

Fire Island National Seashore

**THREATENED & ENDANGERED SPECIES
MONITORING PROGRAM
2018 SUMMARY**



Prepared by:
Lindsay Ries, Farrah Leone, Brianna Valot and Andrew Wyeth

Fire Island National Seashore
120 Laurel Street
Patchogue, NY 11772

Contents

Introduction.....	2
Methods and Results.....	2
Piping Plovers	2
Colonial Waterbird Surveys (Terns and other waterbirds)	5
Seabeach amaranth and seabeach knotweed.....	6
Asiatic Sand Sedge.....	7
Discussion	8
Compliance document - update	10
Bats	11
Management of T&ES data	11
References	11
Appendix A: Tables and Figures.....	13
Table 1: Historic Productivity of Piping Plovers on FIIS.....	13
Table 2: FIIS 2018 Overall Piping Plover productivity.....	14
Table 3: Piping Plover Banding Information for 2018 from Virginia Tech Study.....	15
Figure 1: The number of Piping Plover breeding pairs and the number of chicks fledged at FIIS, 2005-2018	16
Figure 2: Pie graph displaying the outcome of all laid Piping Plover eggs at FIIS in 2018.....	17
Figure 3: Chart displaying historical values for seabeach amaranth & seabeach knotweed on FIIS (2003-2018).....	18
Figure 4: Bar graph demonstrating the survivorship of seabeach amaranth plants throughout the season.	19
Table 4: Long Island Colonial Waterbird Surveys for Terns and Black Skimmers in 2018.....	20
Appendix B: Maps.....	21
Map 1: Map of Fire Island National Seashore	21
Map 2: Fire Island Lighthouse locations of threatened and endangered species in 2018.....	22
Map 3: Fire Island Villages locations of threatened and endangered species in 2018.	23
Map 4: Fire Island Sunken Forest locations of threatened and endangered species in 2018.	24
Map 5: Fire Island Pines locations of threatened and endangered species in 2018.....	25
Map 6: Fire Island Wilderness (West) locations of threatened and endangered species in 2018.....	26
Map 7: Fire Island Wilderness (East) locations of threatened and endangered species in 2018	27
Appendix C: GPS locations	28
Piping Plover Nests	28
Seabeach amaranth individuals.....	29

Seabeach knotweed individuals	30
Appendix D: Photos	31

Introduction

Fire Island National Seashore (FIIS) is a National Park unit located just south of Long Island, New York. As part of the Threatened and Endangered Species Program monitoring effort conducted at FIIS, the status of several federal and state-listed threatened and endangered species (T&ES) were observed in 2018. T&ES observed and monitored include the piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), common tern (*Sterna hirundo*), seabeach amaranth (*Amaranthus pumilus*), seabeach knotweed (*Polygonum glaucum*) and northern long-eared bat (*Myotis septentrionalis*). In addition, searches for Asiatic Sand Sedge (*Carex kobomugi*) were conducted in conjunction with T&ES surveys.

A total of 11 piping plover nesting pairs were recorded within the Seashore. Nesting productivity reached an average of 2.6 piping plover chicks fledged per pair, with a total of 29 successful piping plover fledglings. New York State Department of Environmental Conservation’s (NYSDEC) Long Island Colonial Waterbird surveys were conducted this season and several least tern and common tern colonies were identified and monitored on Fire Island proper and bay islands within the boundaries of the Seashore. In addition, 78 seabeach amaranth and 13 seabeach knotweed plants were documented throughout FIIS. Virginia Tech researchers continue to study piping plovers as part of their research funded by the Army Corp of Engineers through the Fire Island Inlet to Moriches Inlet (FIMI) project. The FIMI research project began in 2016, and data was shared throughout the season.

Methods and Results

Piping Plovers

Methods

In accordance with U.S. Fish and Wildlife Service (USFWS) guidelines, preseason habitat fencing (symbolic fencing) was constructed and established in early April, prior to the onset of the piping plover breeding season. Areas to be fenced were determined through the compilation of nest/plant data collected from previous years, early season plover observations, and through visual assessments of habitat. Areas where birds are seen regularly are more intensely monitored (for example, the Fire Island Wilderness) and symbolic fencing is erected and adjusted accordingly. Breeding pairs of plovers are identified using binoculars and observed for specific territorial, courtship and nesting behaviors. These behaviors include (but are not limited to) parallel runs, aerial displays, scraping, broken-wing display, and vocalization (Cairns 1982).

Upon discovery of a nest, an alphanumeric tag is used to identify each nesting pair and nest; a number and year are assigned chronologically, using an “A” for first nesting attempt, “B” for second, and so on

(eg. 1A-18). Regardless of nest location along FHS shore, all nests were protected within symbolic fencing borders creating a buffer zone of no less than 50 meters on all sides.

Monitoring efforts for nesting activity are increased after pairing or copulation is observed. Field biologists lead intensive daily monitoring observations for the purpose of quickly identifying nests. This effort helps ensure accurate estimation of hatch and fledge dates. An average hatch date of 27 days from the full clutch date is determined utilizing a chart produced by NYSDEC. Daily brood monitoring is initiated after the first piping plover egg hatches. Chicks are either considered fledged when witnessed 25 days after they have hatched or when a sustained flight of 15 meters is observed before then. When a nest is situated near a vehicle beach access route, a fledge date of 35 days is implemented and driving restrictions are extended to ensure the safety of the brood (USFWS 1996).

Results

A total of 11 nesting pairs were documented, from which there came 13 nesting attempts throughout the Seashore. Nine plover pairs nested in OPWA-East (Old Inlet to the Wilderness Visitor Center) and 1 pair nested in OPWA-West, just east of Bellport Beach. In addition, 1 pair nested on Lighthouse beach. Ten nests hatched and 29 total chicks successfully fledged. This yielded a productivity of 2.6 for 11 breeding pairs (Table 2). Maps of nest locations can be located in Appendix B.

A total of 48 eggs were laid and of these 37 total eggs hatched, with the remainder failing as a result of being destroyed through vandalism (4 eggs), abandoned (4 eggs), overwashed (1 egg) or not hatching and assumed unviable (2 eggs) (Figure 2).

Below is a summary of each nesting attempt:

Nest **1A-18** was found with 1 egg on May 1st in OPWA-East (section 9) by Virginia Tech researchers. On May 7th the nest was exclosed with a full clutch of 4 eggs. Nest 1A-18 hatched all 4 chicks on June 2nd, but only 3 of the chicks were consistently observed given the avoidant nature of the brood. This brood was consistently elusive and difficult to observe, often hiding behind the dunes, within vegetation, or back alongside the bay. Three chicks fledged on June 27th.

Nest **2A-18** was found with 1 egg on May 2nd in OPWA-East (section 9) by Virginia Tech researchers. The nest was exclosed on May 7th with a full clutch of 4 eggs, and all 4 eggs hatched on June 3rd. Four chicks fledged on June 28th.

Nest **3A-18** was found on May 5th with 1 egg in OPWA-East (section 9) by Virginia Tech researchers. The nest was exclosed on May 10th with a clutch of 3 eggs, and a full clutch of 4 eggs hatched on June 7th. Four chicks fledged on July 2nd.

Nest **4A-18** was found on May 8th with a full clutch of 4 eggs in OPWA-East (section 8) by Virginia Tech researchers. Each egg was then floated to estimate the nest's hatch date. Nest 4A-18 was exclosed on May 10th. All 4 eggs hatched on June 4th. By June 19th, one chick from 4A-18 was adopted by 5A-18 and that chick went on to fledge. Unfortunately, on June 27th the adult male from 4A-18 was confirmed

dead after having not been seen for a number of days. Appendix D includes images of the remaining carcass.

Nest **5A-18** was found on May 8th with 1 egg in OPWA-East (section 8) by Virginia Tech researchers. It was exclosed as a full clutch of 4 eggs on May 22nd. 5A-18 is particularly notable seeing as the nesting adults went on to incubate and raise chicks after the nest had been over washed, starting with 4 eggs but ultimately only hatching 2. By June 19th, 5A-18 adopted one chick from 4A-18 and cared for it thereafter. The two chicks from 5A-18 successfully fledged on July 6th.

Nest **6A-18** was found on May 8th with 1 egg in OPWA-East (section 8) by Virginia Tech researchers and was exclosed on May 21st as a full clutch of 4 eggs. Four chicks hatched by June 10th and 2 chicks successfully fledged on July 5th.

Nest **7A-18** was found on May 15th with 1 egg in OPWA-East (section 10) by Virginia Tech researchers. The nest was exclosed on May 21st as a full clutch of 4 eggs. On Memorial Day (May 28th) Virginia Tech researchers discovered that the nest had been vandalized and eggs destroyed. The incident was documented by a NPS Visitor and Resource Protection Ranger (Case Incident Report #NP18067412). The plovers subsequently abandoned the nest.

Nest **7B-18** was established shortly thereafter on June 4th, also in section 10 and was found with 4 eggs. It was exclosed on June 8th. All 4 eggs hatched on July 5th and the chicks remained in this area for a while but also moved further east near the Wilderness Visitor Center. Three chicks fledged on July 30th.

Nest **8A-18** was found on May 15th with 1 egg in OPWA-East (section 9) by Virginia Tech researchers. The nest was exclosed on May 21st with 3 eggs. One June 18th, all 4 eggs hatched. They tended to stay fairly closure to their nest site. Four chicks fledged on July 13th.

