Species Status Assessment

Common Name	Boott's rattlesnake root	**Date Updated:**	2024-01-08
Scientific Name	*Nabalus boottii*	**Updated By:**	Rachael Renzi
Family	Asteraceae		

Species Synopsis *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Boott's rattlesnake root is a perennial forb, more accurately described as a biennial, in the aster family (Asteraceae). *Nabalus boottii,* synonymous with *Prenanthes boottii,* is one of six species in the genus in New York (Werier et al. 2023). *Nabalus crepidineus* is among these, which is another state endangered species. The distribution of *Nabalus boottii* is limited to mountains and ledges in New York, New Hampshire, Vermont, and Maine, with the core of the population existing in the White Mountains of New Hampshire. In New York, the plants are restricted to seven populations in the Adirondacks near mountain summits. Most of these populations have less than 100 individuals. The plant populations seem to be stable but are likely to be negatively impacted by climate change, as their habitat is almost exclusively in the alpine zone.

I. Status

a. Current legal protected Status

i. Federal: **Candidate:**

ii. New York: Endangered

b. Natural Heritage Program

i. Global: G2

ii. New York: S1 **Tracked by NYNHP?** On Active Tracking List

Other Ranks:

COSEWIC: Not listed in Canada
IUCN Red List: Not assessed by IUCN Red List

Status Discussion:

Nabalus boottii is Endangered in New York (Ring 2023). There are seven known populations of *Nabalus boottii* in New York, all located near mountain summits in Essex County. Only one population has over 500 individuals, yet four have under 50 genets (NYNHP 2023). This species is globally limited in number of individuals and in extent of range, being endemic only to the mountains of New England and New York (NYNHP 2024).

II. Abundance and Distribution

Region	Present?	Abundance	Distribution	Time Frame	Listing status or S-Rank	SGCN?
North America	Yes	Unknown	Unknown	Unknown		
Northeastern US	Yes	Unknown	Unknown	Unknown		
New York	Yes	Unknown	Unknown	Unknown	E	
Connecticut	No	-	-	-		
Massachusetts	No	-	-	-		
New Jersey	No	-	-	-		
Pennsylvania	No	-	-	-		
Vermont	Yes	Unknown	Unknown	Unknown	S1	
Ontario	No	-	-	-		
Quebec	No	-	-	-		

