# Listing Endangered Species in Massachusetts

## The Basis, Criteria, and Procedure for Listing Endangered, Threatened, and Special Concern Species

### Natural Heritage & Endangered Species Program

### Massachusetts Division of Fisheries and Wildlife

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# Introduction

**▪ What is the purpose of this document?**

This document describes the basis, criteria, and procedure with which decisions are made regarding the listing and delisting of Endangered, Threatened, and Special Concern species in Massachusetts. Listing is based on the Massachusetts Endangered Species Act (MESA) statute (see Appendix C) and its implementing regulations (see Appendix D).

**▪ What is the basis for the guidelines?**

The guidelines build upon listing policy as administered since implementation of the MESA regulations in 1991, and draw upon other major systems used in the assessment of extinction risk, particularly the systems of NatureServe (Master et al. 2007) and the International Union for the Conservation of Nature (IUCN 2001). Concordance with these and other major systems is sought through the use of three main criteria in the assessment of extinction risk: rarity, trend, and threat. In addition, recent scholarly articles on endangered species listing policy have influenced this document, most notably the studies of O'Grady et al. (2004), Regan et al. (2005), and Grammont and Cuaron (2006).

**▪ What is the purpose of the Massachusetts List of Endangered, Threatened, and Special Concern Species?**

The purpose of the Massachusetts List of Endangered, Threatened, and Special Concern Species (the "MESA list") is to <u>provide legal protection for species at risk, or potentially at risk, of extirpation from Massachusetts, or at risk of global extinction</u>. Criteria used to determine Endangered, Threatened, or Special Concern status must be assessed on a statewide basis. The MESA list is used by government agencies, private conservation organizations, and individuals. The staff of the Natural Heritage & Endangered Species Program (NHESP) in the Division of Fisheries & Wildlife uses the list in making regulatory decisions (pursuant to the Massachusetts Endangered Species Act and the Wetlands Protection Act), prioritizing land aquisition and habitat management projects, and in other conservation activities, in order to offset the effects of documented threats.

**▪ What causes species to be at risk of extirpation from Massachusetts?**

The most pervasive and serious threats to rare species in Massachusetts include: habitat loss (generally due to human activities); habitat degradation (resulting from pollution, alteration of natural disturbance regimes, invasive exotic species, or other factors); predators, parasites, diseases, or competitors; and, for some taxa, the taking of individual organisms or the disruption of breeding activity.

# Guiding Principles

(1) The Massachusetts List of Endangered, Threatened, and Special Concern Species is <u>more than simply a list of rare species</u>.  Rarity is but one criterion used in assessing the risk of extirpation from Massachusetts or of global extinction.  Long-term trends and threats may be an important part of the assessment.  Therefore rarity need not necessarily be concordant with state listing status.  For example, not listing a species for which there are very few populations in the state is reasonable when these populations are large and none of the populations are declining or threatened.  Conversely, listing a species with many populations in the state may be reasonable when most of the populations are small, declining, or threatened.

(2) The decision to add species to, or remove species from, the MESA list, and to determine the appropriate listing status, should be <u>based on all available biological data</u>.  For example, listing decisions may be based on an assessment of the status and trends of populations, or on an assessment of the amount, quality, and spatial configuration of available habitat, or both.  Not all desirable biological information will be available for all species, but all available data should be considered.  The proponent of a listing, delisting, or status change is responsible for compiling and presenting all available data relevant to the listing decision (321 CMR 10.03(7)).

(3) <u>Available biological information may differ among taxa</u>.  There should be a reasonable attempt to use the best scientific evidence available when assessing the potential listing status of a species.  However, for some species, available data may not be of sufficient quality, quantity, or scope to have a full understanding of extinction risk.  Therefore, estimation, inference, and projection are necessary components of the assessment process.  For example, when population trend data are not available, habitat trend data may be used, or population trend may be extrapolated from mortality rate or other demographic data.

(4) <u>The listing of a species for which habitat and resource requirements are completely unknown is likely to accomplish little</u>, as regulatory protection and conservation planning for such a species will be impossible.  A more appropriate alternative is to recommend additional research to gather data necessary for proper consideration for listing.  Of course, not every detail of the ecology of a species must be understood before listing – a partial understanding of habitat associations and resource requirements will often be sufficient for status assessment, species listing, regulatory review, conservation planning, and management decisions.