Nest **9A-18** was found on May 31st with 2 eggs in the east end of Lighthouse beach by Virginia Tech researchers. This pair was elusive and both FIIS staff and Virginia Tech researchers had only observed this pair off and on before they nested. The nest was exclosed on June 1st and reached a full clutch of 4 eggs. Unfortunately red fox digging attempts around the exclosure were seen on June 11th and the nest was determined abandoned on June 13th since sand started to cover the eggs. Predator pressure was likely the cause for their abandonment.

Nest **10A-18** was found by Virginia Tech researchers with 4 eggs on June 1st in OPWA-West (section 7), just east of Bellport Beach. It was exclosed on June 4th and all 4 eggs hatched on June 25th. They were the only plover pair west of Old Inlet in the Fire Island Wilderness but stayed in the same general area where they nested. Three chicks successfully fledged on July 20th.

Nest **11A-18** was found on June 2nd in OPWA-East (section 8) with 1 egg. However, a storm on June 3th over washed and buried the 1-egg nest. Luckily the birds stayed and re-nested shortly thereafter.

Nest **11B-18** was found on June 8th, also in section 8, with 2 eggs. It was exclosed as a full clutch of 3

eggs on June 11th. All 3 eggs hatched on July 5th, but only 1 chick survived to fledge on August 2nd.

The FIIS Wildlife Biologist decided to exclose all nests in 2018. Nest exclosures are frequently used to increase hatch success. However, exclosure use can result in adult mortality, which is not always detected and may result only in apparent nest abandonment (Neuman et al 2014). She will continue to use the Piper Ex tool in the future (Ries et al 2017), but also take into account personal observations in the field as well. However, the decision to stop using exclosures will be made during the season, rather than before the season begins.

Colonial Waterbird Surveys (Terns and other waterbirds)

Methods

In 2018, there was a piping plover survey window and a Tern/Black Skimmer survey window, as part of the NYSDEC Long Island Colonial Waterbird Surveys (LICWS). Piping plover surveys were conducted during their survey window (June 1 – June 9) at each LICWS site once. In addition, two tern and black skimmer population surveys were conducted in June, once June 1-15, and another June 16- 30.

Many of the sites surveyed are located on Fire Island's ocean and bay beaches between the Lighthouse Tract and Smith Point County Park. Several bay islands that are monitored for waterbirds fall within the boundaries of the Seashore, including Islip Spoil Island, Sexton Island, West Fire Island, East Fire Island, Long Cove, Ridge Island, Pelican Island, John Boyle Island, and Hospital Island. These bay islands can only be accessed by motorboat, canoe or kayak, and access may be limited by inclement weather, remoteness of location, and time constraints.

Results

NYSDEC is most interested in breeding least terns (LETE), common terns (COTE) and black skimmers (*Rynchops niger*; BLSK) although all breeding bird species were identified by FIIS staff. Most survey sites were visited during both survey windows despite days with poor weather conditions.

In total, 15 different sites were surveyed throughout the month-long effort (Table 4) including 9 bay islands and 6 sections of Fire Island. Annual population surveys for LETEs and COTEs resulted in total maximum counts across the Seashore (the greatest number counted during a survey period for each site) of 495 and 873, respectively. No ROSTs or BLSKs were observed in 2018.

LETEs were only observed nesting in the Fire Island Wilderness, east of the Old Inlet breach. COTE colonies were only observed on East Fire Island, Ridge Island and Long Cove with 260, 600 and 13 pairs (the greatest number counted during a survey period for each site). These numbers are comparable to the past several years; however, LETEs nesting in the Long Cove area has seen declines. Unfortunately, COTEs have not nested on Sexton Island during the past several years and laughing gulls (*Leucophaeus atricilla*) appear to be nesting in high numbers.

American Oystercatchers (AMOY) also nested on the ocean beaches in the Fire Island Wilderness. Two pairs nested east of the Old Inlet breach, and one pair nested in the Long Cove area within section 2. The first AMOY nest in OPWA-East was just southeast of nest 1A-18 and hatched 2 chicks which presumably fledged. However, the other nest (close to the breach in OPWA-East) did not hatch. The AMOY nesting pair in OPWA-West (in section 2), hatched at least one chick which also presumably fledged. All scanned copy of forms can be found on the network drive.

Seabeach amaranth and seabeach knotweed

Methods

Amaranth and knotweed begin to germinate on FIIS in early July. These plants tend to grow in early successional beach/dune habitat—the same type preferred by piping plovers and least terns for nesting. For this reason, symbolic fencing established for plover and tern nesting habitat remain up during the germination period for amaranth and knotweed. Fencing may be adjusted after initial sweep counts to provide a buffer around plants. Field biologists conduct sweep counts throughout FIIS, both on foot and using an ORV, traveling parallel to the toe of the dune.

This year the survey windows were as follows:

- Survey window 1: 7/10 – 7/21
- Survey window 2: 8/7 – 8/18

After the second survey window individual amaranth plants are re-visited every 2 weeks. Since 2014 every amaranth plant (when feasible) is exclosed to protect it from deer browsing. For amaranth, data collected includes location (GPS location), plant condition, evidence of browsing as well as percent browsed, maximum lateral spread, reproductive status, potential threats, weather conditions, and general observations in accordance with data sheets provided by the U.S. Fish and Wildlife Service. For knotweed, data collected includes location (GPS location) and reproductive status. We continue to monitor existing amaranth plants throughout the fall season, until senescence.

Results

A total of 78 seabeach amaranth plants were found in several sweep counts on FIIS throughout July and August. These plants were then surveyed every two weeks until senescence. Sites from the LICWS were recognized and reported as such for amaranth: Fire Island Lighthouse (21), Fire Island Villages (15), Fire Island Sunken Forest (7), Fire Island Pines (31) and the Fire Island Wilderness (4). Both federal and non-federal tracts of land were surveyed in 2018.

An exclosure was constructed around 6 out of 78 (8 %) to protect them from browsing by white-tailed deer (*Odocoileus virginianus*). Heavy winds during a storm in late-August caused lots of sand to accumulate around and inside the amaranth exclosures. They were immediately removed and the

plants unburied carefully by hand. After this incident exclosures were not re-installed for the rest of the field season.

A range of plant sizes were observed; the largest was 54 cm in diameter at the widest point and the smallest was 3 cm. This resulted in an average size of 13.6 cm. Twenty out of 78 plants were reproductive (26% of all plants). Data on individual seabeach amaranth plants, including GPS locations, are located in Appendix C. Figure 4 displays amaranth survivorship throughout the monitoring season.

Survey windows were conducted concurrently for seabeach amaranth and seabeach knotweed. A total of 13 knotweed plants were counted and marked throughout FIIS (Figure 4). Sites that contained seabeach knotweed included Fire Island Lighthouse (4 plants), Fire Island Villages (4 plants), Fire Island Pines (3 plants) and Fire Island Wilderness (2 plants). Both federal and non-federal tracts of land were surveyed in 2018. All plants were reproductive (flowering). All data related to seabeach knotweed is located in Appendix C.

Asiatic Sand Sedge

Methods

Asiatic Sand Sedge is a perennial sedge that is native to coastal areas of northeastern Asia. It grows on primary dunes and on upper parts of beach wash flats that have recently been disturbed by ocean storms. Asiatic Sand Sedge thrives in the same habitat as piping plovers and seabeach amaranth. It has the ability to out-compete native species and spread rapidly. Due to its potential impact on native and T&ES, monitoring and treatment of the species has been incorporated into the T&ES Monitoring Program.

Monitoring for Asiatic Sand Sedge occurs during the second survey window for T&ES beach plants (8/7 – 8/18). When found, the sedge is marked with a pin flag for future removal and GPS points of its location are taken. To remove the plants, they're carefully dug out by hand and shovel to ensure that none of the plant – particularly the meristem - is left behind. Plants are then put in black garbage bags, tied, and placed in dumpsters for landfills. This treatment and disposal plan was recommended by the FIIS Park Biologist for small clumps and will be compared to previous removals since 2013, using a combination of chemical and mechanical removal treatments.

Results

A total of 10 Asiatic Sand Sedge plants/clumps were found in several sweep counts on FIIS. Sites from the LICWS were recognized and reported as such for Asiatic Sedge: Fire Island Lighthouse (5 clumps), Fire Island Villages (1 clump; Robbins Rest), Fire Island Sunken Forest (1 clump), Fire Island Pines (1 large clump; Blue Point), and Fire Island Wilderness (2 clumps; in western wilderness).

Discussion

Disturbances

There were several anthropogenic and natural disturbances to T&ES in 2018. Storms that cause high tides as well as natural predators (gulls, raccoons, red foxes, ghost crabs, and a variety of avian wildlife) can pose a threat or disturbance to nesting piping plovers and their broods. This year we had 1 nest abandoned along Lighthouse Beach (9A-18), which was attributed to red foxes. In addition, 1 nest was over washed and buried from a storm event close to the Old Inlet breach (11A-18). The area near the breach continues to be highly dynamic during storm events.