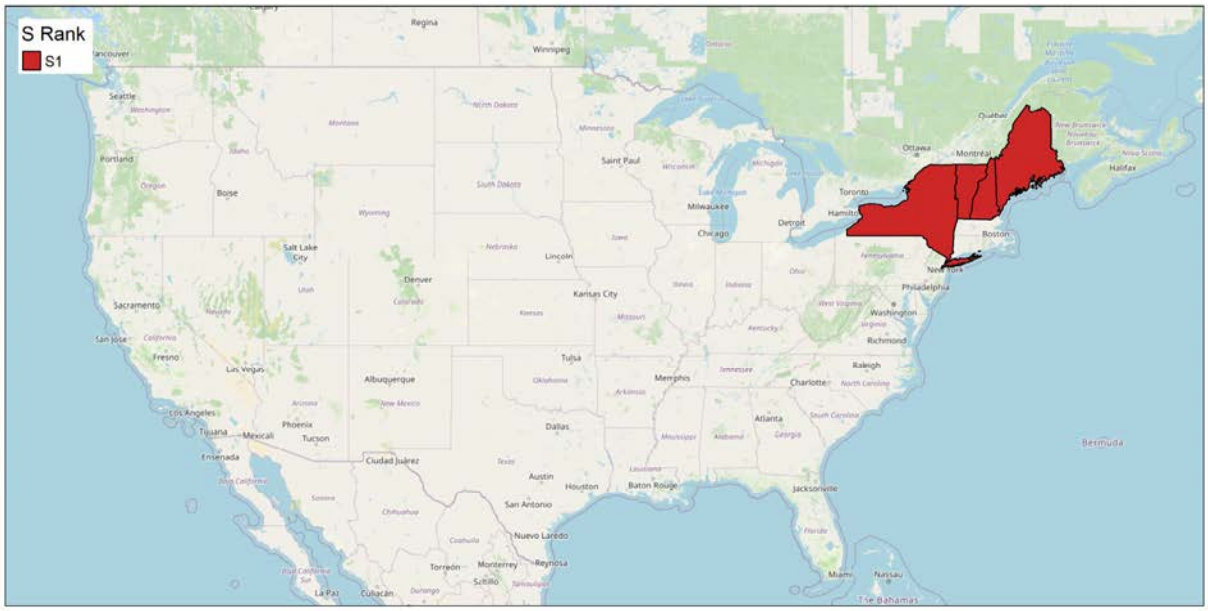


Figure 11: Nabalus boottii *North American distribution.*

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Peripheral	~250 kilometers

III. NY Rarity and Trends

Trends Discussion

Since the 1990s, populations have appeared stable with some slight fluctuation. However, due to inconsistencies in data collection, these trends are difficult to establish (NYNHP 2024). The populations are in protected habitat in New York though they are negatively affected by trampling. All populations within New York have remained extant (NYNHP 2023). Over the long term, the populations have been relatively stable, with less than 10% change overall (NatureServe 2023).

Details of historic and current occurrence

In New York this species is restricted to only a few of the highest peaks of the Adirondacks. In total, there are approximately 300 individuals in New York (NYNHP 2023). Although the number of plants at each population has fluctuated, all populations within the state have remained extant (NYNHP 2023). Surveys to locate the plant in alpine zones in New Hampshire and New York may discover additional populations. One questionable historic population from Maine has not been seen since 1991 (NatureServe 2023). *Nabalus boottii* is restricted to the highest peaks of the northeastern United States in Maine (Boundary Bald Mountain and Mt. Katahdin), New Hampshire (Mt. Washington and Mt. Eisenhower in the Presidential Range), New York (Adirondacks), and Vermont (Mount Mansfield and Camel’s Hump). There is a false report from Quebec, Canada (NatureServe 2023).

