Northeastern bulrush
(*Scirpus ancistrochaetus*)

5-Year Review

August 2019

U.S. Fish and Wildlife Service
New England Field Office
Concord, New Hampshire

5-YEAR REVIEW

Northeastern bulrush (*Scirpus ancistrochaetus*)

GENERAL INFORMATION

Species: Northeastern bulrush (*Scirpus ancistrochaetus*)
Date listed: June 6, 1991
FR citation(s):

55 FR 46963-46968	Proposed endangered status for *Scirpus ancistrochaetus*
56 FR 21091-21096	Determination of endangered status for *Scirpus ancistrochaetus*
70 FR 38976	Initiation of a 5-year Review for *Scirpus ancistrochaetus*
75 FR 47025 47026	Initiation of a 5-year Review for *Scirpus ancistrochaetus*
83 FR 39113 39115	Initiation of a 5-year Review for *Scirpus ancistrochaetus*

Classification: Endangered
Critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing: none

Methodology used to complete the review:
In accordance with section 4(c) (2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened and endangered species to determine whether its status has changed and if it should be classified differently or removed from the List of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the northeastern bulrush as part of a Species Status Assessment (SSA) to inform this 5-year review.

The Service established a team to conduct the SSA and develop the SSA Report (Service 2019). The Service invited state agencies from all states within the range of the species to participate in development of the SSA. The team consisted of Service biologists as well as a species expert from the Commonwealth of Pennsylvania. The SSA Report represents our evaluation of the best available scientific information, including the resource needs and the current and projected future conditions of the species. The SSA Report underwent independent peer and partner review before being used as the scientific basis to support a decisionmaking process reflected in the recommendation presented in this 5-year review.

The species occurs only within the North Atlantic-Appalachian Unified Region 1. The lead field office (FO) is the New England Field Office.

REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment Policy: Not Applicable

Recovery Criteria:

The objective identified in the northeastern bulrush Recovery Plan (Plan) (Service 1993) was to reclassify the species from endangered to threatened. The Plan stated that reclassification to threatened would be initiated when:

1. 20 populations are permanently protected;
2. annual monitoring over a 10-year period shows that 20 representative populations are stable or increasing; and
3. life history and ecological requirements are understood sufficiently to allow for effective protection, monitoring, and management.

The previous 5-year review (Service 2009) determined the downlisting criteria identified in the Plan were only partially met, the Service recommended a change in listing status to threatened, because (1) the number of extant populations was three times greater than when the species was listed; (2) approximately half of all known populations were on public lands; and (3) approximately half of the extant populations appeared to be stable or increasing.

The Plan does not contain delisting criteria. As a result of the SSA analysis and our finding and recommendation in this 5-year review that the northeastern bulrush does not meet the definition of threatened or endangered, we will not address recovery criteria further at this time. Please refer to the 5-factor analysis below for information on threats to the species.

Updated Information

Biology and Habitat:

The northeastern bulrush is a wetland obligate plant occurring in acidic to circumneutral wetlands including sinkhole ponds, wet depressions, vernal pools (collectively, seasonal or ephemeral wetlands), beaver flowages, and other riparian areas found in hilly country (Service 1991). Northeastern bulrush requires water levels that fluctuate seasonally and/or annually as well as ample sunlight. The northeastern bulrush can reproduce both sexually and vegetatively, though its primary means of recruitment appears to be vegetative reproduction. Fluctuations in population size are common, and plants can be absent above ground for several years in response to unfavorable environmental conditions before re-emerging when favorable habitat conditions return.

Population Status

There are 148 known extant populations of the northeastern bulrush in 8 states, up from 113 known extant populations in 7 states at the time of the 2009 5-year review. A State-by-State summary of the status of the northeastern bulrush is presented below.

New York. At the time of the 2009 5-year review, there was only one historical extirpated population, located in northeastern New York near the Vermont border. In 2010, a second New

York population was found adjacent to central Pennsylvania. There is a third population in New York where the Wetland Trust and the Upper Susquehanna Coalition implemented a pilot program to propagate and transplant the northeastern bulrush.

Pennsylvania. At the time of the 2009 5-year review, there were 70 known extant northeastern bulrush occurrences. Today, there are 89 known extant populations. All new populations are within its previously known range.