As far as anthropogenic disturbances, FIIS staff follows USFWS (1996) guidelines for managing recreational activities such as beach driving. For example, full-sized vehicles shall not be permitted on beaches where unfledged chicks are found, and that beach access points/dune crossings found within 1000 meters of a nest with chicks be closed to all traffic until those chicks are fledged (35 days after hatching for chicks near vehicle areas). The FIIS Wildlife Biologist continued the Plover Hotline (631-687-5030), first established in 2010, which was regularly updated with information on dune crossing/beach closures to vehicles. Adequate warning of closures (2-3 weeks) was given for established nests, when possible. However, no dune crossings were closed because plovers did not successfully nest west of Watch Hill in 2018. 9A-18 (Lighthouse beach and within 1000 meters of the Kismet driving cut) was abandoned before restrictions on driving were enforced.

A plover enclosure closest to the Wilderness Visitor Center – 7A-18 – was vandalized over Memorial Day weekend. Three of the four eggs were gone (the fourth egg was found broken approximately 30 feet north of the enclosure) and the netting and enclosure itself looked like it had been cut and someone had entered it. This vandalism caused the plovers to abandon the nest. Vandalism does not happen often at the Seashore; however several nests in the Fire Island Wilderness were vandalized in 2009 and a plover enclosure was vandalized in 2012 on the NPS land just west of Robbins Rest (Ries et al 2012, Ries et al 2009). NPS V&RP Rangers and field biologists need to remain vigilant and continue to discuss vandalism openly in areas of high visitor use.

Plover mortalities

There were 4 confirmed adult plover mortalities during the nesting season in 2018 within the boundaries of Fire Island National Seashore. Three occurred at Smith Point County Park and 1 occurred at OPWA-East. Mortalities were reported by Virginia Tech researchers (text taken from email sent by Samantha Robinson on 6/14/18).

- GF (XY2) – This bird was associated with nest 4A at Fire Island National Seashore, in OPWA-East. He was male, and typically the more attendant of the parents. His nest hatched on 6/4/18, and he was not observed after this date. He was found dead on 6/17/18 (Appendix D). We suspect he was dead for a few days (maybe more) and attacked by an avian predator because of the wound (very limited, just near the stomach). The brood remained active for several days;

however, an adjacent plover pair (5A) adopted the remaining chick from 4A on 6/19/18, which went on to fledge.

- GF (K7X) – The bird was found dead inside the enclosure on 6/11/18 after the Plover Stewards from Smith Point County Park observed a peregrine falcon struggling with the blueberry netting on top. The body was intact, with blood splattered in the enclosure. Two spots had blood on the body, on head and neck.
- GF (4XL) – The bird was found ~ 50m from his nest on 6/11/18, which was abandoned sometime between 5/27/18 and 6/1/18. We suspect avian predation. The head was still attached to the body, but the midsection of the bird was picked at. This occurred at Smith Point County Park
- Unknown adult – Piping plover wing found outside the nest 10A enclosure at Smith Point County Park on 6/11/18. The female was observed nearby, but the male associated with that nest, GF (C2K), had not been observed since 6/1/18. Our best estimate of the cause of this mortality is feline predation. Avian predators often leave the carcass relatively intact except for sometimes the head is detached and the innards are picked at. Cats are more likely to play with their prey and thus parts could be detached.

Three of the mortalities were caused by an avian predator, possibly by the peregrine falcon that was observed on 6/11/18. OPWA-East is directly adjacent to Smith Point County Park, so it's expected these sites would have similar predator issues. Cats are suspected to be the cause of mortality for the unknown adult. Unfortunately cats may be a new threat on piping plover success at the Seashore; cat tracks were present throughout OPWA-East in 2018.

Red Foxes

Since observations from previous seasons implicated red fox as a threat to piping plover breeding and productivity success, Virginia Tech was funded through the Fire Island to Moriches Inlet (FIMI) interim project to research red foxes and their impacts on listed species (piping plovers) on Fire Island, from Democrat Point through Smith Point County Park. Their study is titled, "Red Fox (*Vulpes vulpes*) Movements, Habitat Selection, and Demography, on Fire Island, New York". It began in the summer of 2015 and continued through the fall of 2018. Information on the project can be accessed at: <http://vtshorebirds.fishwild.vt.edu/projects.html> and <https://irma.nps.gov/rprs/Permit/Profile/42421>

Mange – first detected east of the Old Inlet breach and throughout Smith Point County Park in the summer/fall/winter of 2015 – has continued to keep the red fox population relatively low in that area. Mange was first observed last summer (2017) in red foxes on the west end of Fire Island, near the Fire Island Lighthouse. However, red foxes were still observed on Lighthouse beach and Sailors Haven in 2018, and there was a known den north of the over washes (but south of Burma Road) at Lighthouse beach. FIIS staff and Virginia Tech researchers are continuing to follow and record the cycle of mange and its distribution.

Compliance document - update

The Addendum to the 1998's Environmental Assessment for Endangered Species Habitat Management (1998) was signed by the Superintendent on March 23, 2018. The 1998 EA has served the Seashore as the planning (and compliance) document for the management of T&ES, and focuses on several "focus species" which include the piping plover (*Charadrius melodus*), common tern (*Sterna hirundo*), least tern (*Sterna antillarum*), roseate tern (*Sterna dougallii*), seabeach amaranth (*Amaranthus pumilus*), seabeach knotweed (*Polygonum glaucum*), and northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). These species occupy similar habitats and habitat protection has been a critical management tool for the T&ES program.

Seashore staff reviewed the 1998 Environmental Assessment (EA) for Endangered Species Habitat Management. This was done to ensure accurate content and to evaluate whether the preferred alternative still described actions the Seashore currently takes, as part of Threatened and Endangered Species Habitat Management. This assessment was documented in the addendum. In addition, a discussion of climate change and sea level rise, as it relates to T&ES, is incorporated into this document to provide consistency amongst other Seashore planning documents and National Park Service (NPS) policies. Specifically, the 2016 Fire Island National Seashore General Management Plan (GMP) recommends the NPS to "update the Seashore's Threatened and Endangered Species Management Plan and include provisions to consider and address the potential effects of climate change and sea-level rise on T&E species" (GMP, page 54).

After reviewing the 1998 EA, it was determined that no new management actions or significant deviations exist in the current management practices of T&ES compared to the 1998 EA indicating that the document is still valid. A new PEPC project was created for this addendum (PEPC 79662) and attachments include:

- a. the 1998 EA for Endangered Species Habitat Management; PEPC 75218
- b. the 1998 protocol (Protocol for Graduated Beach Habitat Management),
- c. signed addendum to the 1998 EA (herein)
- d. an updated and official (signed by the Superintendent) standard operating procedure for the monitoring and management of endangered beach species

The other action that is not covered under the 1998 EA is predator removal, particularly for park resident individuals that are negatively impacting T&ES success. The 1998 EA focused on the management of habitat (upper beach, wash-overs, etc.) that support threatened and endangered beach species. Predators were and are becoming more of an issue at the Seashore, and an additional project with appropriate compliance is necessary to consider removal. A programmatic categorical exclusion was developed for native and non-native individuals – shown to be negatively impacting T&ES success (PEPC 78678). Attached to this PEPC statement is an updated and official (signed by the Superintendent) protocol for nuisance wildlife.

Bats

Bats have been experiencing precipitous declines during the past several years. White-Nose Syndrome (WNS) is an emerging disease that has killed more than 6 million bats since its discovery in 2007, reducing regional populations of some bat species by more than 90 percent. The northern long-eared bat (*Myotis septentrionalis*) was listed as federally threatened by the USFWS in April 2015.

Ries et al (2017) described bat research/monitoring projects FIIS has worked with researchers on during the past several years. In the summer of 2018, Virginia Tech researchers started a project at the William Floyd Estate. The goal of this project is to determine if the site supports a maternity colony of northern long-eared bats. It was funded through FY17 NPS White-Nose Syndrome funding, co-written by the FIIS Wildlife Biologist and Dr. Mark Ford, and titled, “*Northern long-eared bat mist-netting and acoustic surveys at Fire Island National Seashore.*” If a maternity colony is confirmed, additional funding will be requested.

The FIIS Wildlife Biologist continues to summarize data collected to date on the northern long-eared bat. The goal is to develop a long-term monitoring plan for northern long-eared bats and incorporate those efforts into the T&ES Monitoring Program effort. A summary of data collected to date will be available in a separate report in the near future, preferably a published NPS Natural Resource Report.

Management of T&ES data

Annual reports for T&ES are completed and all (since 2003) have been posted on the NPS Integrated Resource Management Applications (IRMA) Portal, which is accessible to the public at <https://irma.nps.gov/DataStore/>.

All data gathered for T&ES is inputted into Microsoft Excel spreadsheets, which are located on the network drive by year in the Natural Resource Management folder under ‘T&Especies’.

References

Cairns, W. 1982. *Biology and Behavior of Breeding Piping Plovers*. Wilson Bulletin 94(4): 531-545.

National Park Service. December 2016. *Fire Island National Seashore General Management Plan Environmental Impact Statement*.

Neuman K.K., Page G.W., Stenzel L.E., Warriner J.C. & Warriner J.S. 2004. *Effect of mammalian predator management on snowy plover breeding success*. Waterbirds 27: 257-263

NPS Integrated Resource Management Applications Portal. 2017. National Park Service. Accessed on 10/24/18 at: <https://irma.nps.gov/DataStore/>

Ries L. 2017. Threatened and Endangered Species Monitoring Program - 2017 Summary. Accessed on 9/24/19 at: <https://irma.nps.gov/DataStore/Reference/Profile/2247612>

Ries L. 2012. Threatened and Endangered Species Monitoring Program - 2012 Summary. Accessed on 9/24/19 at: <https://irma.nps.gov/DataStore/Reference/Profile/2190626>

Ries L. 2009. Threatened and Endangered Species Monitoring Program - 2009 Summary. Accessed on 9/24/19 at: <https://irma.nps.gov/DataStore/Reference/Profile/2190623>

Seabird Ecological Assessment Network (SEANET). 2018. Tufts Center for Conservation Medicine. Accessed on 10/24/18 at: <https://vet.tufts.edu/seanet/>

U.S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Technical/Agency Draft. Hadley, Massachusetts.