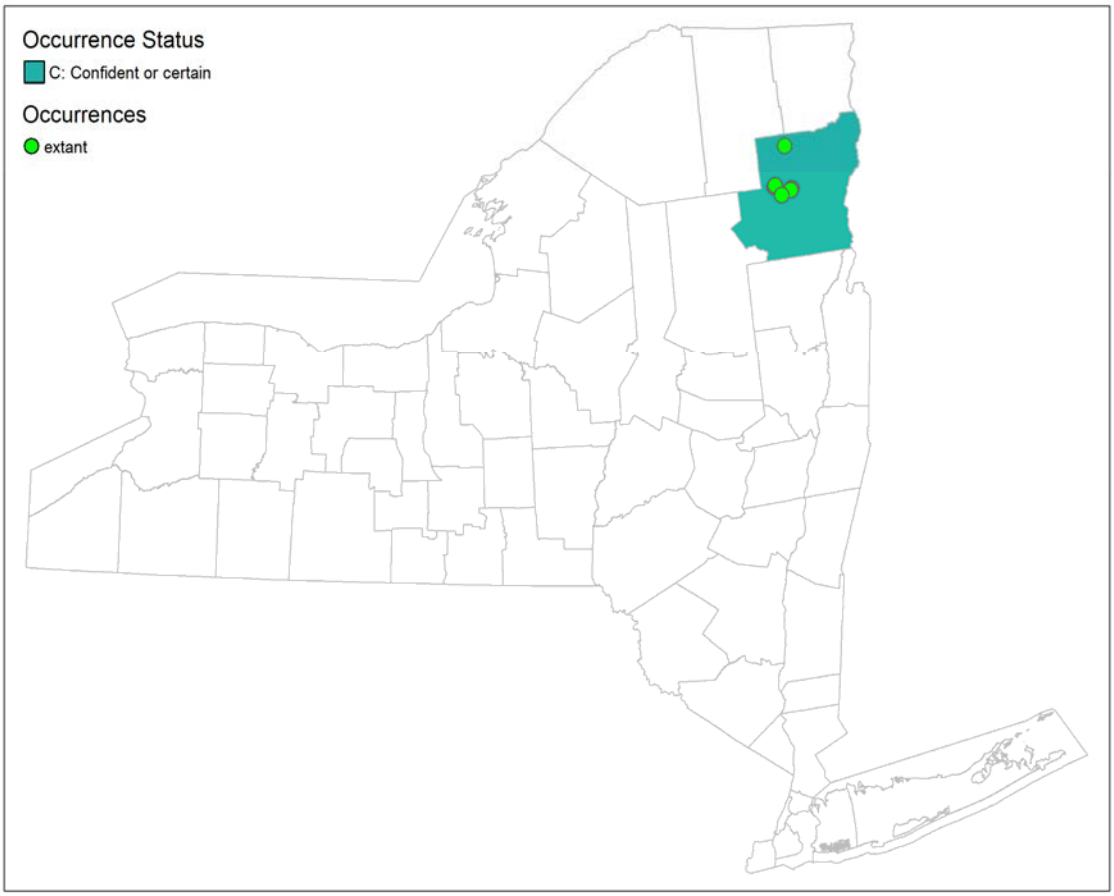


Figure 22. *NYS distribution for* Nabalus boottii

Table 1. *Number of records (element occurrences) of* Nabalus boottii *grouped by the dates known to be extant (the years spanning first observation to last observation) and the number and percent of total of USGS 7.5 minute map quadrangles these observations fall within for New York State.*

Years	# of Records	# of distinct quads	% of quads in State
Pre-1995	6	4	0.4
1995-2004	4	3	0.3
2005-2014	4	3	0.3
2015-2023	2	2	0.2

Monitoring in New York

These populations are not regularly monitored, though all have been visited between 2002 and 2019 (NYNHP 2023). Additional monitoring is needed, as current data may be somewhat inaccurate as basal rosettes can be easily overlooked. Further, because monitoring is carried out by differing organizations, different levels of survey effort may contribute to population data inconsistencies (NYNHP 2024).

IV. Primary Habitat or Community Type *(from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):*

NatureServe broad habitat types: Bare rock/talus/scree, Cliff, Forest Edge, Alpine, Forest/Woodland, Riparian, Herbaceous wetland (NatureServe 2023).

Northeastern Habitat Classification Macrogroup: Alpine (Includes subalpine woodland and shrub), Cliff and Talus.

NY Natural Heritage Communities: Cliff community, Open alpine community (Edinger et al. 2014, NYNHP 2023).

Habitat or Community Type Trend in New York

Declining:	**Stable:**	**Increasing:**	**Unknown:** ✓
Time Frame of Decline/Increase:			
Habitat Specialist	**Yes:** ✓	**No:**	

Habitat Discussion:

Nabalus boottii is a true alpine plant. In New York, this species is restricted to a few of the highest peaks in the Adirondacks and grows in the alpine zone at or above the treeline (Bogler 2006, Fernald 1970, Werier et al. 2023). In this area, plants occur in open grassy meadows, near rock outcrops, in seeps at the bases of cliffs, adjacent to krummholz, on ledges and crevices in cliffs, and along trails. It is also known from around buildings, a rock wall of a parking lot, and disturbed areas in the alpine zone (NYNHP 2023).

Throughout its range, *Nabalus boottii* is found in a variety of alpine habitats: moist tundra lawns, streamsides, steep cirque ledges and crests, cliffs, and disturbed alpine sites such as trailsides and hut areas (Rawinski 1986b). It is usually restricted to elevations above 1,000 meters but the plant has been found occasionally well below tree line on open ledges (Zika 1992). Plants tend to be found in somewhat exposed situations, as well as disturbed areas such as fell-fields, steep slopes, ravines and streamsides.

Nabalus boottii is often found as a component of plant communities which are subject to a high degree of natural disturbance from high winds and ice damage (Rawinski 1986a and 1991). Likewise, its tolerance for some disturbance allows it to grow along trails, near a heavily used hut, and even in a gravel parking lot (Rawinski 1986a, Ketchledge 1990). There is no evidence, however, that human disturbance is advantageous to the species. In the Adirondacks, human disturbance (trampling) is detrimental to the plant. Although *Nabalus boottii* may have populations producing high numbers of flowering individuals, this is not an adequate measure of reproductive success. Seed set of individuals is thought to be sparse (NatureServe 2023). Further knowledge of the life history of the species is necessary to determine reproductive success.

