

# Species Status Assessment

<b>Common Name</b>	Riverweed	<b>Date Updated:</b>	2024-03-07
<b>Scientific Name</b>	<i>Podostemum ceratophyllum</i>	<b>Updated By:</b>	Rachael A. Renzi
<b>Family</b>	Podostemaceae		

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

Riverweed is an aquatic perennial forb in the riverweed family (Podostemaceae). It is the only species in the genus *Podostemum* in NY, as its family is primarily tropical (Werier et al. 2023; Philbrick & Crow 1992). Considered a foundational species of fast-moving streams and rivers, *Podostemum ceratophyllum* provides habitat, food, and other benefits for macroinvertebrates and fish (Hutchens et al. 2004; Wood & Freeman 2017). The populations range from northern NY, including the Adirondacks and southeastern NY, to the Catskills (NYNHP 2023, 2024). There is also one population reported from Long Island and one from central NY (NYNHP 2023, 2024). The population sizes are difficult to estimate, but it is usually locally abundant (NYNHP 2023, 2024). Its global range stretches from Nova Scotia and New Brunswick, west to Quebec and southeastern Ontario, and south to Georgia, Louisiana, Arkansas, and Oklahoma. It is disjunct in the Dominican Republic, and Honduras (Philbrick & Novelo 2004). In NY, the plant is known from 23 extant populations, though ten of these have not been seen in over 25 years (NYNHP 2023). In addition, two populations were found to have no plants in more recent surveys (NYNHP 2023). Overall, the larger populations seem to be stable, but more surveys are needed (NYNHP 2023, 2024).

## I. Status

### a. Current legal protected Status

<b>i. Federal:</b>		<b>Candidate:</b>	
<b>ii. New York:</b>	<u>Threatened</u>		

### b. Natural Heritage Program

<b>i. Global:</b>	<u>G5</u>		
<b>ii. New York:</b>	<u>S2S3</u>	<b>Tracked by NYNHP?</b>	On Active Tracking List

### Other Ranks:

COSEWIC: Not listed in Canada  
IUCN Red List: Least Concern

### Status Discussion:

*Podostemum ceratophyllum* is Threatened in New York (Ring 2023). There are 23 known extant populations and ten populations which have not been seen in recent years and are considered historical. Many of the *Podostemum ceratophyllum* populations are clustered along rivers (NYNHP 2023, 2024). Habitat is somewhat limited for this species but certainly not rare.

## 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	T	
Connecticut	Yes	Unknown	Unknown	Unknown	S3	
Massachusetts	Yes	Unknown	Unknown	Unknown	S2	
New Jersey	Yes	Unknown	Unknown	Unknown	S2	
Pennsylvania	Yes	Unknown	Unknown	Unknown	S4	
Vermont	Yes	Unknown	Unknown	Unknown	S1	
Ontario	Yes	Unknown	Unknown	Unknown	S2	
Quebec	No	-	-	-		