Appendix A: Tables and Figures

<u>Year</u>	<u>Breeding Pairs</u>	<u>Nest Attempts</u>	<u>Productive Pairs</u>	<u>Eggs Hatched</u>	<u>Hatchlings per Breeding Pair</u>	<u>Chicks Fledged</u>	<u>Chicks Fledged per Nest Attempt</u>	<u>Chicks Fledged per Pair</u>
1993	7	7	0	0	0	0	0	0
1994	3	4	0	0	0	0	0	0
1995	9	2	1	N/A ¹	N/A	2	1	0.2
1996	2	1	1	N/A	N/A	1	1	0.5
1997	1	1	0	0	0	0	0	0
1998	1	1	1	N/A	N/A	1	1	1
1999	3	2	2	N/A	N/A	5	2.5	1.7
2000	3	3	3	N/A	N/A	9	3	3
2001	4	4	4	N/A	N/A	11	2.8	2.8
2002	10	11	9	33	3.3	28	2.6	2.8
2003	20	22	15	64	3.2	35	1.6	1.8
2004	17	18	15	57	3.4	37	2.1	2.2
2005	17	20	14	54	3.2	40	2	2.4
2006	21	26	15	46	2.2	32	1.2	1.5
2007	25	35	11	45	1.8	18	0.5	0.7
2008	15	26	8	32	2.1	20	0.8	1.3
2009	19	24	9	53	2.8	13	0.5	0.7
2010	16	23	9	38	2.2	17	0.7	1.1
2011	14	16	10	38	2.7	21	1.3	1.9
2012	12	17	8	35	2.9	15	0.9	1.3
2013	11	13	3	35	3.2	7	0.5	0.6
2014	8	12	3	15	1.9	7	0.6	0.9
2015	3	5	2	6	2.0	5	1.0	1.7
2016	9	10	6	25	2.8	16	1.6	1.8
2017	11	14	7	37	3.4	17	1.2	1.5
2018	11	13	11	37	3.7	29	2.2	2.6
Average	10.5	12.7	6.4	32.5	2.3	14.8	1.3	1.4

¹Data from previous nesting seasons are incomplete

Table 1: Historic Productivity of Piping Plovers on FIIS

¹Data from previous nesting seasons are incomplete

Nest	Area	Status	Date found	Exclosed?	# of eggs laid	Actual hatch date	# of eggs hatched	# of chicks fledged	Est. fledge date (+25 days)
1A	Wilderness East (section 9)	FLEDGED	5/1/2018	Yes	4	6/2/2018	4	3	6/27/2018
2A	Wilderness East (section 9)	FLEDGED	5/2/2018	Yes	4	6/3/2018	4	4	6/28/2018
3A	Wilderness East (section 9)	FLEDGED	5/5/2018	Yes	4	6/7/2018	4	4	7/2/2018
4A	Wilderness East (section 8)	FLEDGED	5/8/2018	Yes	4	6/4/2018	4	3	6/29/2018
5A	Wilderness East (section 8)	FLEDGED	5/8/2018	Yes	4	6/11/2018	2	2	7/6/2018
6A	Wilderness East (section 8)	FLEDGED	5/8/2018	Yes	4	6/10/2018	4	2	7/5/2018
7A	Wilderness East (section 10)	Failed - Vandalized	5/15/2018	Yes	4	.	.	.	.
7B	Wilderness East (section 10)	FLEDGED	6/4/2018	Yes	4	7/5/2018	4	3	7/30/2018
8A	Wilderness East (section 9)	FLEDGED	5/15/2018	Yes	4	6/18/2018	4	4	7/13/2018
9A	Lighthouse Beach	Failed - Abandoned	5/31/2018	Yes	4	.	.	.	.
10A	Wilderness West (section 7)	FLEDGED	6/1/2018	Yes	4	6/25/2018	4	3	7/20/2018
11A	Wilderness East (section 8)	Failed - Overwashed	6/2/2018	No	1	.	.	.	.
11B	Wilderness East (section 8)	FLEDGED	6/8/2018	Yes	3	7/8/2018	3	1	8/2/2018

Table 2: FIIS 2018 Overall Piping Plover productivity

NPS Nest #	Fate	Female	Male	Chick1	Chick2	Chick3	Chick4	Chick1_fate	Chick2_fate	Chick3_fate	Chick4_fate
1A-18	HATCHED	GF(97)	GF(06)	GF(29A)	GF(YNK)	GF(50V)	GF(E48)	DIED	FLEDGED	FLEDGED	FLEDGED
2A-18	HATCHED	GF(2AN)	GF(PC1)	GF(E44)	GF(962)	GF(315)	GF(6ML)	FLEDGED	FLEDGED	FLEDGED	FLEDGED
3A-18	HATCHED	GF(HN8)	GF(LMT)	GF(92Y)	GF(2VX)	GF(125)	GF(945)	FLEDGED	FLEDGED	FLEDGED	FLEDGED
5A-18	HATCHED	GF(CU6)	GF(TEE)	GF(XH4)	GF(N61)	-	-	FLEDGED	FLEDGED	-	-
4A-18	HATCHED	GF(6UP)	GF(XY2)	GF(XHY)	GF(XA4)	GF(51T)	GF(8L7)	FLEDGED	FLEDGED	FLEDGED	DIED
6A-18	HATCHED	GF(JCY)	GF(PY3)	GF(3XY)	GF(CK2)	GF(560)	UNBANDED	FLEDGED	FLEDGED	DIED	DIED
7A-18	FAILED - HUMAN	GF(LAT)	GF(70E)	-	-	-	-	-	-	-	-
8A-18	HATCHED	GF(YTV)	GF(1EL)	GF(AX4)	GF(T3C)	GF(3L1)	GF(5JV)	FLEDGED	FLEDGED	FLEDGED	FLEDGED
11A-18	FAILED - WEATHER	UNKNOWN	UNKNOWN	-	-	-	-	-	-	-	-
7B-18	HATCHED	GF(LAT)	GF(70E)	GF(7EH)	GF(E28)	GF(NHX)	GF(YLC)	FLEDGED	FLEDGED	DIED	FLEDGED
11B-18	HATCHED	GF(2C0)	GF(PA6)	UNBANDED	UNBANDED	GF(8EH)	-	DIED	DIED	FLEDGED	-
9A-18	ABANDONED	UNBANDED	UNBANDED	-	-	-	-	-	-	-	-
10A-18	HATCHED	GF(NE5)	GF(0K8)	GF(5H9)	GF(MA2)	GF(1A2)	GF(VC1)	DIED	FLEDGED	FLEDGED	FLEDGED

Table 3: Piping Plover Banding Information for 2018 from Virginia Tech Study. GF = Green Flag. Please refer to Virginia Tech’s Annual 2018 Report for more information (when available can be found on NPS IRMA site).

