

Description of Cape Sable thoroughwort in Everglades National Park

Cape Sable thoroughwort (*Chromolaena frustrata*) is a federally endangered perennial herb that occurs in coastal hardwood hammock, buttonwood hammock and other coastal habitats in southern Florida. It is endemic to Miami-Dade and Monroe Counties and a large portion of the range and total number of individuals are protected within Everglades National Park (ENP). In ENP, Cape Sable thoroughwort occurs along the southeastern coast in buttonwood and coastal hardwood hammock habitats between Clubhouse Beach and Little Madeira Bay. Plants occur in the hammock understory and are frequently associated with other coastal plant species including *Alternanthera flavescens*, *Suaeda linearis*, *Acanthocereus tetragonus*, *Capparis flexuosa* and *Heliotropium angiospermum*. Cape Sable thoroughwort is a relatively small plant with individuals typically less than 1m in height. This species is believed to require an open understory hammock habitat with few shrubs, sapling trees or other sources of competition for light or water. In areas of suitable habitat, dense localized populations may occur.

Within suitable habitat in ENP, Cape Sable thoroughwort has a relatively patchy distribution. Occurrences within the park range in size from a few square feet to several acres. The number of individuals at each occurrence ranges from fewer than 10 to thousands of plants. A quantitative population estimate of Cape Sable thoroughwort in Everglades National Park indicated that nearly 400,000 plants are currently found throughout its range in the park (van der Heiden, et al 2015). Plants have been found in areas with previous human disturbance, including trail edges and abandoned homesites. The largest known occurrence in the park is found in coastal hardwood and buttonwood hammock habitat adjacent to Coastal Prairie Trail. Based on surveys conducted in January 2014, the population begins approximately 1.25 miles west of the eastern trailhead and extends west for approximately 1.1 miles. In the second section of the trail that passes through buttonwood hammock, the trail passes north of another occurrence of Cape Sable thoroughwort where plants are known from within the buttonwood hammock but have not been observed along the trail itself. Smaller occurrences are also known from the vicinity of Rowdy Bend Trail, Snake Bight Trail and Bear Lake Trail (Figs. 1 and 2). No plants have been observed on or along the trail at Rowdy Bend since the report of Bradley and Gann (2004). No observations of plants along Snake Bight Trail or Bear Lake Trail are known. Several isolated occurrences are known that are not associated with any designated trails (Figs. 1, 2 and 3). Designated critical habitat for Cape Sable thoroughwort includes the majority of the known range in ENP and suitable habitat to the east (Figures 1 and 4). Comprehensive surveys of suitable habitat east of Terrapin Bay have not been completed and additional occurrences of Cape Sable thoroughwort may be present (Figure 4).

Little is known about the population dynamics of Cape Sable thoroughwort. Habitat disturbance resulting from hurricane storm surge appears to be associated with substantial increases in population size. Surveys of most of the historic locations in the western half of the range within ENP conducted in 2003 resulted in the observation of 150 plants and a description of the species are rare in ENP (Bradley and Gann 2004). Following Hurricanes Katrina and Wilma in 2005, both of which produced significant storm surge events, surveys increasingly led to the detection of more plants and the documentation of wider distribution than was previously known. Observations suggest that increases were associated with

reduction in understory cover and an opening of overstory cover in areas where dense occurrences were found. However, quantitative information on population responses to storm events are not available and it is likely that at least some of the occurrences observed following the 2005 hurricane season were simply overlooked during previous survey efforts.

Monitoring plots at fixed locations established in 2009 and remonitored in 2014 did not indicate detectable changes in population size during that time period (Gann 2014). These plots provide an opportunity to track general population trends and will be useful in characterizing hurricane effects following future storms. Defoliation of nearly all plants throughout the occurrence in the vicinity of Coastal Prairie Trail was observed in 2012. A single individual larva was observed and identified from a photograph as a Tiger moth (Arctiidae) (Marc Minno email communication March 7, 2012). Subsequent observations and transect monitoring suggest (van der Heiden 2015) that this event did not affect the population size in that area.

The primary threats Cape Sable thoroughwort in the park are displacement of plants and degradation of suitable habitat by infestations of invasive plant species and habitat loss or conversion due to sea level rise associated with global climate change. Activities in the park such as trail maintenance, biological monitoring, exotic species control and visitor use may have the potential to impact individuals, especially in areas where plants occur on or in the vicinity of trails.

Non-native species frequently invade suitable and occupied habitat for Cape Sable thoroughwort. The primary invasive plant species found in these habitats are Brazilian peppertree (*Schinus terebinthifolius*), latherleaf (*Colubrina asiatica*), seaside mahoe (*Thespesia populnea*). These non-native species pose a direct threat to Cape Sable thoroughwort populations by altering habitat and shading or otherwise outcompeting individual plants. Brazilian peppertree is frequent in occupied habitat along Coastal Prairie Trail where it was found on 66.7% of transects used to estimate *C. frustrata* population size (van der Heiden et al 2015). Brazilian peppertree is likely present at all occupied sites and throughout occupied and unoccupied critical habitat (Figure 2). Seaside mahoe was also observed on 5.6% of the transects (Van der Heiden et al 2015). Latherleaf has been observed immediately adjacent to Cape Sable thoroughwort populations along Rowdy Bend Trail and in a coastal hammock near Monroe Lake Mound. Latherleaf and Brazilian peppertree are likely to be found at varying densities throughout the range of Cape Sable thoroughwort and within all areas of occupied and unoccupied critical habitat.