(5) <u>Different assessors may bring different perspectives to the assessment process</u>, and failure to reach a unanimous decision is not a failure of the listing process itself.  When recommendations differ among assessors, every attempt should be made to reach a decision based on the scientific basis of the proposal in the course of the listing procedure (see "Listing, Delisting, and Status Change Procedure" section below).  Because the listing of a species has regulatory consequences (protection under state law), listing a species simply as a precaution is not recommended.  Listing of a less threatened species may have unnecessary social and economic impacts and reduce the proportion of limited resources that are allocated to conservation of more highly threatened species.

# Definitions

**Best Scientific Evidence Available** – means species occurrence records, population estimates, habitat description, assessments, peer reviewed scientific literature, documented consultation with experts and information contained in the records of the Natural Heritage and Endangered Species Program or other credible scientific reports of species sighting information reasonably available to the Director (321 CMR 10.02).

**Director** – means the Director of the Division of Fisheries and Wildlife within the Department of Fish and Game, for purposes of 321 CMR 10.00 located at Rte. 135, North Drive, Westborough, MA 01581.

**Disjunct** – distinctly separate; used in reference to portions of the geographic range of a species.

**Domestic Animals** – means only those animals listed in 321 CMR 9.02(3), except as provided in 321 CMR 9.02(2)(d) (definition found at 321 CMR 9.02).

**Element** – the NatureServe term for a conservation target, which may be either a plant or animal taxon or an ecological community.

**Element Occurrence (or simply "Occurrence")** – the NatureServe term for an area of land and/or water in which a species or natural community is, or was, present.  With reference to a given species element, observation records in geographic proximity are grouped into an "element occurrence," indicating a geographic location presumably inhabited by a population of that species.

**Endangered** – with reference to any species of plant or animal, means in danger of extinction throughout all or a significant portion of its range, or in danger of extirpation from Massachusetts, as documented by biological research and inventory (321 CMR 10.03).

**Endangered Species** – means any species of plant or animal listed as an Endangered Species in Massachusetts pursuant to 321 CMR 10.03 and so listed at 321 CMR 10.90.

**Endemic** – native to, and restricted to, a particular geographical region.

**Extant** – refers to a species present in Massachusetts within the past 25 years, and that has been documented as such with at least one record (less than 25 years old) in the NHESP database.

**Extinction** – means the loss of a species from its entire global range (321 CMR 10.02).

**Extirpation** – means the loss of a species from its entire range within Massachusetts (321 CMR 10.02).

**Federal Endangered Species Act** - means The Endangered Species Act of 1973, 16 U.S.C. §1531 et. Seq. and the regulations promulgated thereunder.

**Federal List** – means the List of Endangered and Threatened Wildlife (50 CFR 17.11) and the List of Endangered and Threatened Plants (50 CFR 17.12).

**Federally Listed Species** – means any species on the federal list (321 CMR 10.02).

**Fisheries and Wildlife Board** – means the board established pursuant to M.G.L. c.131, § 1A.

**Historic** – refers to a species that has not been present in Massachusetts for more than 25 years, and that has no records in the NHESP database less than 25 years old.

**International Union for Conservation of Nature and Natural Resources (IUCN)** – a global conservation network that includes nations, states, various government agencies, non-governmental organizations, and scientists and other experts. The mission of the IUCN is "to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable" (IUCN 2007).

**Native, in reference to species** – means a species which either occurs or has occurred within Massachusetts, provided that the original occurrence of such species is not the result of a deliberate or accidental introduction by humans into Massachusetts or an introduction elsewhere which spread into Massachusetts (321 CMR 10.02).

**Natural Heritage and Endangered Species Advisory Committee** – means the committee established pursuant to M.G.L. c.131, § 5B.

**Natural Heritage and Endangered Species Program (NHESP)** – means the program within the Division of Fisheries and Wildlife responsible for the inventory, research, and protection of rare plant and animal species and the maintenance of electronic and hard copy records of rare species (321 CMR 10.02).

**NatureServe** – A nonprofit organization, formerly part of the Nature Conservancy, that compiles, analyzes, and reports biodiversity data for conservation purposes and the public in general. NatureServe coordinates the network of state Natural Heritage Programs. See NatureServe (2007) for more information.

**Nongame Wildlife** – means any non-domesticated animal not regulated by the Division as a game species and any plant, native to the commonwealth, which is not classified as domesticated (definition found at M.G.L. 131, § 1).