Piping Plover Productivity: 2005-2018

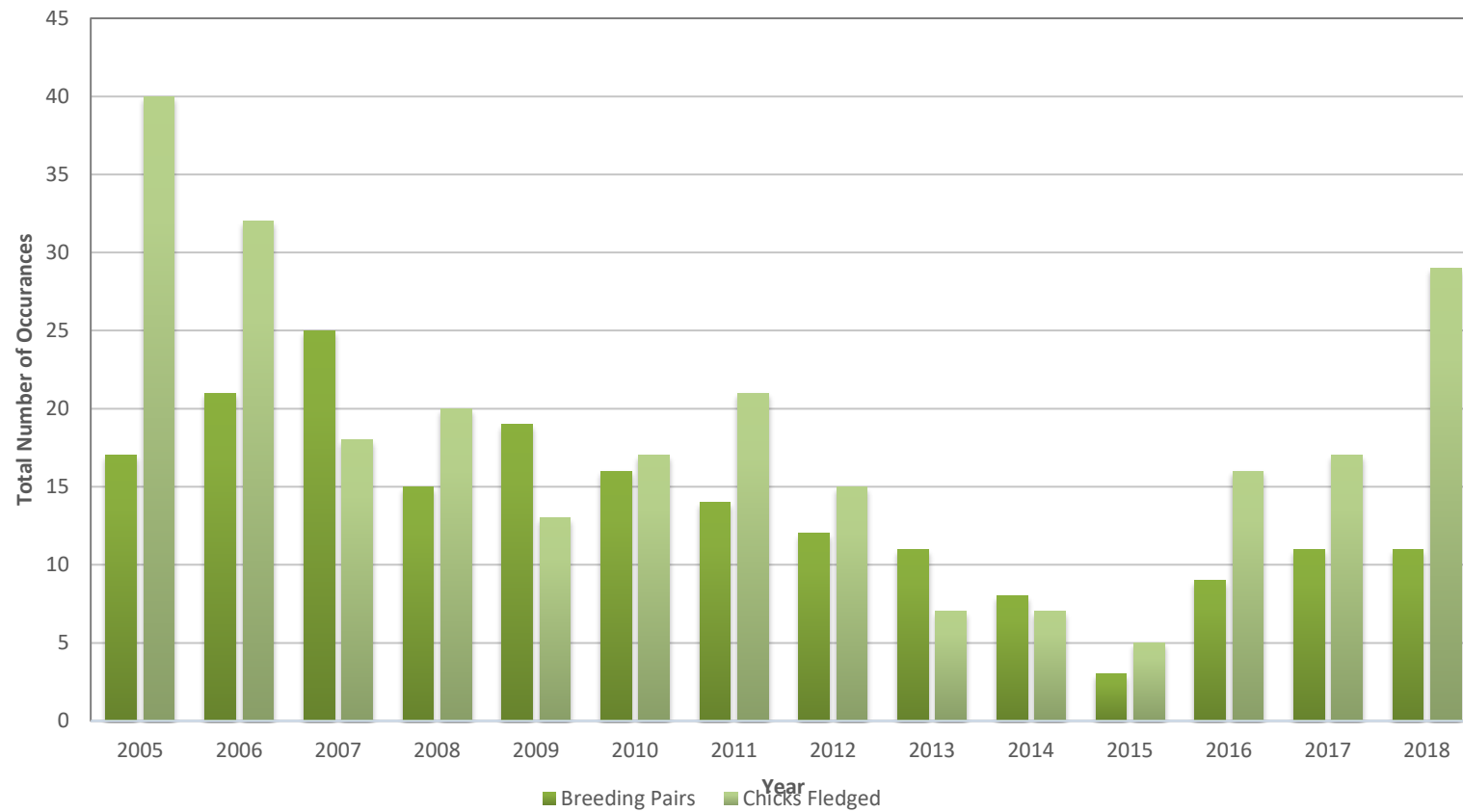


Figure 1: The number of Piping Plover breeding pairs and the number of chicks fledged at FIIS, 2005-2018

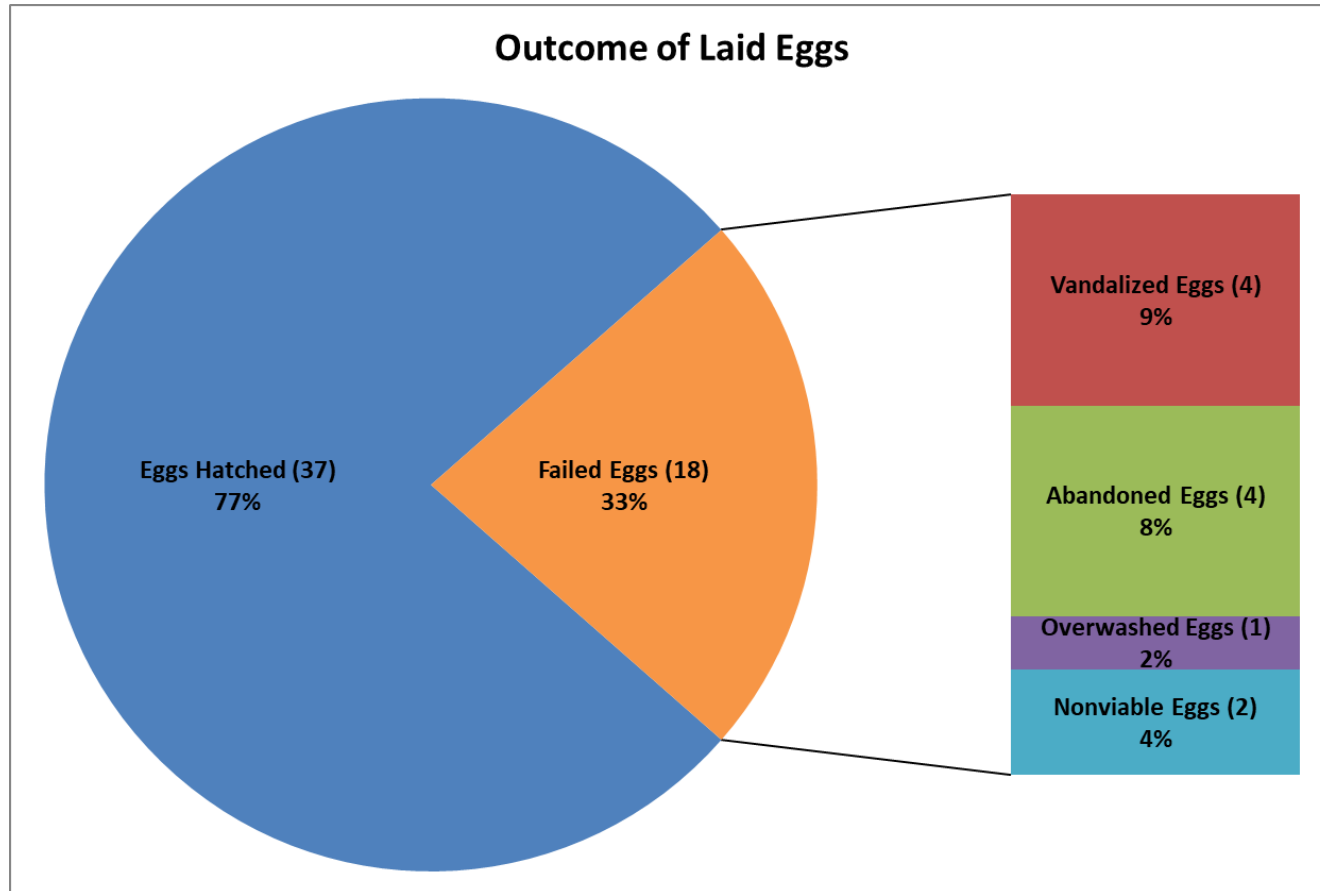


Figure 2: Pie graph displaying the outcome of all laid Piping Plover eggs at FIIS in 2018.

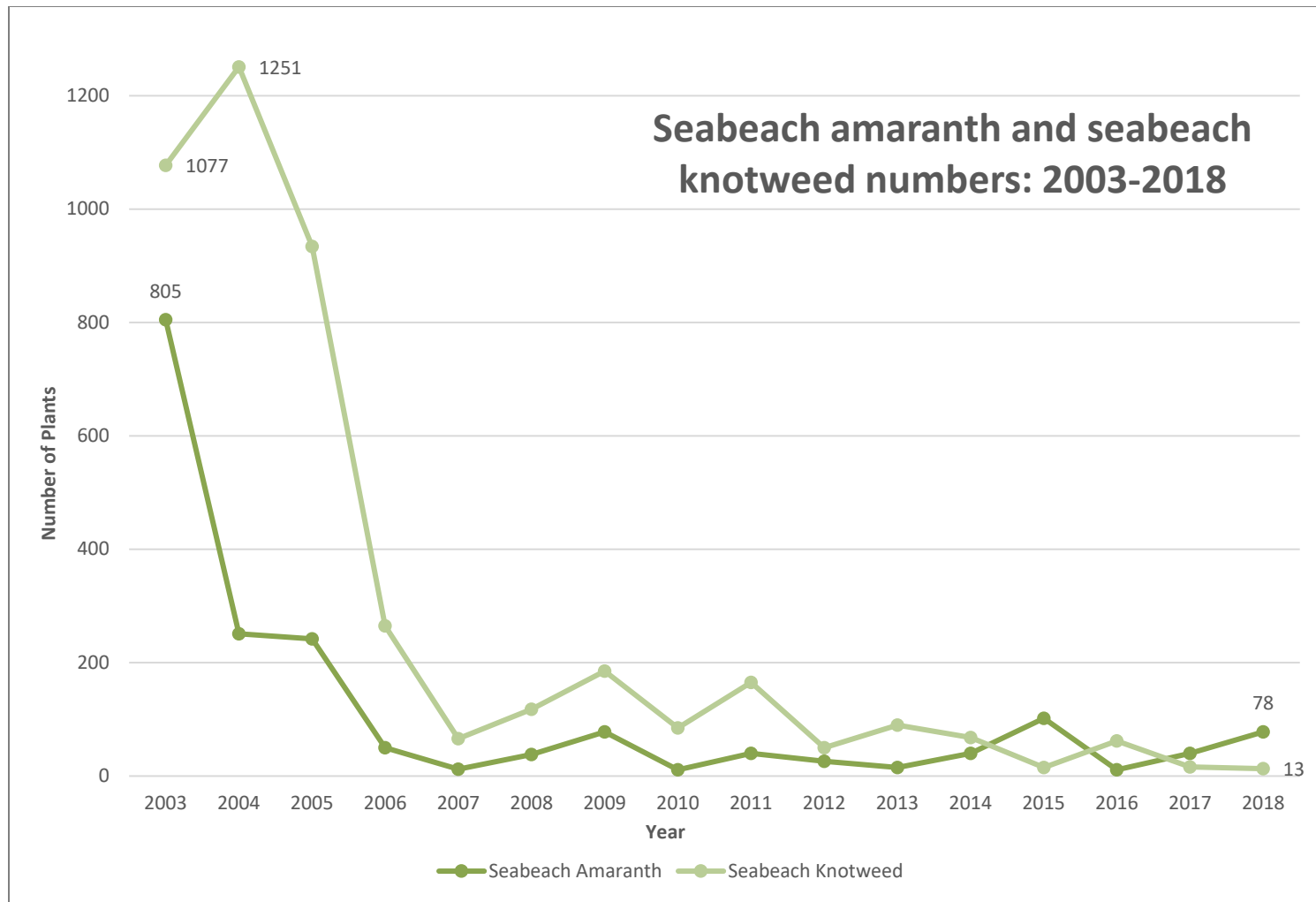


Figure 3: Chart displaying historical values for seabeach amaranth & seabeach knotweed on FIIS (2003-2018).

