

Seabeach Amaranth (*Amaranthus pumilus*) at Rockaway Beach

Queens, NY

Monitoring and Conservation Report
2018

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NYC Parks

City of New York
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1. Introduction

Seabeach amaranth (*Amaranthus pumilus*) is an annual herbaceous plant with reddish-colored, prostrate stems and fleshy, rounded dark green leaves (Figure 1). It is an important plant species for sand dune creation; one large plant can create a mini dune of up to 2-3 cubic meters (USFWS 1993). Eliminated from two-thirds of its historic range, it was federally listed as a threatened species in 1993. Threats to the plant include development (e.g., home construction, beach stabilization efforts), increase in salt water inundation from sea level rise, and heavy recreational use (e.g., beach raking and vehicular traffic).



Figure 1. Seabeach amaranth.

Seabeach amaranth is endemic to the Atlantic coastal plain from Massachusetts to South Carolina. Within New York City, it is found at Breezy Point, Jacob Riis Park, and Rockaway Beach in Queens. Colonizing from the high tide line to edge of the foredune, the plant prefers a large range in dynamic areas with low competition from other plant species. Because it is an annual species, its populations fluctuate in size and location annually due to influence of wind, waves and storms. Germination occurs in June and July, and seeds mature in August and September. This species is difficult to protect due to its annual life cycle and the dynamic nature of its habitat (Center for Plant Conservation, 2012). While seabeach amaranth is a fecund seed producer, it relies on seed banks and prolific dispersal to maintain populations when growing conditions fluctuate from year to year (Lea & King, 2002). Thus, protection of the plant's ability to disperse its seed is the most effective conservation tool on site.

As seabeach amaranth is a federally listed threatened species, NYC Parks is required to conduct annual surveys of the total number of plants, average size (an indicator of plant vigor), and current threats on our property, Rockaway Beach, and report these results to the regional office of the U.S. Fish and Wildlife Service. Past monitoring efforts involved counts and mapping of every individual plant. During the 2018 season, the monitoring protocol was revised to more efficiently capture a larger population. Additionally, protection measures were augmented with the use of caged enclosures and expansion of pre-existing fencing areas when necessary in order to increase the numbers and distribution of seabeach amaranth.

This report summarizes monitoring and conservation efforts of seabeach amaranth on Rockaway Beach in 2018 and provides a look back at historic changes in the seabeach amaranth population and monitoring program.



2. Site Background

2.1 Site Location

Since 1996, when the Rockaway Beach Endangered Species Nesting Area (RBESNA) was established in response to the discovery of endangered Piping Plovers¹ nesting in the Far Rockaway section of the Rockaway Peninsula, NYC Parks has been managing the area, which spans from Beach 9 Street to Beach 149 Street on the south side of the Rockaway peninsula (NYC Parks UPR 2012). These 6.5 miles of coastline are split into three continuous management areas: **Far Rockaway** (Beach 9th Street-Beach 35th Street), **Arverne by the Sea** (Beach 35th Street-Beach 73 Street) and **Rockaway Beach** (Beach 73rd Street-Beach 149th Street) (see Figure 2).



Figure 2. Seabeach amaranth habitat. Rockaway, NY.

¹ Bird common names are capitalized according to the American Ornithological Society.

2.2 Site History

Historically, seabeach amaranth has been documented growing in two of the three management areas with the densest part of the population occurring in the primary RBESNA bird nesting site (Beach 38th Street-Beach 57th Street), where it takes advantage of symbolic fencing protection (i.e., temporary fencing to indicate the boundaries of protected habitat). The protected area also provides a safe haven to other threatened and of-concern species such as American Oystercatchers (*Haematopus palliatus*), Black Skimmers (*Rynchops niger*), Common Terns (*Sterna hirundo*), Least Terns (*Sternula antillarum*) and Piping Plovers (*Charadrius melodus*) - a threatened, federally-protected shorebird. This main growing area is 2.89 km (1.80 mi) in perimeter length and 0.145 km² (0.056 mi²) in area. Outlying individuals and clusters of seabeach amaranth in Far Rockaways (Beach 19th-Beach 32nd Streets) and Rockaway Beach (Beach 60th- 62nd Streets) tend to occur in or near nesting areas fenced off for Piping Plovers. It takes advantage of these protected nesting areas where recreational activities and beach raking are restricted (Figure 2). These areas are generally small (between 25 m²-1453 m²) and initially tailored to the 50m buffer protection requirements for Piping Plover nests. Based on current and historical surveys, outlying populations occur at Beach 17th-Beach 32nd Sts., Beach 37th-Beach 38th Sts., and Beach 62nd-Beach 65th Sts.