**Plant** – means any member of the plant kingdom including seeds, roots, or other parts (321 CMR 10.02).

**Population** – a group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups.

**Species** – means any distinct plant or animal population whose members interbreed or cross pollinate when mature or are self perpetuating through the production of viable seed or offspring and can include any subspecies or variety of plant or animal (321 CMR 10.02).

**Special Concern** – with reference to any species of plant or animal, means documented by biological research and inventory to have suffered a decline that could threaten the species if allowed to continue unchecked, or occurring in such small numbers, or with such a restricted distribution, or specialized habitat requirements, that it could easily become Threatened within Massachusetts (321 CMR 10.03).

**Species of Special Concern and Special Concern Species** – means any species of plant or animal listed as a Species of Special Concern in Massachusetts pursuant to 321 CMR 10.03 and so listed at 321 CMR 10.90.

**State list** – means the Massachusetts list of Endangered, Threatened, and Special Concern species found at 321 CMR 10.90.

**State-listed Species** – means any species on the state list (321 CMR 10.02).

**Taxa** – plural of taxon.

**Taxon** – a group of organisms at a specified level in a hierarchical taxonomic organization. The specified level may be kingdom, phylum, class, order, family, genus, or species, or any intermediate (sub- or super-) level in this hierarchy.

**Threatened** – with reference to any species of plant or animal, means likely to become endangered within the foreseeable future throughout all or a significant portion of its range, or to be declining or rare as determined by biological research and inventory, and likely to become Endangered in Massachusetts in the foreseeable future (321 CMR 10.03).

**Threatened Species** – means any species of plant or animal listed as a Threatened species in Massachusetts pursuant to 321 CMR 10.03 and so listed at 321 CMR 10.90.

# Criteria for Changes to the Massachusetts List of Endangered, Threatened, and Special Concern Species

## I. Outline of Criteria

Criteria for listing of Endangered, Threatened, and Special Concern species are based on the Massachusetts Endangered Species Act (MGL c.131A, § 4), from which an excerpt is provided in Appendix C; and the Code of Massachusetts Regulations (321 CMR 10.03), provided in Appendix D. These statutory and regulatory criteria are organized into three functional groups, as listed in the following outline and interpreted in section II below.

NOTE: *Italicized* text is that taken directly from the state MESA regulations (321 CMR 10.03).

    (A) Criteria determining <u>eligibility</u> of a species for the list
        (1) Taxonomic status (321 CMR 10.03(5)(a))
        (2) Whether the species is extant or historic
        (3) Whether the species is native or has been introduced (321 CMR 10.03(5)(c))
        (4) Presence of habitat in Massachusetts

    (B) Criterion <u>mandating</u> inclusion of an eligible species on the list
        (5) Federal Endangered Species Act status (321 CMR 10.03(4))

    (C) <u>Criteria for inclusion of an eligible species</u> on the list and determination of listing status
        (6) Rarity
            (a) *Rarity, as determined by a limited number of occurrences or by occurrence in limited numbers* in Massachusetts (321 CMR 10.03(5)(g))
            (b) *Restricted distribution, as determined by limited or disjunct geographic range* (321 CMR 10.03(5)(f))
        (7) Trends
            (c) *Reproductive and population status and trends* in Massachusetts (321 CMR 10.03(5)(b))
        (8) Threats
            (d) *Specialization, as determined by unique habitat requirements* (321 CMR 10.03(5)(e))
            (e) *Vulnerability, as determined by threats to the species or its habitat* (321 CMR 10.03(5)(d))

## II. Interpretation of Criteria

(A) Criteria determining <u>eligibility</u> of a species for the list

To be eligible for listing, a species must meet all four of the following criteria. Any species included on the state list that, due to new information, is subsequently found to no longer meet any of the following four criteria should be proposed for delisting, subject to the standard process described in this document.

(1) Taxonomic status (321 CMR 10.03(5)(a))

To be eligible for listing, a species must be "*any distinct plant or animal population whose members interbreed or cross pollinate when mature or are self perpetuating through the production of viable seed or offspring*" (321 CMR 10.02).  This may include any subspecies or variety of plant or animal.  Within well-studied taxonomic groups for which a widely-used checklist exists (e.g., the American Ornithologists' Union *Check-list of North American Birds*), the state list should be in taxonomic concordance.  Within taxonomic groups for which taxonomic understanding is less well-developed, the state list should be in concordance with the opinion of generally recognized taxonomic expert(s) currently studying the species-level taxonomy of the group in question.  A plant taxon of hybrid origin may be listed if it has been shown to be both: (1) capable of sexual reproduction; and (2) able to maintain discrete populations separate from the parent taxa.