Massachusetts. At the time of the 2009 5-year review, there was only one known extant occurrence in Massachusetts. A second population was found in 2011.

New Hampshire. At the time of the 2009 5-year review, there were nine known extant occurrences in New Hampshire. Today, there are 14 known extant populations. The new populations were found in Merrimack County, approximately 40 miles east of its previously known range. Visual observations indicate that one of these populations may be the largest in the State, although it has not been thoroughly surveyed due to its location being partially on private property.

Vermont. At the time of the 2009 5-year review, there were 22 known extant populations. Today, there are 31 known extant populations. Newly discovered populations are all within the previously known range.

Virginia. At the time of the 2009 5-year review, there were seven known extant populations in Virginia. As of 2017, there were eight known extant populations.

Maryland. No Change. There is one known extant occurrence in Maryland.

West Virginia. No Change. There are three known extant populations in West Virginia.

Genetics

The best available genetic information on the northeastern bulrush comes from Cipollini *et al.* (2013) and Cipollini *et al.* (2017). As the authors acknowledge, because the results of Cipollini *et al.* (2017) are based on analysis of only eight loci, there is some uncertainty in the conclusion drawn from these results. Cipollini *et al.* (2017) explored genetic variation among populations of the northeastern bulrush across its range. Populations do not appear to be well connected genetically and are clustered by geography and distance (Cipollini *et al.* 2013). The Pennsylvania and southern Appalachian clusters exhibit higher genetic diversity than the New England cluster (Cipollini *et al.* 2017). This suggests either rare long-distance dispersal (e.g., seeds transported by migratory birds or other means) and recruitment or a historically more widespread "parent" population with connectivity between the regions. The autosomal genotype found in the New England cluster is not represented in the other clusters. Genetic variation among populations within each cluster is low, especially in the New England states where

populations are genetically identical to each other and differ from the other two clusters. Rangewide, there is almost no intrapopulation genetic diversity Cipollini et al. (2013).

Threats, Conservation Measures, and Regulatory Mechanisms:

The primary threat to the northeastern bulrush that has been identified since the 2009 5-year review is changing climate. We generally anticipate climate change will result in higher water levels early in the growing season followed by hotter summers and a faster drying cycle. Changing climate will affect fluctuating water levels and light availability, both of which are factors affecting the species' viability. Populations that occur in seasonal wetlands, particularly those populations that are currently considered to be in "poor" condition, will display the strongest negative effects of climate change. A detailed description of the factors affecting the viability of the northeastern bulrush is presented in the SSA Report.

Threats from low genetic diversity include genetic drift and inbreeding depression, and lower genetic diversity reduces the species' adaptive capacity. We are not aware of any evidence that low genetic diversity has affected population viability; however, the effects of low genetic diversity in the northeastern bulrush have not been studied.

Conservation measures have benefited northeastern bulrush viability. Rangewide, survey efforts have resulted in a dramatic increase in the number of known populations across its range. In Pennsylvania, long-term monitoring efforts are being conducted to develop management strategies. In New York, there is a successful pilot program for the propagation and transplantation of the northeastern bulrush. In Vermont, the Service is conducting invasive species control measures. A detailed description of conservation measures can be found in the SSA Report.

Regulatory protections afforded to the northeastern bulrush include the Clean Water Act of 1972 (as amended), State wetland protections, and State endangered species regulations. These protections apply independently of the species' Federal status under the Act. More information on regulatory mechanisms can be found in the SSA Report and Factor D below.

Synthesis

Currently, there are 148 known extant populations of the northeastern bulrush distributed across a 600-mile north/south range in 4 physiographic provinces and 2 habitat types. This results in good resiliency and redundancy. Genetic diversity is low but representation is increased by environmental setting diversity, resulting in moderate representation. The northeastern bulrush continues to be found at sites both within and outside of its known range. The SSA Report's future condition scenario expects the species' resiliency to decline moderately and its representation and redundancy to decline slightly.