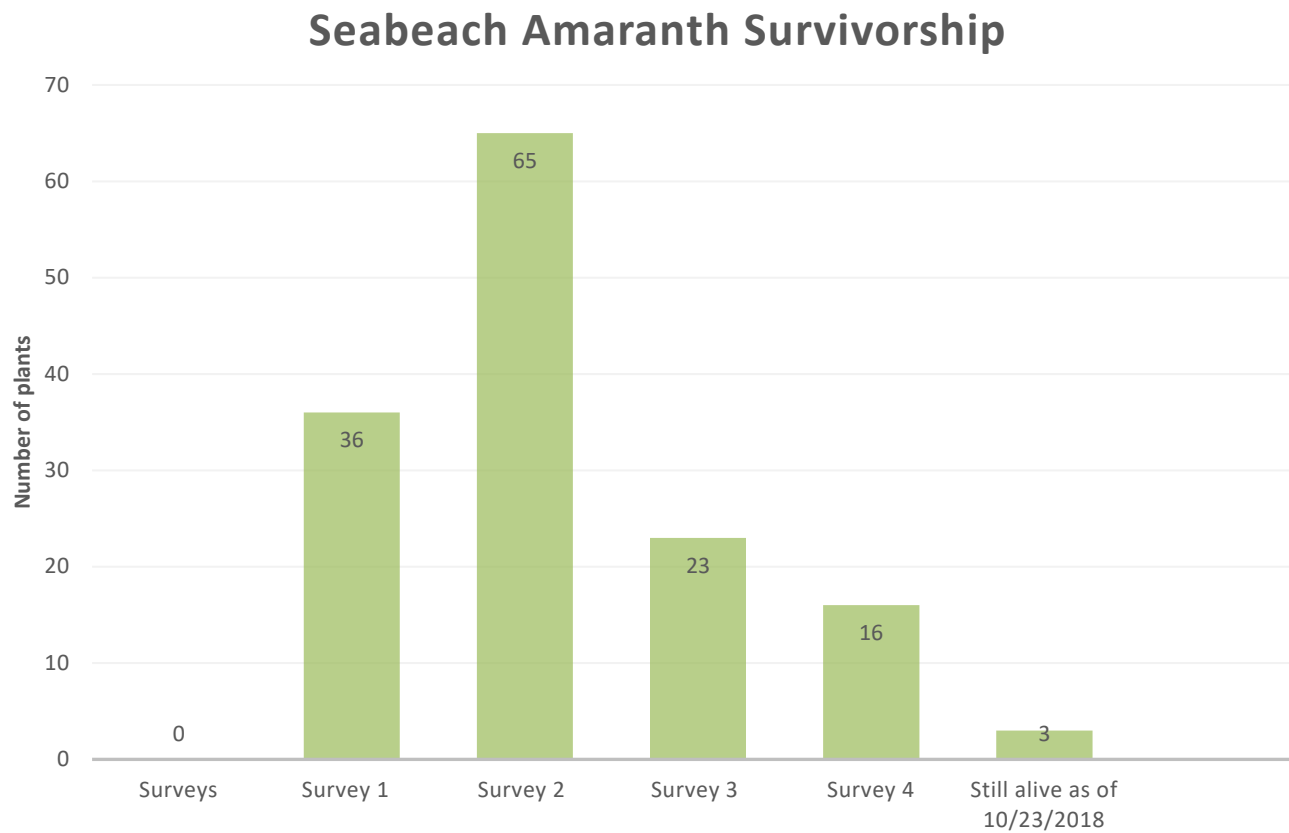


Figure 4: Bar graph demonstrating the survivorship of seabeach amaranth plants throughout the season.

Tern Survey Window	1st	2 nd	1st	2 nd	1st	2 nd
Site / Species	COTE		LETE		BLSK	
East Fire Island	35	260	-	-	-	-
Fire Island Pines	-	-	-	-	-	-
Fire Island Sunken Forest	-	-	-	-	-	-
Fire Island Villages	-	-	-	-	-	-
Hospital Island	-	-	-	-	-	-
John Boyle Island	-	-	-	-	-	-
Lighthouse	-	-	-	-	-	-
Long Cove	5	13	-	-	-	-
OPWA*	-	-	490	495	-	-
Pelican Island	-	-	-	-	-	-
Ridge Island	460	600	-	-	-	-
Sexton Island	-	NS	-	NS	-	NS
Watch Hill Bay	-	-	-	-	-	-
West Fire Island	-	-	-	-	-	-

Table 4: Long Island Colonial Waterbird Surveys for Terns and Black Skimmers in 2018. Sites are listed alphabetically are labeled as being bay islands or on Fire Island. Tern and black skimmer surveys are conducted twice in June. Species codes: COTE = Common Tern, LETE= Least Tern, BLSK = Black Skimmer (* = Davis Park included in Wilderness survey)

Appendix B: Maps

Maps are organized by Long Island Colonial Waterbird Survey areas and include piping plover nests, seabeach amaranth and seabeach knotweed individuals for each area.

Map 1: Map of Fire Island National Seashore



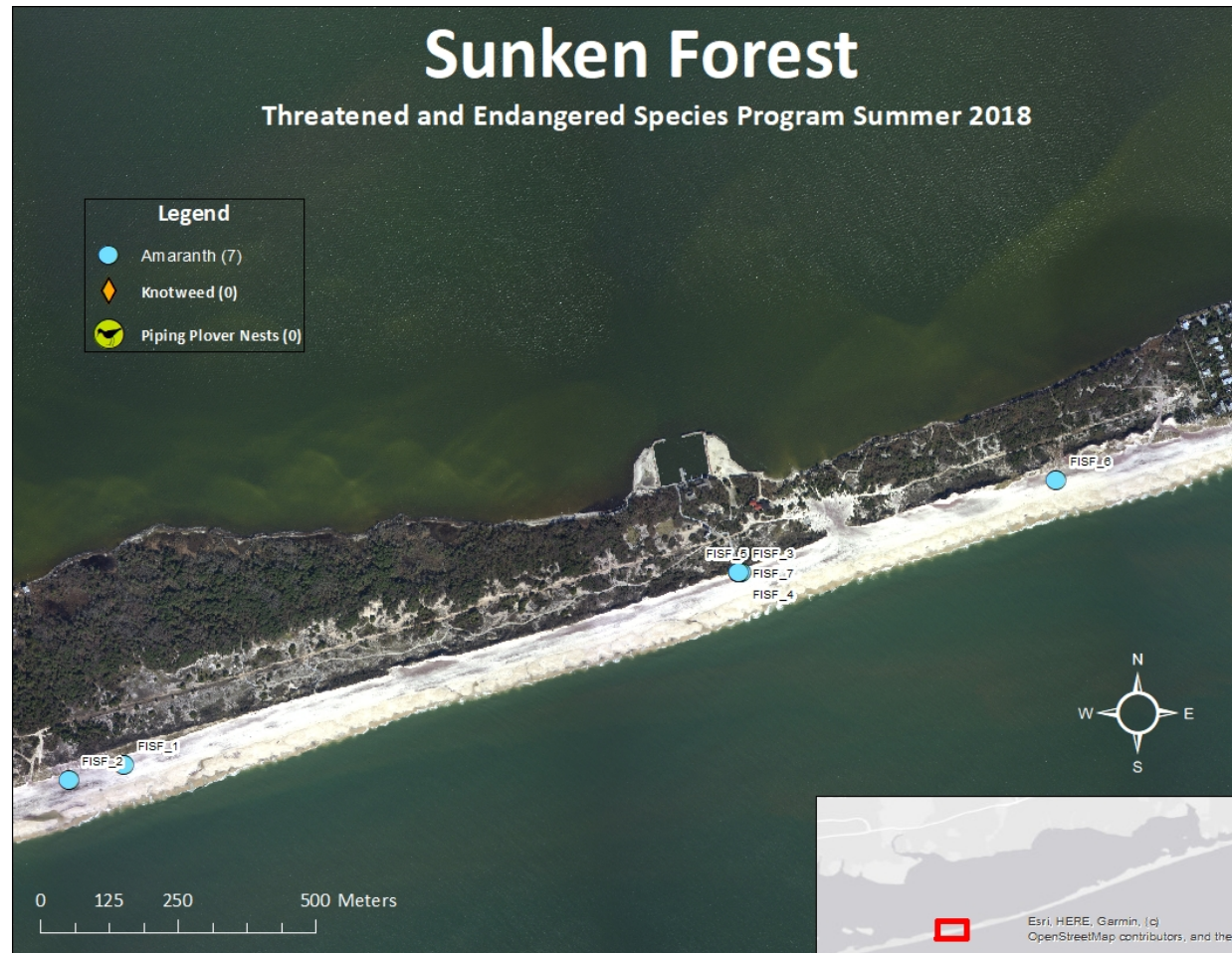
Map 2: Fire Island Lighthouse locations of threatened and endangered species in 2018.



Map 3: Fire Island Villages locations of threatened and endangered species in 2018.



Map 4: Fire Island Sunken Forest locations of threatened and endangered species in 2018.