(2) Whether the species is extant or historic

Eligible species must have been documented in the state within the past 25 years.  Historic (no record in the NHESP database less than 25 years old) and extirpated species will be proposed for delisting.

(3) Whether the species is native or has been introduced (321 CMR 10.03(5)(c))

Any non-native species introduced to Massachusetts, or introduced to the region or continent and then spread into Massachusetts, is <u>not</u> eligible for listing.  A native species that had been extirpated from Massachusetts, and then was re-introduced by either purposeful conservation efforts or natural agency, <u>is</u> eligible for listing.

(4) Presence of habitat in Massachusetts

To be eligible for listing, a species must have habitat within the state of Massachusetts.  In most cases, this habitat will support a breeding population, but in some cases the population may not breed in Massachusetts (e.g., when there are seasonal feeding grounds within the state that support a population of a migratory bird that is vulnerable to significant population decline or extinction).

(B) Criterion <u>mandating</u> inclusion of an eligible species on the list

(5) Federal Endangered Species Act status (321 CMR 10.03(4))

Any species that is extant in Massachusetts, and is listed by the Federal Endangered Species Act, must be listed in Massachusetts.  A species federally listed as Threatened must be listed as either Threatened or Endangered in Massachusetts.  A species federally listed as Endangered must be listed as Endangered in Massachusetts.

(C) <u>Criteria for inclusion of an eligible species on the list and determination of listing status</u>

The criteria for listing of a species and determination of listing status are grouped into three main categories: rarity, trend, and threat. These are the major criteria used by NatureServe, IUCN, and other widely-used systems employed in the determination of conservation status (O'Grady et al. 2004, Regan et al. 2005, Grammont & Cuaron 2006).

(6) **Rarity**

(a) *Rarity, as determined by a limited number of occurrences or by occurrence in limited numbers* in Massachusetts (321 CMR 10.03(5)(g))

(i) Number of extant occurrences. Following standardized NatureServe methodology, species observation records in close proximity are grouped into "occurrences," so that each occurrence, together with mapped habitat, is used to infer the presence of a population. Taxon-specific rules are followed in the delimitation of occurrences. Occurrences with no observations of the species within the past 25 years are considered historic, and are not counted for the purpose of assessing rarity.

For some species, knowledge of both within-state distribution and the amount of unsurveyed, appropriate habitat may be used to estimate the total potential number of occurrences, which should then be taken into account in the assessment of rarity. Consider the following hypothetical example: 20 bogs with appropriate habitat characteristics for a particular bog species are identified statewide; 10 of the bogs are adequately surveyed for the species, whereupon the species is at 5 of them. Given these data, the species has at least 5 occurrences in the state, potentially as many as 15, but probably closer to 10. This range (5-15 occurrences) would be used in the assessment of rarity.

Populations of mobile taxa (e.g., birds) may not occupy the area of an occurrence on an annual basis. In such a case, the true number of occurrences may be less than the number of occurrences documented in the NHESP database during the past 25 years. For example, if 20 breeding sites of a listed bird have been documented in the state during the past 25 years, but only 10 of those sites are used in a typical year, then there are only 10 occurrences for the purpose of assessing rarity.

(ii) Population size. When an estimate of population size is available (e.g., for some plants and vertebrate animals), such information will contribute to an assessment of rarity. For many groups of organisms, such data will seldom be available (e.g., insects). Moreover, some organisms (e.g., insects) have a naturally high variability in population size over a relatively short period of time.

(b) *Restricted distribution, as determined by limited or disjunct geographic range* (321 CMR 10.03(5)(f))
(i) Limited global distribution. Restricted distribution (regional endemism) is relevant to the assessment of rarity at a larger scale. When Massachusetts constitutes a significant portion of the global distribution of a species, or harbors a large portion

of the total number of populations of a species, the state assumes a disproportionately high responsibility for conservation of that species relative to the responsibility of other states.

(ii) <u>Disjunction</u>. When Massachusetts populations represent a small and disjunct (relative to species-specific dispersal ability) portion of the global distribution of a species, such populations may represent either a taxonomically unrecognized species, or an evolutionarily incipient species. In such cases, Massachusetts assumes the responsibility for conservation of a disjunct population of that species.

