Species Listing PROPOSAL Form:

Listing Endangered, Threatened, and Special Concern Species in Massachusetts

Scientific name: *Mimulus moschatus* **Current Listed Status (if any):** E

Common name: Muskflower

Proposed Action:

_____Add the species, with the status of: _____
_____Remove the species
__X__**Change the species' status to:** ____T__

Change the scientific name to: _____
Change the common name to: _____
(Please justify proposed name change.)

Proponent's Name and Address:
Karro Frost, NHESP, 100 Hartwell Rd., West Boylston, MA 01583

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Association, Institution or Business represented by proponent: NHESP

Proponent's Signature: **Date Submitted:**
5/30/2014

Please submit to: Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, 1 Rabbit Hill Road, Westborough, MA 01581

Justification

Justify the proposed change in legal status of the species by addressing each of the criteria below, as listed in the Massachusetts Endangered Species Act (MGL c. 131A) and its implementing regulations (321 CMR 10.00), and provide literature citations or other documentation wherever possible. Expand onto additional pages as needed but make sure you address all of the questions below. The burden of proof is on the proponent for a listing, delisting, or status change.

(1) Taxonomic status. Is the species a valid taxonomic entity? Please cite scientific literature.
Yes, *Mimulus moschatus* Dougl. is a valid taxonomic name. The name was published in Bot. Reg. *Pl. 1118* (1827). The species retains this name in Fernald 1950 and in Haines 2011.

(2) Recentness of records. How recently has the species been conclusively documented within Massachusetts?
Four populations were conclusively documented in Massachusetts during 2013. Massachusetts has 16 distinct EOs, and 10 are current (NHESP database).

(3) Native species status. Is the species indigenous to Massachusetts?
Cullina et al. 2011 list the species as native to Massachusetts. Sorrie 1987 considered the populations in Franklin and Hampshire counties native, but populations in Middlesex County were considered introduced.

There has been controversy about the native status of this species as its first New England observation was in 1902, after it had been observed in western North America (Ewing 2001).

M. moschatus has a natural range reported as: "Nf. and Que. to Mich., s. through N.Y. to W. Va. and widespread in the w. cordillera, sometimes escaped from cult. elsewhere in our range." (Gleason and Cronquist 1991). Although there has been DNA research on this species, all specimens in the literature have been from the western US (Whittall et al. 2006).

(4) <u>Habitat in Massachusetts.</u> Is a population of the species supported by habitat within the state of Massachusetts?

Yes, the species is currently supported by habitat in Massachusetts.

(5) <u>Federal Endangered Species Act status.</u> Is the species listed under the federal Endangered Species Act? If so, what is its federal status (Endangered or Threatened)

No, this species has no federal status.

(6) <u>Rarity and geographic distribution.</u>

(a) Does the species have a small number of occurrences (populations) and/or small size of populations in the state? Are there potentially undocumented occurrences in the state, and if so, is it possible to estimate the potential number of undocumented occurrences?

<u>Number of populations</u> MA has 16 distinct EOS, 10 of which are current (NHESP database). It is ranked as G5 species and as N3N4 nationally. Among New England states, it is of conservation concern in VT (S2) and NH (S1). This species is considered exotic in Maine, and hasn't been ranked in CT. It is not known from RI. It is of conservation concern in VA and NC, and QC and QN in Canada. It is considered exotic in NF, PE, NB, NS in Canada and NY and WV in the US (NatureServe 2014).

<u>The population sizes of extant MA occurrences</u> Documented population numbers vary greatly. EOs vary from a few genets in EOs 13 and 14 to 1000s in EO 1 and 10. Three EOs in the database have hundreds of genets, 3 EOs have 15 to 100 genets, and 4 EOs have less than 15 genets.

<u>Likelihood of finding additional EOs</u> It is likely that additional plants will be discovered. In the past three years, the Franklin County Flora Group has found and documented 5 EOs. It is likely that more EOs will be located on the Green River in Colrain, Leyden and Greenfield, the West Branch of North River in Colrain and Heath, and the Deerfield River throughout its length in western Franklin County. In addition, several sub-populations were observed along the east branch of the Westfield River upstream of Knightsville dam. There is potential that more populations may be located upstream and downstream of the floodplains surveyed in 2013.

(b) What is the extent of the species' entire geographic range, and where within this range are Massachusetts populations (center or edge of range, or peripherally isolated)? Is the species a state or regional endemic?

The species range includes most of the US and Canada west of the Rocky Mountains and sporadically among the eastern states. It is thought that the native populations occur in cool seepy areas in Franklin and Hampshire counties in Massachusetts. It is not state or regionally endemic.

(7) <u>Trends.</u>

(c) Is the species decreasing (or increasing) in state distribution, number of occurrences, and/or population size? What is the reproductive status of populations? Is reproductive capacity naturally low? Has any long-term trend in these factors been documented?

<u>State distribution</u> The known distribution of county records for this species has not changed much: it was previously known from Franklin, Hampshire and Middlesex counties, with the population in Middlesex believed to be an introduction. The current populations are located in Franklin and Hampshire counties only (NHESP database).