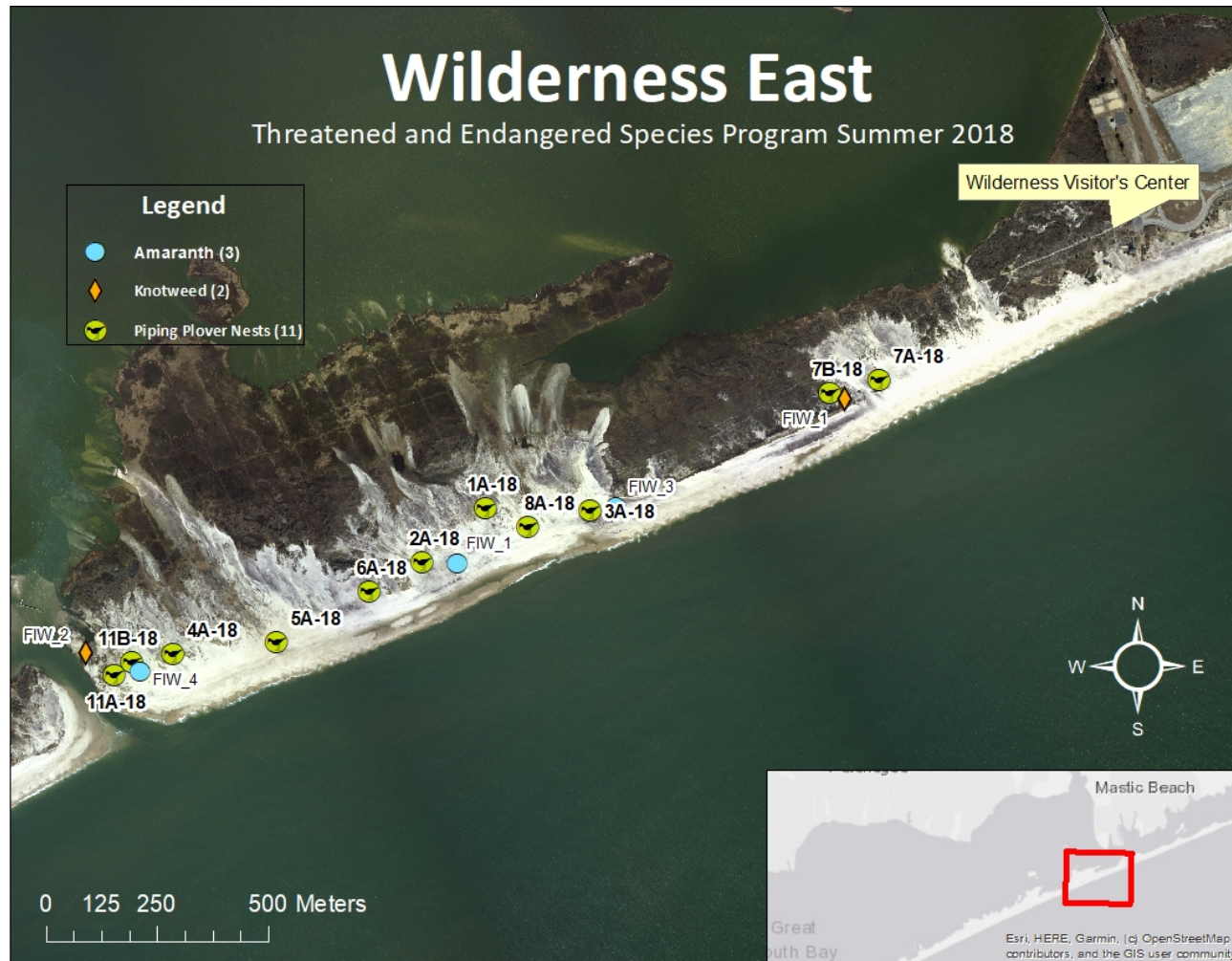
Map 5: Fire Island Pines locations of threatened and endangered species in 2018.



Map 6: Fire Island Wilderness (West) locations of threatened and endangered species in 2018.



Map 7: Fire Island Wilderness (East) locations of threatened and endangered species in 2018.



Appendix C: GPS locations

Piping Plover Nests

Nest	Species	Site Name	Location Description	UTMx	UTMy	Date found	Exclosed? (Y/N)	Date Exclosed	Hatch Date	Productivity
1A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 9)	678665	4510667	5/1/2018	Y	5/7/2018	6/2/2018	3
2A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 9)	678522	4510544	5/2/2018	Y	5/7/2018	6/3/2018	4
3A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 9)	678901	4510661	5/5/2018	Y	5/10/2018	6/7/2018	4
4A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 8)	677961	4510339	5/8/2018	Y	5/10/2018	6/4/2018	3
5A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 8)	678194	4510365	5/8/2018	Y	5/22/2018	6/11/2018	2
6A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 8)	678402	4510479	5/8/2018	Y	5/21/2018	6/10/2018	2
7A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 10)	679551	4510954	5/15/2018	Y	5/28/2018	.	0
7B-18	PIPL	Fire Island Wilderness	Wilderness East (Section 10)	679441	4510925	6/4/2018	Y	6/8/2019	7/5/2018	3
8A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 9)	678759	4510623	5/15/2018	Y	5/21/2018	6/18/2018	4
9A-18	PIPL	Fire Island Lighthouse	Lighthouse beach	651136	4499344	5/31/2018	Y	6/1/2018	.	0
10A-18	PIPL	Fire Island Wilderness	Wilderness West (Section 7)	676038	4509402	6/1/2018	Y	6/4/2018	6/25/2018	3
11A-18	PIPL	Fire Island Wilderness	Wilderness East (Section 8)	677829	4510292	6/2/2018	N	.	.	0
11B-18	PIPL	Fire Island Wilderness	Wilderness East (Section 8)	677869	4510321	6/8/2018	Y	6/11/2018	7/5/2018	1

