Species Status Assessment

Common Name	small-flowered dwarf bulrush	**Date Updated:**	2023-12-20
Scientific Name	*Cyperus subsquarrosus*	**Updated By:**	Kyle J. Webster
Family	Cyperaceae		

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

Small flowered dwarf bulrush (*Cyperus subsquarrosus*) is an annual graminoid in the Sedge Family (Cyperaceae). It occurs from south-central Brazil north to Canada, including Mexico and much of the United States (NatureServe 2023, Flora North America 2002).*Cyperus* has a global distribution throughout tropical and temperate areas and consists of approximately 600 species, 96 of which occur in North America (Flora North America 2002). There are 32 species of *Cyperus* in New York, 19 of which are native (Werier et al. 2023).

In New York, *Cyperus subsquarrosus* occurs on moist sandy substrates at the edges of ponds, lakes, and rivers (NYNHP 2023). It occurs in Suffolk County, Orange County, along the Hudson River in Warren County, and on Lake Champlain in Essex County. There are disjunct historical populations on Lake Oneida in central New York, but they are presumed extirpated (NYNHP 2023).

Cyperus subsquarrosus has probably always been rare in New York (NYNHP 2024). Populations can fluctuate greatly from year to year, and persist in the seed bank during wet years, making short-term trends difficult to determine. Most of the extant populations have been visited more than once and appear to be relatively stable despite being small in size and often in poor habitat. The long-term trends are stable to declining with several large populations having been lost due to shoreline development and beach recreation. More surveys of historical populations and consistent monitoring of extant populations are needed to better determine the short and long-term trends of *Cyperus subsquarrosus* in New York.

I. Status

a. Current legal protected Status

i. Federal: **Candidate:**

ii. New York: Endangered

b. Natural Heritage Program

i. Global: G5

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

Other Ranks:

COSEWIC: Endangered
IUCN Red List: Not assessed by IUCN Red List

Status Discussion:

Cyperus subsquarrosus is Endangered in New York (Ring 2023). There are eight extant and eleven historical populations. Most populations are relatively small and fluctuate year to year, making them vulnerable in the down years. Populations are threatened by direct destruction, changes in hydrology, and invasive species. At least one population has been extirpated due to shoreline development and beach recreation.

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	Yes	Unknown	Unknown	Unknown	S1	
Massachusetts	Yes	Unknown	Unknown	Unknown	S2	
New Jersey	Yes	Unknown	Unknown	Unknown	S1	
Pennsylvania	Yes	Unknown	Unknown	Unknown	S1	
Vermont	No	-	-	-		
Ontario	Yes	Unknown	Unknown	Unknown	S2	
Quebec	No	-	-	-		