(iii) <u>Edge of range</u>. When a species is both widely distributed and common over much of its range, it may nonetheless be rare in Massachusetts because the state is at the edge the range. Such a species may be at risk of extirpation from Massachusetts for a variety of reasons, including isolation in a suboptimal environment as compared to populations in the interior portion of the range (Lesica & Allendorf 1995). Under some circumstances, peripheral populations are known to diverge genetically from interior populations (Lesica & Allendorf 1995). Such a phenomenon increases the importance of conserving peripheral populations because these populations may be more capable of surviving rangewide population crashes (e.g., as a result of disease) as compared to interior populations (Channell & Lomolino 2000; Lomolino & Channell 1995, 1998; Farnsworth & Ogurcak, 2006).

When a species is locally rare and at the edge of its range in Massachusetts, it should be considered for listing (on the basis of rarity) only when the species has an established history of occurrence in the state and its populations are not increasing. A species that is at the edge of its range in Massachusetts but shows an increasing population trend, or is expanding its range into the state, should not be considered for state listing on the basis of rarity alone (see Appendix E for an expanded discussion of issues relevant to state listing of peripheral populations).

(iv) <u>Global conservation status and conservation status in surrounding states</u>. While global conservation status (e.g., NatureServe "G Rank") and conservation status in surrounding states (e.g., NatureServe "S Rank") do not necessarily reflect the importance of conserving a species in Massachusetts, such data are informative in that: (1) a globally rare and threatened species must, by definition, be rare and threatened in Massachusetts; and (2) in some cases conservation status in Massachusetts may be informed by conservation status in surrounding states (such data should be viewed with caution, however, because some state conservation status ranks may be inaccurate, outdated, or both).

## (7) **Trends**

(c) *Reproductive and population status and trends* in Massachusetts (321 CMR 10.03(5)(b))

Trend data, when available, should contribute to the assessment of conservation status. Trend data in support of Endangered, Threatened, or Special Concern status must show a consistent pattern of long-term (relative to generation time of the species) decline in total statewide population size, total number of populations within the state, total amount of habitat (specific to the species) in the state, or extent of within-state geographic range. Trend data must be documented across multiple years, often decades, because seasonal and other temporary trends are uninformative in the assessment of conservation status.

## (8) **Threats**

Primary threats to listed species in Massachusetts include: habitat loss (generally due to human activities); habitat degradation (resulting from pollution, alteration of natural disturbance regimes, invasive exotic species, or other factors); population-threatening levels of predation, parasitism, disease, or competition; and population-threatening levels of disruption of nesting, breeding, feeding, or migratory activity. Concrete, species-specific threats must be identified for any given listing proposal. For example, simply listing "habitat loss" as a general threat is insufficient; a particular habitat type in defined locales must be identified and the ongoing threats to its persistence identified.

(d) *Specialization, as determined by unique habitat requirements* (321 CMR 10.03(5)(e))

Some species are more susceptible to anthropogenic threats because of dependence on a particular type of rare or threatened habitat, or dependence on scarce resources within such habitat. For example, some moths and butterflies exhibit larval host plant specificity, some mussels exhibit larval dependence on host fish, and some plants depend on particular animals for pollination or seed dispersal. When a species depends on habitat or habitat resources that are relatively scarce or declining, and such habitats or resources are relatively unprotected and vulnerable to ongoing threats, then the concept of specialization should contribute to the assessment of listing status.

(e) *Vulnerability, as determined by threats to the species or its habitat* (321 CMR 10.03(5)(d))

Some species-specific traits confer greater vulnerability to anthropogenic threats. The assessment of conservation status should take into account such intrinsic vulnerability. Traits conferring intrinsic vulnerability to anthropogenic threats include:

(i) Dispersal ability. In a landscape where habitat is fragmented by development, roads, and other non-habitat features, populations of species having poor dispersal ability may not maintain adequate dispersal, recolonization, and breeding among habitat patches. Additionally, highly fragmented landscapes may cause greater dispersal-related mortality for some species (e.g., turtles, which may be killed by automobiles when dispersal behavior includes the crossing of roads).

(ii) <u>Demographic factors</u>.  Demographic factors contributing to a low reproductive rate, including low fecundity and delayed sexual maturation, contribute to a greater probability of extinction because they inhibit recovery from population decline in the face of ongoing threats.  Such circumstances can be particularly detrimental to rare species when low reproductive rate prolongs small population size.  High variance in population size also increases the probability of extinction when population size is small.