Seabeach amaranth individuals

Object ID	Site Name (LICWS)	Date found	Date Dead/Gone	# of plants	max size (cm)	Evidence of Browsing (date(s)/none)	Reproductive (date(s)/none)	Exclosed? (Y/N)	Date Exclosed	UTM (x)	UTM (y)
FILH_5	Fire Island Lighthouse Beach	7/13/2018	8/17/2018	1	3.5	None	Non-reproductive	N	N/A	651633	4499467
FILH_14	Fire Island Lighthouse Beach	8/17/2018	10/26/2018	1	4	71%	Reproductive	N	N/A	651529	4499436
FILH_4	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	4.5	100%	Non-reproductive	N	N/A	651631	4499470
FILH_11	Fire Island Lighthouse Beach	7/13/2018	8/17/2018	1	5.0	None	Non-reproductive	N	N/A	651621	4499473
FILH_20	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	5.5	30%	Reproductive	N	N/A	650686	4499199
FILH_10	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	6.0	90%	Non-reproductive	N	N/A	651624	4499473
FILH_8	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	6.0	25%	Reproductive	N	N/A	651647	4499474
FILH_15	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	7	None	Non-reproductive	N	N/A	651506	4499421
FILH_3	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	7.0	75%	Non-reproductive	N	N/A	651627	4499465
FILH_18	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	7.5	None	Reproductive	N	N/A	651172	4499349
FILH_19	Fire Island Lighthouse Beach	8/17/2018	10/26/2018	1	9	None	Non-reproductive	N	N/A	650695	4499205
FILH_7	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	9.0	100%	Non-reproductive	N	N/A	651644	4499474
FILH_2	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	10.0	25%	Reproductive	N	N/A	651625	4499465
FILH_9	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	10.5	75%	Reproductive	N	N/A	651624	4499473
FILH_6	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	11.0	75%	Reproductive	N	N/A	651638	4499466
FILH_17	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	12	None	Reproductive	N	N/A	651175	4499350
FILH_16	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	13	None	Reproductive	N	N/A	651500	4499420
FILH_1	Fire Island Lighthouse Beach	7/13/2018	9/19/2018	1	13.5	30%	Non-reproductive	N	N/A	651611	4499471
FILH_13	Fire Island Lighthouse Beach	8/17/2018	10/26/2018	1	14.5	None	Non-reproductive	N	N/A	651557	4499454
FILH_12	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	18	50%	Non-reproductive	N	N/A	651611	4499470
FILH_21	Fire Island Lighthouse Beach	8/17/2018	9/19/2018	1	21	None	Reproductive	N	N/A	650647	4499197
FIP_13	Fire Island Pines	7/12/2018	8/14/2018	1	3.0	None	Non-reproductive	N	N/A	661685	4502656
FIP_16	Fire Island Pines	7/16/2018	8/9/2018	1	3.0	None	Non-reproductive	N	N/A	661975	4502750
FIP_30	Fire Island Pines	8/9/2018	9/19/2018	1	3.0	None	Non-reproductive	N	N/A	661244	4502520
FIP_10	Fire Island Pines	7/12/2018	8/9/2018	1	3.5	None	Non-reproductive	N	N/A	661622	4502634
FIP_2	Fire Island Pines	7/12/2018	8/14/2018	1	3.5	None	Non-reproductive	N	N/A	664274	4503568
FIP_29	Fire Island Pines	8/9/2018	9/19/2018	1	3.5	None	Non-reproductive	N	N/A	661246	4502517
FIP_11	Fire Island Pines	7/12/2018	8/9/2018	1	4.0	None	Non-reproductive	N	N/A	661570	4502617
FIP_24	Fire Island Pines	8/9/2018	9/19/2018	1	4.0	None	Non-reproductive	N	N/A	661732	4502671
FIP_3	Fire Island Pines	7/12/2018	10/23/2018	1	4.0	None	Non-reproductive	N	N/A	664228	4503549
FIP_12	Fire Island Pines	7/12/2018	8/9/2018	1	4.5	None	Non-reproductive	N	N/A	661291	4502530
FIP_28	Fire Island Pines	8/9/2018	9/19/2018	1	5.0	None	Non-reproductive	N	N/A	661283	4502538
FIP_25	Fire Island Pines	8/9/2018	9/19/2018	1	6.5	None	Non-reproductive	N	N/A	661559	4502613
FIP_22	Fire Island Pines	8/9/2018	8/14/2018	1	7.0	None	Non-reproductive	N	N/A	661985	4502760
FIP_7	Fire Island Pines	7/12/2018	9/19/2018	1	8.5	None	Non-reproductive	N	N/A	661955	4502745
FIP_15	Fire Island Pines	7/16/2018	9/19/2018	1	9.5	None	Non-reproductive	N	N/A	661960	4502748
FIP_6	Fire Island Pines	7/12/2018	8/9/2018	1	9.5	None	Non-reproductive	N	N/A	661959	4502751
FIP_17	Fire Island Pines	8/9/2018	10/23/2018	1	10.0	None	Non-reproductive	N	N/A	664315	4503582
FIP_8	Fire Island Pines	7/12/2018	9/19/2018	1	10.0	None	Non-reproductive	N	N/A	661855	4502718
FIP_9	Fire Island Pines	7/12/2018	9/19/2018	1	10.0	None	Non-reproductive	N	N/A	661665	4502646
FIP_26	Fire Island Pines	8/9/2018	9/19/2018	1	10.5	None	Reproductive	N	N/A	661317	4502543
FIP_20	Fire Island Pines	8/9/2018	9/19/2018	1	11.0	None	Non-reproductive	N	N/A	662068	4502790
FIP_4	Fire Island Pines	7/12/2018	8/9/2018	1	11.0	None	Non-reproductive	N	N/A	661981	4502759
FIP_1	Fire Island Pines	7/12/2018	9/19/2018	1	11.5	67%	Non-reproductive	N	N/A	664443	4503634
FIP_19	Fire Island Pines	8/9/2018	9/19/2018	1	13.0	None	Non-reproductive	N	N/A	664165	4503522
FIP_21	Fire Island Pines	8/9/2018	10/23/2018	1	14.0	None	Non-reproductive	N	N/A	661987	4502760
FIP_18	Fire Island Pines	8/9/2018	9/19/2018	1	15.0	None	Non-reproductive	N	N/A	664165	4503522
FIP_5	Fire Island Pines	7/12/2018	10/23/2018	1	15.5	None	Non-reproductive	N	N/A	661969	4502753
FIP_14	Fire Island Pines	7/12/2018	9/19/2018	1	20.0	None	Non-reproductive	N	N/A	661874	4502721
FIP_23	Fire Island Pines	8/9/2018	9/19/2018	1	20.0	None	Non-reproductive	N	N/A	661736	4502672
FIP_27	Fire Island Pines	8/9/2018	9/19/2018	1	25.0	None	Non-reproductive	N	N/A	661312	4502534
FIP_31	Fire Island Pines	8/9/2018	9/19/2018	1	30.0	None	Non-reproductive	N	N/A	664928	4503825
FISF_6	Fire Island Sunken Forest	7/12/2018	8/14/2018	1	4.0	None	Non-reproductive	Y	7/12/2018	660909	4502424
FISF_1	Fire Island Sunken Forest	7/12/2018	9/19/2018	1	6.0	90%	Non-reproductive	N	N/A	659218	4501907
FISF_2	Fire Island Sunken Forest	7/12/2018	8/14/2018	1	8.0	None	Non-reproductive	N	N/A	659117	4501880
FISF_4	Fire Island Sunken Forest	7/12/2018	10/23/2018	1	48.0	None	Non-reproductive	Y	2017	660333	4502257
FISF_7	Fire Island Sunken Forest	8/14/2018	still alive as of 10/23	1	48.0	None	Non-reproductive	N	N/A	660333	4502257
FISF_5	Fire Island Sunken Forest	7/12/2018	still alive as of 10/23	1	50.0	None	Reproductive	Y	2017	660337	4502257
FISF_3	Fire Island Sunken Forest	7/12/2018	still alive as of 10/23	1	54.0	None	Reproductive	Y	2017	660333	4502257
POW_1	Fire Island Villages	8/9/2018	10/26/2018	1	9	None	Reproductive	N	N/A	657431	4501323
POW_2	Fire Island Villages	8/9/2018	10/26/2018	1	9	None	Non-reproductive	N	N/A	657429	4501324
FIV_6	Fire Island Villages	8/9/2018	9/19/2018	1	13.0	90%	Non-reproductive	N	N/A	658173	4501577
FIV_2	Fire Island Villages	8/9/2018	8/14/2018	1	14.5	38%	Non-reproductive	N	N/A	658763	4501760
POW_3	Fire Island Villages	8/9/2018	9/19/2018	1	15.5	None	Reproductive	N	N/A	657426	4501323
POW_7	Fire Island Villages	8/9/2018	10/26/2018	1	16	None	Reproductive	N	N/A	657412	4501318
FIV_9	Fire Island Villages	8/9/2018	10/26/2018	1	16.5	None	Non-reproductive	Y	N/A	655024	4500617
FIV_3	Fire Island Villages	8/9/2018	10/23/2018	1	17.0	73%	Non-reproductive	Y	8/14/2018	658737	4501751
FIV_7	Fire Island Villages	8/9/2018	9/19/2018	1	19.0	47%	Non-reproductive	N	N/A	658170	4501576
POW_6	Fire Island Villages	8/9/2018	10/26/2018	1	20	None	Reproductive	N	N/A	657411	4501316
FIV_8	Fire Island Villages	8/9/2018	10/23/2018	1	21.0	79%	Non-reproductive	N	N/A	658075	4501541
FIV_4	Fire Island Villages	8/9/2018	9/19/2018	1	22.0	90%	Non-reproductive	N	N/A	658186	4501582
FIV_1	Fire Island Villages	7/17/2018	10/23/2018	1	28.0	None	Reproductive	Y	7/17/2018	657569	4501353
POW_4	Fire Island Villages	8/9/2018	10/26/2018	1	32	None	Reproductive	N	N/A	657424	4501323
FIV_5	Fire Island Villages	8/9/2018	9/19/2018	1	47.0	30%	Reproductive	N	N/A	658185	4501582
FIW_2	Fire Island Wilderness	7/11/2018	8/16/2018	1	6.6	None	Non-reproductive	N	N/A	676044	4509408
FIW_1	Fire Island Wilderness	7/13/2018	9/20/2018	1	8.5	None	Non-reproductive	N	N/A	678602	4510543
FIW_4	Fire Island Wilderness	8/8/2018	9/20/2018	1	11.5	None	Non-reproductive	N	N/A	677886	4510300
FIW_3	Fire Island Wilderness	8/8/2018	9/20/2018	1	14.0	None	Non-reproductive	N	N/A	678959	4510669
				78							

Seabeach knotweed individuals

Knotweed ID (FID)	Site Name (LICWS)	Location Description	Size (cm)	Date	UTMs (x)	UTMs (y)	# of plants	Reproductive status
FIP_1	Fire Island Pines	In the Pines next to SBA FIP_2	21	7/12/2018	664273	4503566	1	Flowering
FIP_2	Fire Island Pines	Next to SBA FIP_4	8	7/12/2018	661981	4502760	1	Non-reproductive
FIP_3	Fire Island Pines	Next to SBA FIP_4	13	7/12/2018	661981	4502758	1	Flowering
FIW_1	Fire Island Wilderness	Eastern wilderness, section 10 east of 1A enclosure	13	7/13/2018	679475	4510914	1	Flowering
FIW_2	Fire Island Wilderness	Section 9 at the breach close to the bay side	6	7/13/2018	677766	4510342	1	Flowering
FILH_1	Fire Island Lighthouse	East of the Lighthouse path	6	7/13/2018	650890	4499267	1	Flowering
FILH_2	Fire Island Lighthouse	East of the Lighthouse path	20	7/13/2018	650890	4499267	1	Flowering
FILH_3	Fire Island Lighthouse	East of the Lighthouse path	17	7/13/2018	650890	4499267	1	Flowering
FILH_4	Fire Island Lighthouse	West of Kismet cut	5	7/13/2018	651626	4499470	1	Flowering
FIV_1	Fire Island Villages	NPS land, west of Robbins Rest	12	7/17/2018	655162	4500651	1	Flowering
FIV_2	Fire Island Villages	NPS land, west of Robbins Rest	28	7/17/2018	655152	4500649	1	Flowering
FIV_3	Fire Island Villages	NPS land, west of Robbins Rest	16	7/17/2018	655042	4500638	1	Flowering
FIV_4	Fire Island Villages	NPS land, west of Robbins Rest	20	7/17/2018	655041	4500638	1	Flowering
							13	

Appendix D: Photos



Image 1: Carcass of male from nest 4A, GF (XY2). Found on 6/17/18 and based on the remains, researchers proposed that this adult was depredated by an avian predator.