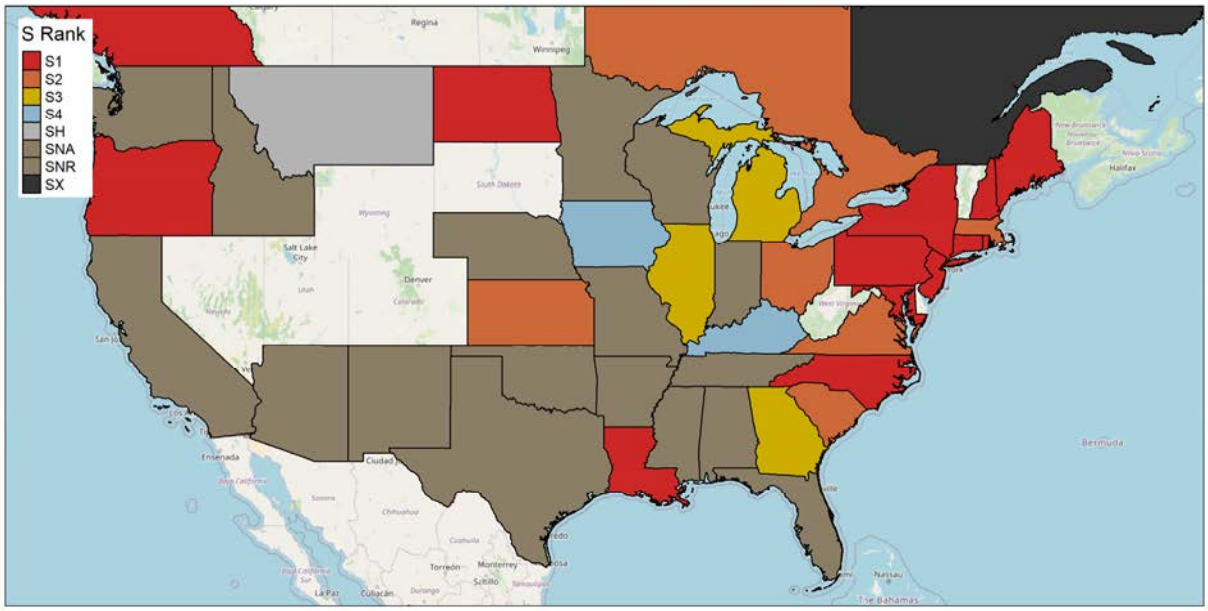

Figure 1: Cyperus subsquarrosus *North American distribution.*

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

III. NY Rarity and Trends

Trends Discussion

Cyperus subsquarrosus has seemingly always been rare in New York (NYNHP 2024). Populations can fluctuate greatly from year to year, and the plants may persist in the seed bank but not emerge in wet years, making short-term trends difficult to determine. Most of the extant populations have been visited more than once and appear to be relatively stable despite being small in size and in poor habitat. The long-term trends are stable to declining. There are more historical records where habitat exists that have not been survey for, but several large populations have been lost due to shoreline development and beach recreation. More surveys of historical populations and consistent monitoring of extant populations is needed to better determine the short and long-term trends of *Cyperus subsquarrosus* in New York.

Details of historic and current occurrence

Cyperus subsquarrosus occurs on Long Island in Suffolk County, in the Hudson Highlands in Orange County, along the Hudson River in Warren County, and on Lake Champlain in Essex County. There are historical records from Oneida County in central New York where it is presumed extirpated due to shoreline development and beach recreation. The populations can fluctuate greatly from year to year, but generally range from 20-300, with one containing 1000-2000 individuals.

