challenger Elementary Science Night
 - City of Miramar Earth Day
 - Deerfield Spring Fest
 - Flamingo Gardens KidzFest
 - Florida Nursery, Growers and Landscape Association
 - Fort Lauderdale Beach Sweep
 - Gumbo Limbo Nature Center's Sea Turtle Awareness Month
 - Loggerhead Marine Life Center TurtleFest
 - Marine Industry Day
 - Mcnicol Middle School Green Expo
 - NSU College of Natural Sciences and Oceanography's Open House
 - NSU Earth Day Celebration
 - Party With a Purpose
 - RIPTIDE Music Festival

- Sharkwater Yacht Christening Celebration
- Stocked on Salt Ocean Cleanup
- Tortuga Music Festival Conservation Village
- Tri-Rail's Rail Fun Day
- Veteran Earth Art Charity Event

- Excavation demonstrations (9 demonstrations, ~100 participants)
 - Sea Turtle Oversight Protection Youth Camp
 - Marine Environmental Education Center at the Carpenter House afternoon program

- Ride-along tours (10 tours, 19 participants)

- Traveling Turtles of Florida Trunk* (2 rentals, 100 students)
 - * Developed by Inwater Research Group maintained by BCSTCP
 - Sea Castle Elementary (two 5th grade classes)

Appendix 13: Historical sea turtle strandings in Broward County, 2004-2017. Red bars indicate dead strandings and green bars indicate live strandings.