Five-factor Analysis:

The purpose of a 5-year review is to recommend whether a listed taxon continues to warrant protection under the Act and, if so, whether it should be reclassified (from threatened to endangered or from endangered to threatened). This task requires that the analysis of the threats to the species be performed while assuming that the species is not receiving the regulatory protections, funding, recognition, and other benefits of listing under the Act. Summaries of ongoing applications of the Act's protections may shed light on some future activities that constitute threats to the species. However, the analysis under Factor D (Inadequacy of Existing Regulatory Mechanisms) focuses on the adequacy of alternative (i.e., non-ESA) mechanisms to address the continuing and foreseeable threats.

Factor A. Present or threatened destruction, modification, or curtailment of the species' habitat or range:
Human-caused disturbance can affect northeastern bulrush populations directly and indirectly, as can beaver activity if the activity causes water levels to get too high or to stay level for a long period of time. At the time of listing, development was identified as an important threat, but that threat appears to have diminished. At this time, oil and gas development in Pennsylvania is perhaps the most likely development threat; however, no available information indicates any populations are under imminent threat from development. Although other types of activities such as road construction, forestry, recreation, and plant competition are factors that may affect the species, they are not primary factors influencing viability of the northeastern bulrush. A description of these factors can be found in the SSA Report.

Climate change is a primary factor influencing viability, and we expect climate change to reduce the quality of northeastern bulrush habitat that occurs in seasonal wetlands. We generally anticipate that changes in climate will result in higher water levels early in the growing season followed by hotter summers and a faster drying cycle. Changing climate will affect water level fluctuations through increased temperatures, increased droughts and floods, and decrease light availability as co-occurring vegetation increases in response to a longer growing season. Effects of changing climate are further described in Factor E.

Factor B. Overutilization for commercial, recreational, scientific or educational purposes:
Overutilization does not appear to be a factor affecting the northeastern bulrush at this time.

Factor C. Disease or predation:
Disease has not been documented as a factor affecting the species.

Deer browsing and trampling, as well as bear trampling and wallowing, have been noted in some populations, and these activities can have mixed, sometimes substantial, impacts on northeastern bulrush populations, especially if the populations are very small. Deer browsing impacts individuals and may affect plant fitness, particularly if other factors, such as decreased light availability, are affecting the population. Bear trampling and soil compaction occur as bears move through northeastern bulrush sites. Bears also excavate wallows near the edge of wetlands, and some northeastern bulrush populations have been impacted by this activity. Wallows can be

big enough to affect entire populations if the populations are very small; however, wallows also can be beneficial as they help create areas of open water, which are important during dry periods. These factors affect only a small number of populations, and they are not likely to cause the extirpation of a population. Therefore, predation and wallows are not primary factors influencing northeastern bulrush viability.

Factor D: Inadequacy of existing regulatory mechanisms:
All wetland habitats in which the northeastern bulrush occurs are ostensibly protected by Federal and State statutes and regulations (e.g., Clean Water Act), although these mechanisms typically include a permitting process that allows direct impacts to wetlands. Some States have additional statutes and/or regulations that protect the northeastern bulrush and/or its habitat. For example, Vermont, New York, and Massachusetts require protection of upland buffers and permits to work within wetlands; however, State protection of upland areas around the wetlands is inconsistent, and disturbance such as roads or other development near wetlands can cause indirect effects such as sedimentation, altered hydrology, and introduction of invasive species.

The species is designated as State endangered throughout its range except for West Virginia, which does not have a State endangered species law, and these State designations are independent of the species' Federal status. The States that currently protect the northeastern bulrush under an endangered species law or otherwise, generally, at a minimum, require project proponents to coordinate with State resource agencies to develop minimization measures. A description of the States' regulatory protections can be found in the SSA Report. In general, the northeastern bulrush is not at risk rangewide from inadequacy of regulatory mechanisms.

Factor E: Other natural or manmade factors affecting its continued existence:
Although the species exists in wetlands that regularly experience fluctuating water levels, the northeastern bulrush and its habitat are susceptible to floods and droughts. We expect that changes in climate will impact the northeastern bulrush's habitat by changes in the amount, timing, and severity of precipitation and drought; and the number of extreme precipitation events. Higher temperatures, without increasing summer precipitation, may cause wetlands to dry up earlier, and an extended growing season may allow other vegetation to encroach upon, and increase shading of, northeastern bulrush. We expect these impacts to be more noticeable in populations that occur in seasonal wetlands. We expect beaver activity to mitigate effects of changing climate by maintaining larger wetlands and open area compared to seasonal wetlands and by removing trees and reducing shading at the wetland perimeter.