2.3 Conservation Efforts

Distinct conservation and monitoring efforts are utilized in the separate growing areas (Far Rockaway, Arverne by the Sea, and Rockaway Beach), due to the differences in access, use and growing patterns. Every year, at the end of March, staff of the NYC Parks Wildlife Unit-Plover Staff (WU) and Forestry, Horticulture, and Natural Resources (FHNR) erect symbolic fencing around the primary bird nesting site, in preparation for the arrival of Piping Plovers (*Charadrius melodus*), a threatened, federally-protected shorebird. The fencing, comprised of t-posts, twine and flagging, is a temporary fence implemented to deter beachgoers from entering the protected areas.

The main population of seabeach amaranth in the Rockaways benefits from this protection afforded to nesting shorebirds since it is protected against beach raking, as well as vehicular and pedestrian traffic. In order to allow this population to complete its life cycle and fully disperse seed, conservation efforts were changed in 2016 for the fencing to remain in place until the end of the plants' life cycle in December. In 2018, due to a large number of plants growing outside of the fencing (near wrackline), the southern border of the main enclosure was extended more towards the water line.

Outlying clusters and individuals are demarcated with flags and informative signage is installed in proximity by WU. In 2017, FHNR incorporated wire mesh cages (exclosures) as a form of protection for individual plants from vehicular and pedestrian traffic (Figure 3) if there are fewer than 10 individuals in a concentrated area.



Figure 3. Seabeach amaranth with exclosure protection in Rockaway, NY.



3. Monitoring Methods

3.1 Frequency

FHNR started surveying seabeach amaranth annually in the Rockaways in 2011. After the plants emerge, initial delineation surveys are conducted around the timing of Piping Plover nesting events (mid-July to early August) by WU (and previously by the NYC Parks Urban Park Rangers). This initial sweep count identifies the general extent and clustering, as well as a rough tally, of the main population (Beach 38th-Beach 57th Sts.) and the outlying individuals and clusters. As preparation for a complete census, it provides a valuable, baseline delineation that is helpful in accounting for and managing the staggered emergence of the species.

After the initial delineation surveys are complete, FHNR staff conducts an official census utilizing sweep counts and assesses overall plant size by developing circular plots in the main population ~~to~~ (FHNR, 2018). Plants in the main population can occur in the wrackline (southern proximity of the symbolic fence), the foredune (front of site) or backdune (back of site) areas.

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In 2018, completion of the census was delayed due to asynchronous hatching of the Black Skimmer population. NRG staff completed the survey in September (approximately mid-month), after fledging was complete. The restricted habitat of the outlying individuals and clusters require monitoring efforts that are slightly different than those of the main population. In these areas, FHNR staff conducts a full census and obtains measurements of every individual in any given enclosure, if the estimated count is less 100. If plant numbers are greater than 100 in any given enclosure, a sweep count/circular plot method, explained below, is used to measure the vigor of the population (plant size in cm).

3.2 Plot Locations

Main population

In order to identify the extent of the main population, clusters of plants were delineated with flagging (e.g. the wrackline, foredune or backdune areas). Sweep counts were then conducted in order to locate as many plants as possible. The beach was divided into 10 m wide sections in which surveyors walked in a line from wrack to dune with tally counters for a span of 1 block length (e.g., Beach 56th-55th Sts.). When a plant was encountered, it was tallied then marked by drawing a circle in the sand around it to indicate that it was counted. To avoid redundant counting, there was clear communication about individual plants that were discovered on the division between two survey areas and a line was drawn in the sand every few meters to indicate the dividing line.

Monitoring plots were set up to assess plant vigor (i.e., average width of plants). One circular plot was developed per block length. Circular plots were 30 meters in diameter and used in densely populated areas with greater than 50 plants. If there were fewer than 50 plants, all plants were measured. The plot center was chosen randomly by throwing a ruler over one's shoulder into a fairly populated area and the point was flagged. A 30 m measure was used to



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mark the circumference of the circular plot and the boundary was flagged using a different colored flag than those used for the sweep count delineation boundaries. Inside each plot, a survey was conducted to identify any plants that may have been missed in the sweep count. Each plant was flagged in the circular plot (with a third color), measured (cm) and any new plants found in the circular plot were added to the tally total for that block length. Lastly, a Trimble Geo7x GPS unit was used to record the plot center point and all flags were removed.