In areas where Cape Sable thoroughwort co-occurs with invasive species, these exotics can be found in close proximity to individual plants. In some cases, effective control of these non-native species without injuring or killing individual Cape Sable thoroughwort plants may not be possible. Potential impacts may result from unintentional overspray of herbicide, damage to individual plants when clearing vegetation around invasive species for application of herbicide and unintentional trampling of plants when surveying for or accessing known invasive plant occurrences. These impacts can be mitigated to a large degree through education and careful supervision of those carrying out exotic plant control efforts. Impacts to individual plants in large populations of Cape Sable thoroughwort (eg. habitat in vicinity of coastal prairie trail) are anticipated to be limited to a very small portion of the total number of individuals that make up the population. Very small occurrences (<20 plants) are more susceptible to

proportionally large impacts and these occurrences may require complete avoidance of treatment within occupied habitat. Treatment of invasive species in all occupied areas will have both short and long term benefits to Cape Sable thoroughwort and its critical habitat. Control of invasive species is considered necessary for the long term stability of these populations.

Project description: Phase I

The ENP Exotic Vegetation Management Program (EVMP) proposes to carry out combined surveillance for and control of Category I and II invasive species within all coastal hardwood and buttonwood hammocks along the northern shore of Florida Bay and inland. These control efforts will focus on habitats that are occupied by Cape Sable thoroughwort and are included within designated critical habitat. Further prioritization of treatment will be based on existing observations of known areas with exotic plant infestations. Currently, three infested areas considered to be high priority for treatment have been identified. Habitats south of Coastal Prairie Trail (Figure 5) have low density infestations of Brazilian peppertree and seaside mahoe. Invasive species in approximately 260 acres of buttonwood and coastal hardwood hammock occupied by Cape Sable thoroughwort in that vicinity should be treated. Occupied habitat in the vicinity of Rowdy Bend Trail (Figure 6) has low to moderate levels of Brazilian peppertree and latherleaf. An area of approximately 45 acres is proposed for treatment. Finally, an isolated coastal hardwood hammock in the vicinity of Monroe Lake (Figure 7) also has low to moderate levels latherleaf and low density Brazilian peppertree. The Cape Sable thoroughwort occurrence is primarily in ecotonal habitat along the edge of the hammock, but treatment of the entire 3 acre hammock area is proposed.

Infested Cape Sable thoroughwort habitat in the vicinity of Coastal Prairie Trail will be accessed on foot from the eastern trailhead or crews will be transported by boat to Clubhouse Beach to access the westernmost areas of suitable habitat. The treatment area in the vicinity of Rowdy Bend Trail will be accessed on foot. The treatment area in the vicinity of Monroe Lake will be accessed with a combination of transportation by boat and walking or via helicopter. Crews will consist of a maximum of 10 individuals. At each site, ground crews will systematically survey for individuals and populations of Brazilian peppertree, seaside mahoe, latherleaf and all other invasive plants listed by the Florida Exotic Pest Plant Council as Category I or II species. Treatment methods will include hand pulling as well as hack and squirt or basal bark treatment with herbicide. Mixed herbicide will be transported in backpack sprayers by treatment crew members. Equipment used to carry out this work will be limited to hand tools such as machetes, clippers and pruners and hand saws. Treatment will largely be restricted to dry season months, which typically include November - April due to inhospitable conditions during the summer months. Annual retreatment of treated areas is proposed for a period of three years.

This project is currently without an identified funding source.

Proposed measures to avoid or minimize impacts to Cape Sable thoroughwort

Measures for all treatment locations:

Prior to initiating treatment, maps of all areas proposed for treatment will be provided by the project leader to the Park Botanist responsible for listed species management.

Prior to annual initiation of any exotic plant control projects within the known distribution of Cape Sable thoroughwort, all known occurrences in areas proposed for treatment will be surveyed by the Park Botanist responsible for listed species management. Additional protective measures (listed below) will be developed for occurrences with <20 plants or that occupy less than 50m².

Personnel conducting exotic control projects will be provided with identification materials prior to starting project to ensure that they are familiar with Cape Sable thoroughwort.

Personnel will be instructed to access sites carefully and avoid trampling Cape Sable thoroughwort when accessing sites and carrying out control measures.

Personnel will be instructed to avoid injuring plants when clearing vegetation for application of herbicide to exotic species.

Personnel will report all observations of Cape Sable thoroughwort in areas where plants were not previously known. This includes unoccupied critical habitat and any other suitable location where invasive control efforts are implemented.

To the extent practicable, monitoring of sites will be carried out by qualified NPS staff or agents before and after treatment to assess short and long term impacts of exotic control measures.