Climate change is the primary factor influencing the viability of the northeastern bulrush. However, only those populations in seasonal wetlands may be substantially impacted. We expect the 13 populations (8.7 percent of known extant populations) in seasonal wetlands that are currently in poor condition will be unable to respond to the additional stress of changing climate and will be extirpated. We expect all populations in beaver wetlands to persist. Additional information on the effects of climate change on the northeastern bulrush can be found in the SSA Report.

Synthesis

When the northeastern bulrush was listed as endangered, there were 13 known populations in 6 states. Following years of increased survey efforts and discovery of many new populations, the 2009 5-year review recommended that the northeastern bulrush be reclassified from endangered to threatened. We now know of 148 extant populations distributed across 8 states, 4 physiographic provinces, and 2 habitat types. Additional populations likely will be found as *de novo* searches continue.

The SSA Report's future condition scenario projects a loss of 8.7 percent (13) of extant populations and that throughout its range, the northeastern bulrush's resiliency will exhibit a moderate decline, while its representation and redundancy will show a slight decline. Nevertheless, 135 populations are projected to remain distributed across a large geographic range in at least 3 physiographic provinces, 2 habitat types, and all currently occupied States.

Based on the species' current representation, resiliency, and redundancy and our analysis of threats that may influence its future condition, we conclude that the northeastern bulrush has a very low risk of extinction in the near term and that this risk is not likely to increase appreciably in the foreseeable future. Therefore, the northeastern bulrush is not in danger of extinction throughout all or a significant portion of its range and is not likely to become in danger of extinction in the foreseeable future, and it no longer meets the definition of an endangered or threatened species.

RESULTS

Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
__X_ **Delist** (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
__X_ *Recovery*
____ *Original data for classification in error*
____ No change is needed

New Recovery Priority Number *(indicate if no change; see 48 FR 43098, September 21, 1983 & 48 FR 51985, November 15, 1983 - Correction)*:

Brief Rationale:

Listing and Reclassification Priority Number, if reclassification is recommended *(see 48 FR 43098, September 21, 1983)*

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (Removal from list regardless of current classification) Priority Number:
____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Develop a post-delisting monitoring plan with States and species experts.
- Develop standard survey protocol for use in the post-delisting monitoring plan.

Literature Cited

Cipollini, K., P. Lavretsky, D. Cipollini and J. Peters. (2017). Genetic Population Structure across the Range of Endangered Northeastern Bulrush, *Scirpus ancistrochaetus*. International Journal of Plant Sciences. 178. 000-000. 10.1086/688960.

Cipollini, K., K.C. Millam, D. Burks, D. Cipollini, S. Girod, Z. VanGundy and J.L. Peters. 2013. Genetic structure of endangered northeastern bulrush (*Scirpus ancistrochaetus*) in Pennsylvania, USA using information from RAPDs and SNPs. Biochem Genet 51:686–697.

[Service] U.S. Fish and Wildlife Service (Service). 1993. Northeastern bulrush (*Scirpus ancistrochaetus*) recovery plan. Hadley, Massachusetts. 70 pp.

[Service] U.S. Fish and Wildlife Service (Service). 2009. Northeastern bulrush (*Scirpus ancistrochaetus*) 5-year Review: Summary and evaluation. Available online at http://ecos.fws.gov/docs/five_year_review/doc2618.pdf. Accessed March 10, 2010.

[Service] U.S. Fish and Wildlife Service. 2019. Species Status Assessment Report for the Northeastern Bulrush (*Scirpus ancistrochaetus*), Version 1.0. August 2019. Hadley, MA.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of northeastern bulrush (*Scirpus ancistrochaetus*)

Current Classification: Endangered

Recommendedation resulting from the 5-year Review:

___ Downlist to Threatened
___ Uplist to Endangered
_X_ Delist
___ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:

REGIONAL OFFICE APPROVAL:

Approve: Paul R. Ply Date: 8/28/19

Assistant Regional Director – Ecological Services, DOI Unified Region 1 - North Atlantic-Appalachian, U.S. Fish and Wildlife Service