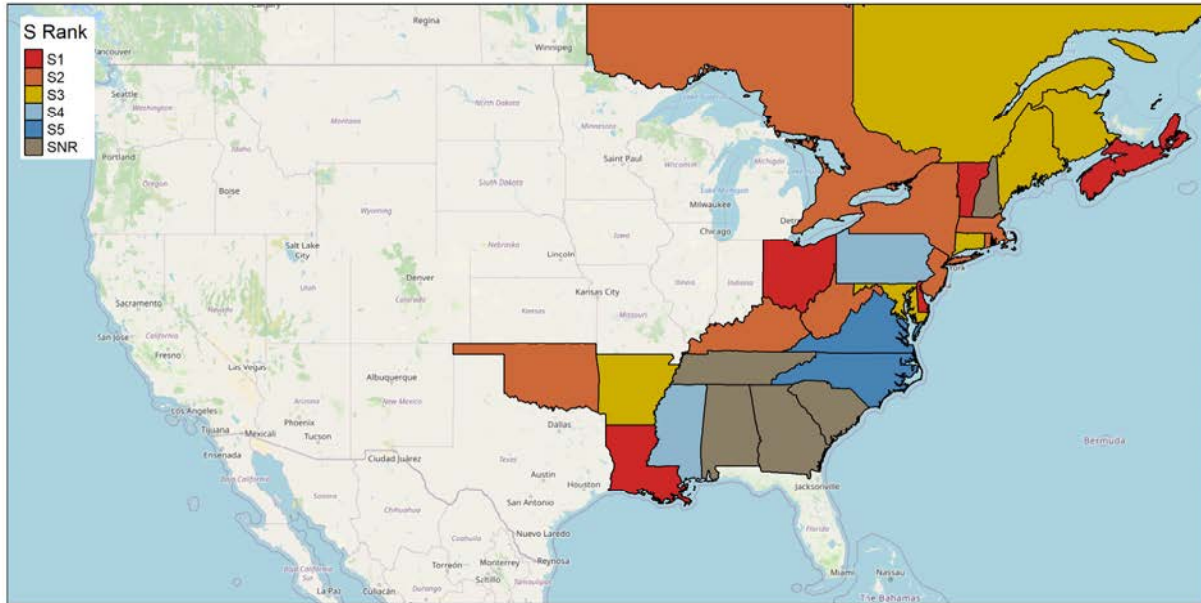


Figure 1. *Podostemum ceratophyllum* North American distribution.

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Core	≥500km

### III. NY Rarity and Trends

#### Trends Discussion

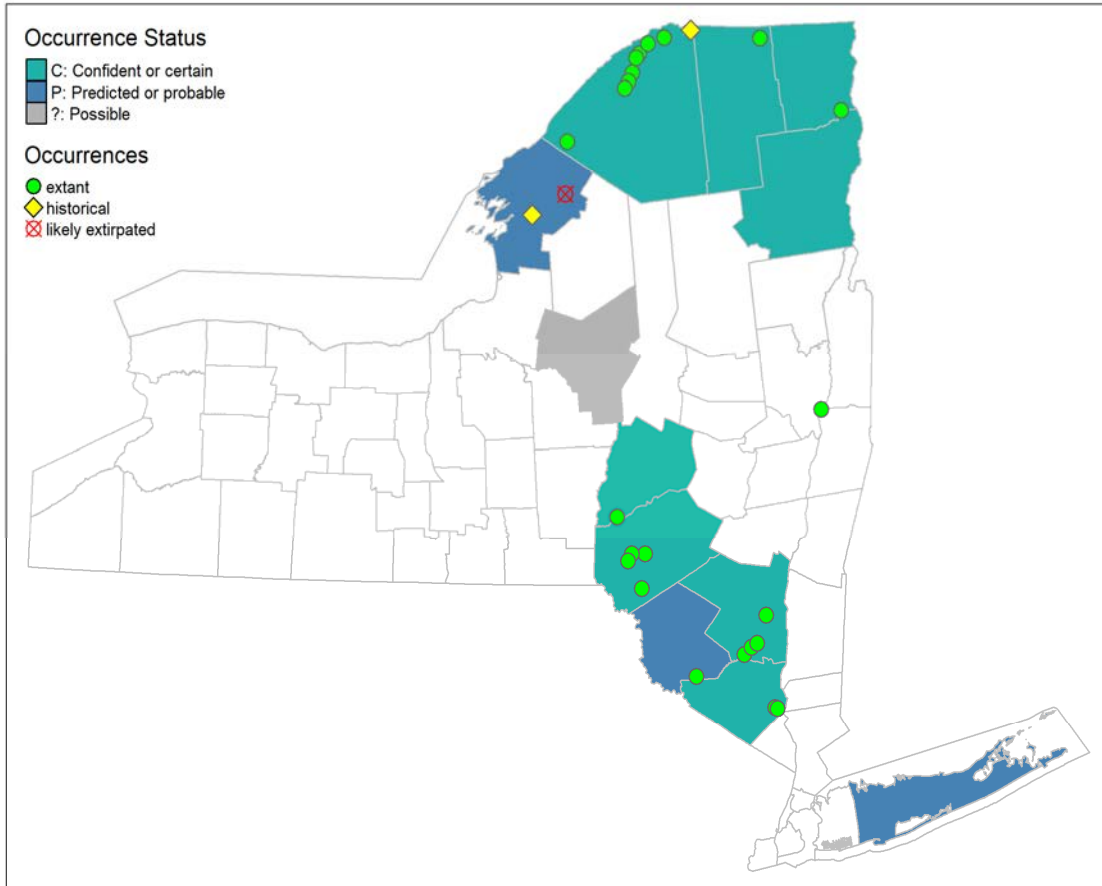
Of the 23 extant populations, 17 have first been documented in the past 40 years. This would seem to point to an increase in this species, but this plant has potentially been overlooked in the past (NYNHP 2023, 2024). The fact that this species resembles algae makes it difficult to detect in its habitat (NYNHP 2023, 2024). The habitat for this species may have decreased in the past 100+ years as rivers and streams were developed and/or polluted. One large population and two smaller ones were found to have no plants in more recent visits (NYNHP 2023). Ten populations (not considered historical) have not been seen in over 25 years (NYNHP 2023). Still, no population of this species is known to have become extirpated (NYNHP 2023).