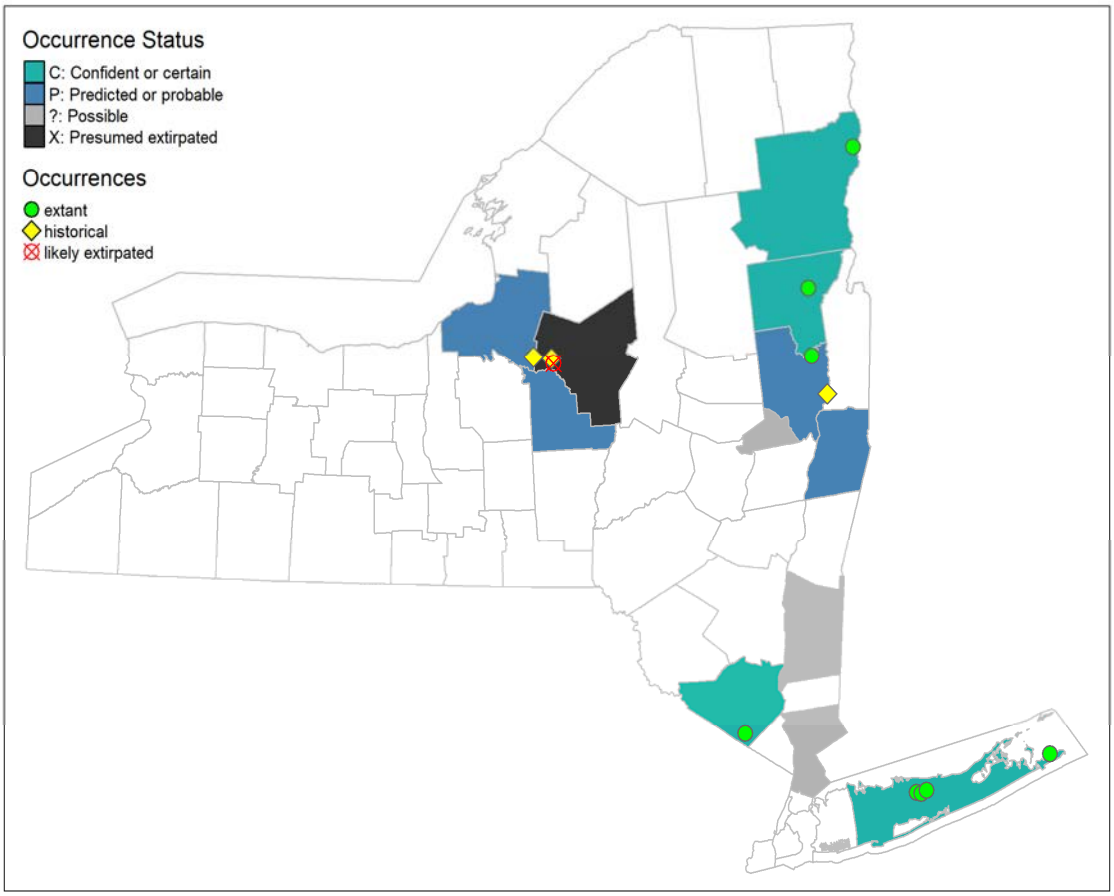

Figure 2: *NYS distribution for* Cyperus subsquarrosus.

Table 1. *Number of records (element occurrences) of* Cyperus subsquarrosus *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	12	10	1.0
1995-2004	7	5	0.5
2005-2014	7	5	0.5
2015-2023	2	2	0.2

Monitoring in New York

There are 19 populations known statewide, of which eight are extant and eleven are historical (NYNHP 2023). Only five of the historical populations are shown in Figure 2 and Table 1. Two occur on NYS Park lands and are monitored on a ten-year rotation. None of the other populations have been regularly monitored. The extant populations were last surveyed in 2005, 2020, and 2021 respectively (NYNHP 2023).

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

NY Natural Heritage Communities: Coastal plain pond shore, Farm pond/artificial pond, Inland non-calcareous lake shore, Riverside sand/gravel bar (Edinger et al. 2014).

Habitat or Community Type Trend in New York

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

Habitat Discussion:

In New York, *Cyperus subsquarrosus* occurs at shorelines and sandbars of ponds, lakes, and rivers, where moist sandy substrates are exposed in the late season as water levels draw down (NYNHP 2023).

Likewise, elsewhere it occurs at the sandy borders of ponds and streams (Fernald 1970), and riverbank draw-down zones, and other moist sandy areas (Weakley 2020).

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):*

Cyperus subsquarrosus is an annual sedge that germinates in mid to late summer on exposed sandy substrates after adjacent water bodies draw down (NYNHP 2023). The wind pollinated flowers bloom shortly after and each flower develops into a single seed (achene). The seeds develop throughout late summer and disperse when mature, typically in early autumn (NYNHP 2023). In addition to falling directly from the inflorescence, seeds may be dispersed short distances by wind and water (Lew-Smith 2003). However, no published information is available regarding the seed dispersal of *Cyperus*.

Baskin et al. (2019) collected soil samples from mudflats to study the seed bank dynamics of drawdown species including multiple *Cyperus* spp. They found that germination rates were low in the first 1-5 years but then steadily increased up to the eleventh year where it then started to decrease (Baskin et al. 2019). After 15 years Baskin et al. (2019) was still seeing germination and surmised that the seed bank could persist for longer.

