

# CAPE HATTERAS NATIONAL SEASHORE SEABEACH AMARANTH SURVEYS 2012 ANNUAL REPORT

## INTRODUCTION

Seabeach amaranth (*Amaranthus pumilus*) is a federally threatened plant species found in barrier island beach environments, where it grows in overwash flats at accreting ends of islands and at the foot of frontal dunes. The species is intolerant of competition and thus is limited to highly dynamic areas that are marginally conducive to plant growth. It survives in these habitats as a “fugitive” or “pioneer” species, continually moving around in the landscape to occupy suitable habitat as it becomes available. Amaranth must recruit annually either from existing seed bank or from seeds dispersed by wind, water, or anthropogenic factors (i.e., dredging, beach nourishment) (Jolls 2004). Populations can therefore be highly variable from year to year in any given area, but dormant seeds may remain viable for many years.

The natural habit of seabeach amaranth makes it vulnerable to both man-made and natural disturbances. The primary threat to the species is habitat destruction. Man-made beach-stabilizing structures (i.e., bulkheads, jetties, continuous barrier dunes) and off-road vehicle and pedestrian traffic on beaches have contributed to major habitat loss (USFWS 1996). Barrier islands are extremely dynamic in nature and are constantly being shaped by hurricanes and storm events, resulting in the rapid creation and elimination of potential amaranth habitat. Other threats to amaranth include herbivory by insects and mammals, competition from non-native, invasive plants, and sea level rise.

In 1993, *Amaranthus pumilus* was listed as federally threatened with extinction under authority of the Endangered Species Act (USFWS 1993). At the time of its listing, the species had been eliminated from two-thirds of its historic range that extended from Massachusetts to South Carolina (USFWS 1996). Cape Hatteras National Seashore (CAHA) was once heavily populated with amaranth, hosting three to fifteen thousand individuals per year in the late 1980s. Seabeach amaranth has since been in decline at CAHA, and was last documented here in 2005. Since populations can be highly variable, park staff continues to survey for the species annually.

## METHODS

Some notable research in the past several decades has assessed the life history and habitat requirements of seabeach amaranth (Bucher and Weakley 1990, Johnson 2004, Jolls et al. 2004, Sellars and Jolls 2004, Strand 2002). Compilation and review of these studies, many of which address the crucial habitat characteristics that determine likelihood of amaranth occurrence (i.e., elevation, overwash disturbance potential, and competition), have provided a baseline for the selection of survey locations and methods at CAHA. Locations of historic amaranth occurrences at CAHA are also taken into consideration. Specific habitats surveyed include high beach (between the wrackline and foredune), sandflats on accreting ends of the islands, and large dune blowouts.

Surveys for seabeach amaranth are ideally conducted in July-September when the plants are sufficiently large to locate and document. CAHA staff begins surveying for plants in mid-July, usually starting where seasonal resource closures for nesting shorebirds are being removed. These are areas where off-road vehicle and pedestrian traffic has been excluded for the growing season. Historically at CAHA, when plants were found, they were typically found in vehicle-free areas, often the same areas protected for nesting birds. In the case that plants are found, the location of all individual plants or plant clusters are recorded with a GPS device with sub-meter accuracy. The diameter (mm) is recorded and whether it is located in an area open or closed to pedestrian and/or ORV traffic. Any evidence of these uses (e.g., footprints or tire tracks) within 20 feet is also recorded. In areas where plants are observed, a follow-up monitoring survey in late September is recommended to examine survivorship and seed production (Marion 2005).

Amaranth survey locations and observations are documented in a shared database as they occur in order to avoid duplication. The spreadsheet includes the survey date, observer(s), district, total survey time (hrs), person hours, location, total shoreline mileage, and survey results. A designated CAHA biotech monitors the database and works directly with other biotechs to assure that surveys have been completed and documented for all potential habitat.

## **RESULTS**

Plant surveys were conducted from mid-July through August 2012 in areas of the Seashore that contain potential habitat for seabeach amaranth. Staff spent more than 90 hours surveying specifically for amaranth, covering over 55 lineal miles of potential beach habitat by foot. More hours were actually spent in potential habitat than was actually recorded, as other field work required staff to be in the historical and potential habitat. No amaranth was found anywhere within the survey areas.

## **DISCUSSION**

Seabeach amaranth populations have fluctuated greatly since surveys began at CAHA in 1985 (Table 1). In the last 10 years, numbers were the highest in 2002 with 93 plants. More recently numbers have declined with only one plant found in 2004 and two plants found in 2005. No plants have been observed since that time and the plant is currently thought to possibly be extirpated from CAHA. The area on Bodie Island spit where amaranth had been located in 2004 and 2005 has been continuously protected through summer and winter resource management closures. At Cape Point, a portion of the area where amaranth was historically found has also been continuously protected through summer and winter resource closures. No plants were found within any of these protected areas. At Hatteras Inlet, large portions of the historic range were simply no longer present due to continued erosion. While it is thought that the plant may possibly be extirpated from CAHA, it should be noted that since plants are not evident every year, but may survive in the seed bank, populations of seabeach amaranth may still be present even though plants are not visible for several years (USFWS 2007).

Table 1. Population Estimates of *Amaranthus pumilus* at CAHA by Site.

Year	Bodie Is. Spit	Cape Pt. / South Beach	Hatteras Island Spit*	Ocracoke Island
1981				15
1984				1
1985	0	300-500	300-500	100
1986	0	>200	>300	>100
1987	0	5,200	274	1,409
1988	0	800	1,718	13,310
1990	0	2,830	252	250
1994			0	0
1996	0	6	82	10
1997	0	59	16	6
1998	0	55	210	0
1999	0	3	5	0
2000	0	1	1	0
2001	0	27	16	8
2002	0	11	75	7
2003	0	16	3	11
2004	1	0	0	0
2005	1	0	0	1
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0

Population estimates by NC Natural Heritage Program, East Carolina Univ. and NPS  
 \*Plants noted as present in 1973

There has been some recent consideration of the potential for reintroduction of seabeach amaranth at the Seashore. CAHA’s Off-Road Vehicle Management Plan/EIS, implemented in February 2012, identifies desired future conditions for park resources of concern (NPS 2010). Each species with desired future conditions has both a “short-term” and “long-term” target, defined as 10 years and 20 years after implementation of the plan, respectively. The short-term target for seabeach amaranth is to “develop a restoration plan for 4 suitable sites”. The long-term target requires that “at least 3 of 4 suitable sites are occupied for 5 consecutive years”. The adaptive management initiatives that accompany the species’ desired future conditions address the research that the CAHA may conduct to determine the conditions under which recreational use may be managed to enhance visitor experience without adversely affecting the achievement and maintenance of the desired future conditions (ORV Mgmt Plan). The adaptive management initiative associated with amaranth is to “develop a study to assess the feasibility of seabeach amaranth restoration at up to four suitable sites.” Park staff is currently drafting a comprehensive report analyzing past and current amaranth research and reintroduction attempts in similar locations along the Atlantic coast. This report will be used to determine the feasibility of a seabeach amaranth restoration attempt at CAHA.

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