The historical populations may still be extant, as targeted surveys at these populations have not been conducted (NYNHP 2023). Nine populations that were visited more than once in the last 50 years are still considered extant (NYNHP 2023). Two populations first documented in 1930 were revisited in 1980; these were still locally abundant, indicating that the populations can be stable for at least 50 years (NYNHP 2023). Overall, it seems that *Podostemum ceratophyllum* populations are stable in NY, but more surveys, especially to historical populations, are needed.

#### Details of historic and current occurrence

In New York, this species occurs in northern New York, including the Adirondacks and southeastern New York, including the Catskills with one population reported from Long Island and one from central New York (NYNHP 2023, 2024). The population sizes are difficult to

estimate, but it is usually locally abundant (NYNHP 2023, 2024). The sizes of each population range from about 30 clumps to thousands of plants, or 100,000 ramets (NYNHP 2023). Its range stretches from Nova Scotia and New Brunswick, west to Quebec and southeastern Ontario, and south to Georgia, Louisiana, Arkansas, and Oklahoma. It is disjunct in the Dominican Republic, and Honduras (Philbrick & Novelo 2004).



**Figure 2.** NYS distribution for *Podostemum ceratophyllum*.

**Table 1.** Number of records (element occurrences) of *Podostemum ceratophyllum* 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	17	18	1.8
1995-2004	6	5	0.5
2005-2014	8	7	0.7
2015-2023	3	3	0.3

## Monitoring in New York

Twelve of the 23 populations have been visited in the last 15 years (NYNHP 2023). There are no regularly scheduled surveys for *Podostemum ceratophyllum*.

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

Northeastern Habitat Classification Macrogroup: Small rivers, Medium rivers, Large rivers.

NY Ecological Communities: Confined river, Rocky headwater stream (Edinger et al. 2014, NYNHP 2023).

## Habitat or Community Type Trend in New York

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

## Habitat Discussion:

Riverweed grows submerged (up to 75+ cm deep) to seasonally exposed on cobbles and bedrock substrate in fast flowing, relatively large streams or rivers, especially rapids (NYNHP 2023, 2024; Crow & Hellquist 2000; Gleason & Cronquist 1991; Fernald 1950).

## 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):*

*Podostemum ceratophyllum* is an aquatic perennial forb. Holdfasts, shaped like fleshy disks, keep the plant attached to rocks in turbulent water (NYNHP 2024, Rutishauser et al. 2003). It is considered by some to be a foundation species, as it is known to provide habitat for a high abundance of aquatic macroinvertebrates and fish, is consumed as a food source for various aquatic organisms, sequesters dissolved elements, and contributes organic matter (Hutchens et al. 2004; Wood & Freeman 2017). Philbrick et al. (1984) report that not all populations of *Podostemum ceratophyllum* in New England produce seed, but plants will produce empty capsules. Seed germination occurs when the seeds are submersed, then, seedlings attach themselves to rocks via rhizoidal outgrowths of the radicle (Philbrick et al. 1984). Flowers appear both above and below water, then capsule maturation occurs within two or three weeks (Philbrick et al. 1984). All in all, the time from germination to flowering in the young plant is less than 2 months (Philbrick et al. 1984).

**Table 2. Phenology of *Podostemum ceratophyllum* in New York State (NYNHP 2023).**

Phenology	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flowering						■	■	■	■			
Fruiting								■	■	■	■	
Vegetative				■	■	■	■	■	■	■		

**VI. Threats**

Some of the streams where this species occurs may be used for a water source. This development could result in a change to the stream that would make the habitat less suitable for riverweed (NYNHP 2023, 2024). Other populations are threatened by water quality deterioration because of development, agriculture, or run off from a sewage treatment plant (NYNHP 2023, 2024). Negative impacts to this species include siltation and sedimentation, nutrient pollution, an overgrowth of epiphytes, and dam building (Wood & Freeman 2017; Quiroz et al. 1997 in Philbrick & Novelo 2004).

**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:

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

Water quality of the rivers where this species occurs should be protected.

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 *Podostemum ceratophyllum*.**

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

Conservation Actions	
Action Category	Action
Land/water management	2.3. Habitat & natural process restoration

## VII. References

### This SSA drew heavily from these resources:

New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry. 2023. Element Occurrence and Element Dataset. Albany, New York. [Exported 12/14/2023].