Additional mitigation measures for occurrences with less than 20 plants or that occupy less than 50m²:

During pre-treatment site surveys, Supervisory Park Botanist will determine if invasive species co-occur with individuals of Cape Sable thoroughwort and determine if control measures can be carried out without impacting more than 5% of the occurrence. If control measures can be carried out without impacting more than 5% of the occurrence, treatment within the occurrence will proceed. If impacts are expected to exceed 5% of the total number of individuals in the occurrence, the occupied area will be flagged and treatment will not occur in that area. The site specific determination will be provided to the invasive plant control project leader prior to carrying out treatment.

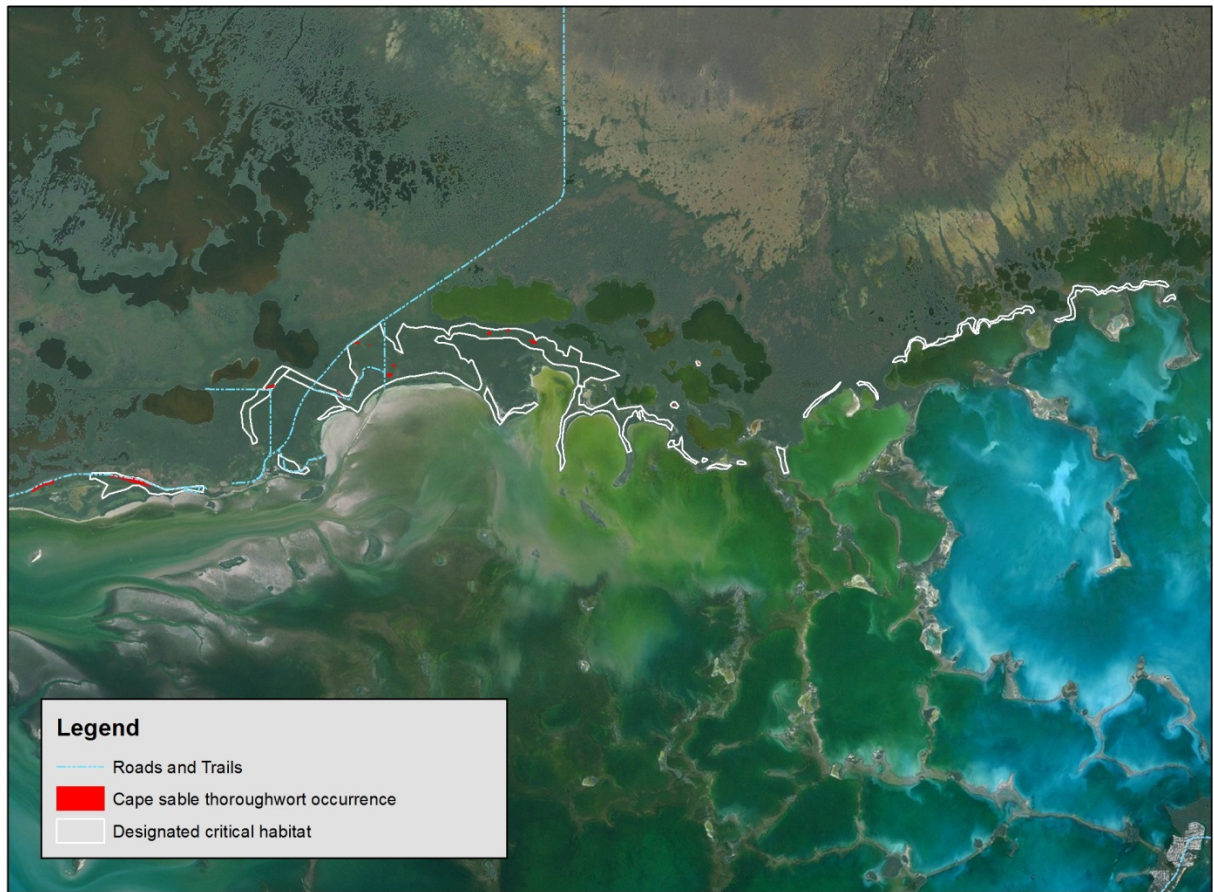


Figure 1. Overview of distribution of Cape Sable thoroughwort (*Chromolaena frustrata*) and its designated critical habitat in Everglades National Park.

Literature Cited:

- Bradley, K.A. and Gann, G.D. 2004. Status survey and monitoring of Cape Sable Thoroughwort, *Chromolaena frustrata* (B.L. Rob.) R.M. King and H. Rob. Final Report submitted to U.S. Fish and Wildlife Service. The Institute for Regional Conservation, Miami, FL. 19 pages.
- Gann, G.D. 2014. Vascular plant species of management concern in Everglades National Park. Final report submitted to Everglades National Park. The Institute for Regional Conservation, Miami, FL. 221 pages.
- Minno, M. 2012. Email communication from Marc Minno to Jimi Sadle, Everglades National Park dated March 7, 2012.
- van der Heiden, C. J. Johnson and J. Lange. 2015. Cape Sable thoroughwort populations in the vicinity of Flamingo, Everglades National Park. Final Report submitted to Everglades National Park. The Institute for Regional Conservation. Delray Beach, FL. 15 pages.