Outlying populations

All individual plants were counted and measured. If a fenced area contained greater than 100 individuals, all individuals were tallied by a sweep count and the circular plot method was used to assess plant vigor.

3.3 Parameters

Plant Data

The total number of plants and the plant vigor (i.e., average width of plants) were collected using the methods mentioned in the previous section.

Spatial Data

Individual points were taken of stand-alone outlying individuals (not clusters) and of circular plot centers. Polygons were created for clusters and large swaths of plants (main site and outliers). Polygons were used for the determination of cluster size and to represent symbolic fencing.

Data Management and Reporting

All data was compiled into an Excel document that is organized by the total number of plants counted during the sweep counts and an average size of plants in each monitoring plot. The total number of plants, counting method, plant vigor and current threats were reported to the regional office United States Fish and Wildlife Service by September, as is done on an annual basis (see Appendix).

4. Results and Discussion

4.1 Population Trends (1990-2018)

Based on two decades of monitoring, seabeach amaranth population sizes in the Rockaways have fluctuated widely (Figure 4). Since the annual plant largely colonizes in dynamic areas, the constant influence of changing wind, waves, storms and certain types of development and/or replenishment are big factors in the magnitude of a seedling emergence year to year. Superstorm Sandy in 2012 led to reconstruction of the boardwalk and construction of new dune system that was completed in 2016. After construction finished, the next 2017 season experienced a population boom of close to 5,000 individuals. One hypothesis is that construction activities, including the movement of sand, and the natural seed bank may have led to the expansion of the population.

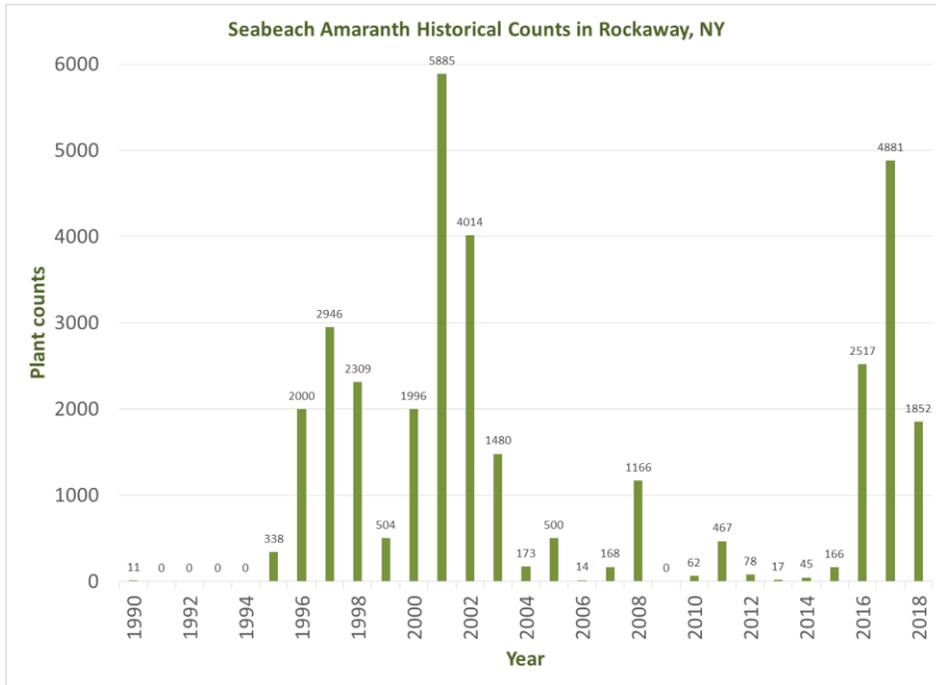


Figure 4. Seabeach amaranth counts from 1990 to 2018. Data from 1990-2010 were compiled from data received from NY Natural Heritage Program. Data from 2011 onwards were collected by NYC Parks.