NatureServe. 2023. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. <http://www.natureserve.org/explorer>. [Accessed 12/14/2023].

Werier, David, Kyle Webster, Troy Weldy, Andrew Nelson, Richard Mitchell, and Robert Ingalls. 2023 New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), USF Water Institute. University of South Florida]. New York Flora Association, Albany, New York. [Accessed 11/21/2023].

Additional references:

Crow, Garrett E. and C. Barre Hellquist. 2000. Aquatic and Wetland Plants of Northeastern North America: A revised and enlarged edition of Norman C. Fassett's a Manual of Aquatic Plants. Volume One: Pteridophytes, Gymnosperms, and Angiosperms: Dicotyledons. The University of Wisconsin Press. Madison, Wisconsin. 536 Pages.

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. <https://www.nynhp.org/documents/39/ecocomm2014.pdf>

Fernald, M.L. 1950. Gray's manual of botany. 8th edition. D. Van Nostrand, New York. 1632 pp.

Gleason, Henry A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Canada.

Gleason, Henry A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden, Bronx, New York. 910 pp.

Haines, Arthur and Thomas F. Vining. 1998. Flora of Maine. A Manual for Identification of Native and Naturalized Vascular Plants of Maine.

Holmgren, Noel. 1998. The Illustrated Companion to Gleason and Cronquist's Manual. Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden, Bronx, New York.

Hutchens, John J., Jr., J. Bruce Wallace, and Eric D. Romaniszyn. 2004. Role of *Podostemum ceratophyllum* Michx. in structuring benthic macroinvertebrate assemblages in a southern Appalachian river. Journal of the North American Benthological Society Vol 23:4. Pp 713-727.

McNeill, J., F.R. Barrie, H.M. Burdet, V. Demoulin, D.J. Hawksworth, K. Marhold, D.H. Nicolson, J. Prado, P.C. Silva, J.E. Skog, J.H. Wiersema, and N.J. Turland (Editors). 2006. International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventh International Botanical Congress Vienna, Austria, July 2005. A.R.G. Gantner Verlag, Ruggell, Liechtenstein.

Michaux, A. 1803. Flora boreali-americana, sistens characteres plantarum quas in America septentrionali collegit et detexit Andreas Michaux. Apud Fratres Levrault, Paris and Strasbourg, France.

Philbrick, C. T. 1984. Aspects of Floral Biology, Breeding System, and Seed and Seedling Biology in *Podostemum ceratophyllum* (Podostemaceae). Systematic Botany, 9(2), 166–174. <https://doi.org/10.2307/2418821>

Philbrick, C.T. and A. Novelo R. 2004 Monograph of Podostemum (Podostemaceae). Systematic Botany Monographs 70: 1-106.

Philbrick, C.T. and Garrett E. Crow. 1992. Isozyme variation and population structure in *Podostemum ceratophyllum* Michx (Podostemaceae): implications for colonization of glaciated North America. Aquatic Botany Vol 43: 4. Pp 311-325. [https://doi.org/10.1016/0304-3770\(92\)90045-K](https://doi.org/10.1016/0304-3770(92)90045-K)

Reschke, Carol. 1990. Ecological communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation. Latham, NY. 96 pp. plus xi.

Rhoads, Ann F. and Timothy A. Block. 2000. The Plants of Pennsylvania, an Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA.

Ring, Richard M. 2023. New York Rare Plant Status Lists. New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry, Albany, NY. December 2023. 108 pp.

Rutishauser, R., Pfeifer, E., Moline, P., & Philbrick, C. T. (2003). Developmental Morphology of Roots and Shoots of *Podostemum ceratophyllum* (Podostemaceae — Podostemoideae). Rhodora, 105(924), 337–353. <http://www.jstor.org/stable/23313561>

Sprague, T.A. 1933. Podostemaceae or Podostemonaceae. Bulletin of Miscellaneous Information (Royal Gardens, Kew) 46: 46.

Weakley, A. S. 2007. Flora of the Carolinas, Virginia, Georgia, and surrounding areas. Working draft of 11 January 2007. University of North Carolina Herbarium (NCU), North Carolina Botanical Garden, University of North Carolina at Chapel Hill. Online. Available: <http://www.herbarium.unc.edu/flora.htm> (accessed 2007).

Wood, James, and Mary Freeman. 2017. Ecology of the macrophyte *Podostemum ceratophyllum* Michx. (Hornleaf riverweed), a widespread foundation species of eastern North American rivers. Aquatic Botany. Vol 139. Pp 65-74. <https://doi.org/10.1016/j.aquabot.2017.02.009>