<u>Number of populations</u> The known number of populations and sub-populations has increased recently due to surveys in Franklin county which have not been done intensively in the past. As stated above, it is likely that there are additional plants which have yet to be observed and documented. All of the current EOs have been updated in the past 5 years. The species does well in seepy, disturbed banks along streams and rivers. It is likely that some of the recent weather events (Hurricane Irene and "Super Storm Sandy") benefitted this species in opening up new scour areas for it to colonize.

Population sizes of extant MA occurrences Based on a review of the information in the NHESP database, it appears that this species is located in scour areas for quite a period of time then is gradually shaded out by successional trees and shrubs. Populations in anthropogenic maintained areas (EOs 1 and 10) have existed for many years and their population numbers appear to be stable.

Reproductive capacity Not much is known about the reproductive capacity of this species. This is a short-lived perennial that can reproduce vegetatively. The seeds are non-dormant (short-lived seed bank). It is intolerant of drought stress and will not produce seeds in drought conditions.

(8) Threats and vulnerability.

(d) What factors are driving a decreasing trend, or threatening reproductive status in the state? Please identify and describe any of the following threats, if present: habitat loss or degradation; predators, parasites, or competitors; species-targeted taking of individual organisms or disruption of breeding activity.

This species is known to be impacted from drought and over-shading. It is thought that it is not a strong competitor and could easily be out-competed by invasive species, including *Fallopia japonica* and *Phalaris arundinacea* which form mono-cultures Another factor is soil sedimentation in its habitat (one population is thought lost due to soil "slumping" covering the population) or scour. Changes in hydrology, which can lead to drought, sedimentation and scour, are very important to the long-term survival of the species. However, scoured and seepy areas provide prime habitats for this species. An additional threat is the species is a short-lived perennial, and populations fluctuate from year to year even in the best conditions.

(e) Does the species have highly specialized habitat, resource needs, or other ecological requirements? Is dispersal ability poor?

> "*Mimulus moschatus* is rare in New England due to its specialized habitat requirements. It is found along watercourses and also sometimes appears in disturbed sites such as ditches and roadsides. Natural threats to this species are natural succession of open areas to shrub and forest communities, vulnerability to environmental stress, particularly to drought and soil instability. Human threats include development, recreation, road management and manipulation of hydrology. Additionally, *Mimulus moschatus* is not a strong competitor and is subject to threats from exotic invasive plants." (Ewing 2001)

Conservation goals.

What specific conservation goals should be met in order to change the conservation status or to remove the species from the state list? Please address goals for any or all of the following:

Providing data do not indicate that the threat of invasive plants (or another currently unidentified threat) to populations ranked A through CD is dramatically increasing, this species can be delisted (or down-listed to SC) if each of the following occurs:

(a) State distribution, number of occurrences (populations), population levels, and/or reproductive rates

If the number of occurrences increases with additional EOs and/or sub-EOs located in the Quabbin area (Prescott Brook), Deerfield River, North River, Westfield River, Green River and on other rivers with similar habitat in Franklin and Hampshire Counties, to 15, with at least 50% (8) with populations of 200 genets or more, this species could be down-listed to SC. If the number of EOs increases to 30, with at least 50% (15) having

populations of 200 or more genets. The state distribution is not expected to increase beyond Franklin and Hampshire counties where the prime habitat for this species is located.

(b) Amount of protected habitat and/or number of protected occurrences

Fifty percent of the current EOs are protected or partially protected. If the number of EOs on protected land can remain at or above 50%, the species may be considered for down-listing to SC or delisting. In addition, as a wetland ranked species (OBL) typically found growing on banks of perennial rivers, it also has protection under the MA Wetlands Protection Act.

(c) Management of protected habitat and/or occurrences

No criteria at this time.

Literature cited, additional documentation, and comments.

Cullina, MD, B Connolly, B Sorrie and P Somers. 2011. The Vascular Plants of Massachusetts: A County Checklist, First Revision. MA NHESP.

Ewing, BC. 2001. *Mimulus moschatus* (Musk Flower) Conservation and Research Plan. New England Wild Flower Society, Framingham, MA, USA.

Fernald, ML 1950. Gray's Manual of Botany, Eighth Edition. D. Van Nostrand Co. New York.

Gleason, HA and A Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition. The New York Botanical Garden, Bronx, New York, USA.

Haines, A. 2011. Flora Novae Angliae. New England Wild Flower Society, Framingham, MA, USA.

The International Plant Names Index [web application]. 2014. Plant Name Query. Published on the Internet http://www.ipni.org [accessed 21 March 2014].

Massachusetts Natural Heritage and Endangered Species Program (NHESP). 2014. Biotics Database.

NatureServe. 2014. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: March 5, 2014).

Sorrie, BA. 1987. Notes of the Rare Flora of Massachusetts. *Rhodora*, Vol. 89, No. 858: 113-196.

Whittall, J.B., M.L. Carlson, P.M. Beardsley, R.J. Meinke., and A. Liston. 2006. The *Mimulus moschatus* Alliance (Phrymaceae): Molecular and Morphological Phylogenetics and their Conservation Implications. *Systemic Botany*, 31(2): pp. 380-397.