4.2 2018 Findings

In 2018, 1,222 plants were censused in the sweep counts and 640 were counted and measured in monitoring plots for a total of 1,862. There were 1,102 plants in the main bird-nesting habitat (Beach 38th – Beach 57th Sts.) and 760 outlying individual plants. In these outlying sites, cage enclosures were installed around 24 plants with the remainder protected with existent fencing, which was originally erected for Piping Plover nest protection. Approval of the borough administrator to keep the fencing in place post-bird nesting season allowed FHNR staff to adequately manage and conserve all individuals and clusters. Every year, there is some vandalism of plants or enclosures. In the Beach 60s population, which is a surfing beach, three enclosed individuals were vandalized and subsequently killed by sand, which was dumped on top of them. Overall, most individuals successfully completed their lifecycle due to protective efforts. The last remaining outlying individual lasted until November 29, 2018.



5. Conclusion and Recommendations

Movement of sand, along with the seed source, is required for the sustainability of this annual species. Large storm events, combined with associated beach nourishment projects, maximize the amount of disturbance in this dynamic landscape. After Superstorm Sandy, the construction of a large dune system and the Rockaway boardwalk began in 2016. Data and observations collected afterwards reflect an increase in the numbers of seabeach amaranth plants and an associated expansion of the population uncharacteristically northward, extending beyond the foredune, all the way past the southern edge of the boardwalk within the sand fencing (landscaped gardens). These observations suggest that the sand movement and replenishment, associated with the storm event and following construction, may have been the mechanisms through which seed dispersal was augmented, subsequently increasing the numbers and distribution range of the seabeach amaranth population. Additionally, we hypothesize that there is a correlation between population fluctuations and on-going beach nourishment projects of the Rockaway beaches. We hope to compile existing data on seabeach amaranth population fluctuations and the timing of beach nourishments projects, storm events, and construction to determine if this analysis is possible or if more data are required.

We recommend continued annual monitoring especially during beach nourishment projects, dune and other coastal storm protection construction (e.g., U.S. Army Corp Rockaway Berm Construction Project). Continued use of symbolic fencing, exclosures for outlying individuals (when feasible), and signage will remain an effective way to demarcate the plant population extent in order to heighten awareness and understanding by the public and NYC Parks Enforcement Patrol and NYC Parks Maintenance and Operations.

6. Acknowledgements

We would like to thank the Plover Monitoring Team of the NYC Parks Wildlife Unit for helping to collect a large amount of data while tasked with their main commitment to the shorebird nesting season. Also, we are grateful for the valuable input of Brady Simmons, Patrick Over, Becca Carden and Michael Hsu for their role in data collection and logistical support.

7. References

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8. Appendix

8.1 2018 Report Submitted to U.S. Fish and Wildlife Service

***Amaranthus pumilus*, Seabeach amaranth
Survey Report 2018**

Site Name: Rockaway Beach

Town: Queens, NY

Date(s) of Survey: 8/8/2018 to 9/3/2017

Organization undertaking survey: NYC Department of Parks and Recreation

Data Collector(s): Carla Garcia, Heather Liliengren, Rebecca Carden, Michael Hsu, Patrick Over

Contact numbers or email: carla.garcia@parks.nyc.gov

Weather Conditions: sunny, windy

Directions to Site: South of Edgemere Ave. at Beach 45th Street

East boundary of count Beach 20th Street

West boundary of count Beach 62nd Street

Present (Y/N) Yes Number of Plants (if counted) 1,862

Counting Method: each plant flagged and counted sweep count general estimate

Plant Vigor: most plants < 6" wide most plants > 6" wide a mix of large and small

Current Threats: vehicle traffic foot traffic other (add to additional notes)

What percent of plants are within shorebird fencing? 98%

Additional Notes: Plants outside of shorebird fencing were flagged and denoted with posted signage. In order to protect against pedestrian and vehicular damage, symbolic fencing was left in place for larger groups of plants while individuals were protected with cage enclosures.

Use the back of this form to sketch plant locations on site or mark on a topo map or aerial photo.

Please send completed forms to:

Steve Sinkevich
U.S. Fish and Wildlife Service
Long Island Field Office
340 Smith Road
Shirley, N.Y. 11967
Or e-mail scanned form to: Steve_sinkevich@fws.gov

For additional information contact Steve Sinkevich at 631-286-0485 or Steve_sinkevich@fws.gov