Justice (1975) found that the seeds of related *Cyperus* were dormant at maturity and for a short time after dispersal. They found that many species of *Cyperus* require after-ripening, maturation of the seed after dispersal, for germination to occur (Justice 1957). While some dormant seeds were able to germinate under a combination of light exposure and cold stratification, after-ripening was found to reduce those requirements and increase germination rates over time (Justice 1957). Baskin and Baskin (1971a, 1971b) found that the seeds of the related *Cyperus squarrosus* could be forced to germinate through a combination of stratification, scarification, and exposure to light. Baskin and Baskin (1971b) concluded that the duration and intensity of light was a critical factor to initiating germination of *Cyperus squarrosus* seeds and likely limited the species habitat. Baskin et al. (2019) also found that mudflat annuals can germinate when submerged as long as exposed to light.

The seed bank and population structure of mudflat annuals is driven by draw down cycle (Baskin et al. 2019). A long-lived seed bank allows species such as *Cyperus subsquarrosus* to maintain their populations during high water years. In years with an early draw down the growing season is extended and plants are able to produce more seeds, replenishing the seed bank (Baskin et al. 2019). Unfortunately, very little published information regarding the natural history, demographics, or ecology of *Cyperus subsquarrosus* is available. More research is needed.

Table 2. *Phenology of* Cyperus subsquarrosus *in New York State (NYNHP 2023).*

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

VI. Threats

Cyperus subsquarrosus is threatened by direct destruction from foot traffic and off-road vehicles in areas with high beach recreation. Changes in hydrology and water quality could severely limit the population sizes and amount of available habitat. Wakes from heavy boat traffic may also limit habitat and affect population sizes. Invasive species threaten the habitat of several populations.

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:

The shoreline habitat of this species should be protected from direct human disturbance such as excessive trampling, beach grooming, and soil disturbance from ATVs. The hydrology and water quality around the occurrences should be preserved. Invasive plant species threatening the shoreline habitats should be managed.

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* Cyperus subsquarrosus.

Conservation Actions	
Action Category	**Action**
Land/water protection	1.1. Site/area protection

Conservation Actions	
Action Category	**Action**
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

VII. References

This SSA drew heavily from these resources:

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].

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].

New York Natural Heritage Program. 2024. Online Conservation Guide for Cyperus subsquarrosus. Available from: https://guides.nynhp.org/dwarf-bulrush/. [Accessed 03/07/2024].

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:

Baskin, Carol C., Jerry M. Baskin and Edward W. Chester 2019. Long-term persistence of summer annuals in soil seed banks of seasonally dewatered mudflats. Plant Ecology. Vol. 220. 45481:731-740

Baskin, Jerry M. and Carol C. Baskin. 1971a. Germination of Cyperus inflexus Muhl. Botanical Gazette 132: 3-9.

Baskin, Jerry M. and Carol C. Baskin. 1971b. The possible ecological significance of the light requirement for germination in Cyperus inflexus. Bulletin of the Torrey Botanical Club 98: 25-33.

Crow, Garrett E. and C. Barre Hellquist. 2000. Aquatic and wetland plants of northeastern North America: A revised and enlarged edition or Norman C. Fassett's a manual of aquatic plants. Volume two angiosperms: Monocotyledons. The University of Wisconsin Press. Madison, Wisconsin. 456 pp.

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.

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

Flora of North America Editorial Committee. 2002. Flora of North America, North of Mexico. Volume 23. Magnoliophyta: Commelinidae (in part): Cyperaceae. Oxford University Press, New York. 608 pp.

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.

Justice, Oren L. 1957. Germination, dormancy, and viability in seeds of certain weedy species of Cyperus. Proceedings of the Association of Official Seed Analysts. Vol. 47:167-175.

Lew-Smith, Michael 2003. Cyperus houghtonii Torrey, Houghton's Flat Sedge, Conservation and Research Plan for New England. New England Plant Conservation Program. New England Wildflower Society

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.

Voss, E.G. 1972. Michigan Flora, Part I. Gymnosperms and Monocots. Cranbrook Institute of Science Bulletin 55 and the University of Michigan Herbarium. Ann Arbor. 488 pp.

Weakley, A.S. 2020. Flora of the southeastern United States. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, NC. Available from: https://ncbg.unc.edu/research/unc-herbarium/floras/