Plant associates include *Diapensia lapponica, Salix uva-ursi, Rhododendron lapponicum, Campanula rotundifolia, Potentilla tridentata, Juncus trifidus, Vaccinium uliginosum, Empetrum nigrum, Cornus canadensis, Carex bigelowii, Solidago cutleri, Minuartia groenlandica, Carex brunnescens, Hierochloe alpina, Woodsia glabella, Asplenium viride, Poa fernaldiana, Agrostis*

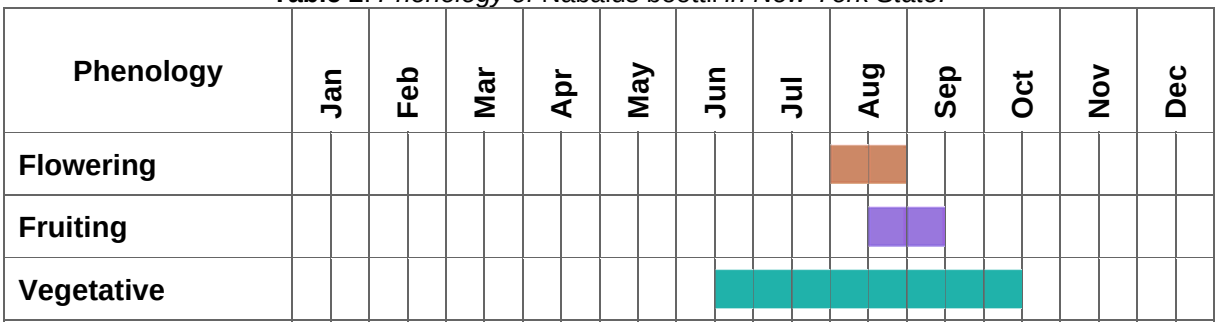
borealis, Abies balsamea, Mitella nuda, Solidago randii, and *Aster acuminatus* (NatureServe 2023).

V. Species Demographics and Life History *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Like many alpine plant species, *Nabalus boottii* shows adaptations to harsh alpine conditions, including generally small stature and small, thickened leaves (Sayers 1989). The plants rely on a variety of pollinators for fertilization in late summer, then seeds are dispersed in mid-September on winds and updrafts, which can carry seeds up to 40km away (Haynes 2019).

Nabalus boottii like other species of *Nabalus*, is a biennial in the broad sense; that is, it flowers only once and then dies, although a plant may live for several years as a vegetative individual before flowering (Sayers 1989). It is unknown how many years are needed before a plant has reserves enough to flower, but the presence of high percentages of vegetative individuals (often about 75% but ranging from 50-100%) in most populations suggests that several years are needed before flowering. Rawinski (1986a) suggests that ability to flower varies with environmental conditions such as nutrient availability and disturbance. He observes that flowering individuals on Mount Washington are most likely to be found in the more disturbed areas, such as near a heavily used hut, along trailsides and in naturally disturbed areas such as highly unstable ravines and ledges. More information is needed on the relationship between the ecology and biology of this species.

Table 2: *Phenology of* Nabalus boottii *in New York State.*



VI. Threats

Although this species appears to do well in disturbed areas, it is unclear how human disturbances will impact this species in the long term. In some areas, trampling by hiker traffic has damaged populations (NYNHP 2024). The alpine habitat also comes with its own set of threats, being a delicate environment. Shifts in phenology put alpine-endemic plants at greater risk for extinction if they are unable to adapt. For example, changes in temperature and precipitation can affect the length of the growing season, alter pollinator activity, and ultimately challenge affect alpine-adapted plants (Inouye 2020). The preservation of alpine habitat is necessary to conserve Boott's rattlesnake root.

Are there regulatory mechanisms that protect the species or its habitat in New York?

Yes: ✓ **No:** **Unknown:**

If yes, describe mechanism and whether adequate to protect species/habitat:

The plants are protected under the Endangered Species Act of 1973.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

The Summit Steward program which works to inform hikers of the fragile nature of alpine plants is a critical program which is helping to reduce trampling of alpine vegetation. This program and other efforts designed to reduce trampling of alpine meadows are needed.

Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection) - https://www.iucnredlist.org/resources/conservation-actions-classification-scheme

***Table 3**. Recommended conservation actions for* Nabalus boottii.

Conservation Actions	
Action Category	**Action**
Land/water protection	1.1. Site/area protection
Land/water protection	1.2. Resource & habitat protection
Land/water management	2.1. Site/area management
Land/water management	2.2. Invasive/problematic species control
Land/water management	2.3. Habitat & natural process restoration
Law and Policy	5.2. Policies and regulations

VII. References

This SSA drew heavily from these resources:

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