# Listing, Delisting, and Status Change Procedure for the Massachusetts List of Endangered, Threatened, and Special Concern Species

Protocol for reviewing proposals to amend the Massachusetts List of Endangered, Threatened and Special Concern Species:

1. Official species listing proposal form (Appendix A) is submitted to the Natural Heritage & Endangered Species Program (NHESP) by a staff member, received from the public, or received from a member of the Natural Heritage & Endangered Species Advisory Committee (NHESAC). [See Notes 1 and 2 below.]

2. Assistant Director for the NHESP and the senior biologist(s) responsible for the taxon under consideration determine whether the proposal has sufficient documentation, and notify all staff members and the NHESAC of the determination. If documentation is not sufficient, the proponent is notified.

3. All NHESP staff members are notified that a proposal has been received, and the form is made available to them for review.

4. The proposal and any relevant data from the NHESP are sent for independent assessment to at least three external biologists that are knowledgeable about the taxonomy, ecology, and conservation needs of the taxon under consideration. The external biologists may include members of the NHESAC, but not NHESP staff. A two month time limit is placed on these assessments.

5. All NHESP staff members are notified when assessments and comments by external reviewers are available for review, and a schedule is set for the staff to meet and discuss these assessments and comments.

6. Staff members meet to discuss the proposal, including the assessments and comments of the external reviewers, and formulate a recommendation that is presented to Division of Fisheries & Wildlife (DFW) senior staff for their review at the next available senior staff meeting. This recommendation, and the decisions leading to the recommendation, is recorded in the official species listing assessment form (Appendix B). The minimum staff members that must be present include the Assistant Director for the NHESP, the NHESP Manager, and three NHESP biologists, including the senior biologist responsible for the taxon under consideration.

7. The NHESAC is presented with a copy of the original proposal, the assessments and comments of the external reviewers, and the assessment and recommendation of the NHESP. The NHESAC reviews these materials and submits its recommendation to the Director of the DFW.

8.      The Director of the DFW presents the recommendations for changes to the Massachusetts List of Endangered, Threatened and Special Concern Species, as approved by senior staff, and with the NHESAC recommendation, to the Fisheries and Wildlife Board with a request that the proposed changes be presented in a Public Hearing. Any change to the List approved by the Wildlife Board after the Public Hearing must be adopted as a regulation in accordance with the provisions of M.G.L.c. 30A, as outlined in 321 CMR 10.03(9).

Note 1
Proposed changes to scientific or common names will be proposed and/or reviewed by the NHESP biologists responsible for the taxon under consideration, and will not be subject to all of the steps in the review process detailed above. Scientific and common names of vertebrates will be those provided in the lists of standard scientific and common names maintained for each North American vertebrate group. Names used for plants and invertebrates will be those generally accepted by taxonomic experts currently working with the group under consideration.

Note 2
The Proponent is encouraged to correspond with NHESP in the process of developing a list change proposal to obtain summaries of NHESP data relevant to the proposal.

# <u>Species Listing PROPOSAL Form:</u>
**Listing Endangered, Threatened, and Special Concern Species in Massachusetts**

Scientific name: _____     Current Listed Status (if any): _____

Common name: _____

<u>Proposed Action:</u>
_____Add the species, with the status of: _____     Change the scientific name to: _____
_____Remove the species     Change the common name to: _____
_____Change the species' status to: _____     (Please justify proposed name change.)

<u>Proponent's Name and Address:</u>

Phone Number:     E-mail:
Fax:

Association, Institution or Business represented by proponent:

Proponent's Signature:     Date Submitted:

<u>Please submit to:</u>  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) <u>Taxonomic status.</u>**  Is the species a valid taxonomic entity?  Please cite scientific literature.

**(2) <u>Recentness of records.</u>**  How recently has the species been conclusively documented within Massachusetts?

**(3) <u>Native species status.</u>**  Is the species indigenous to Massachusetts?

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

**(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?

    (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?

**(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?

**(8) <u>Threats and vulnerability.</u>**

    (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.

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

**<u>Conservation goals.</u>**

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:

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

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

    (c) Management of protected habitat and/or occurrences

**<u>Literature cited, additional documentation, and comments.</u>**

## Species Listing ASSESSMENT Form:
**Listing Endangered, Threatened, and Special Concern Species in Massachusetts**

This assessment form is for use by the Natural Heritage & Endangered Species Program (NHESP) in documenting the recommendations and decisions made during an evaluation of a species for listing or delisting, or review of its listing status, under the Massachusetts Endangered Species Act. All data relevant to listing decisions must be summarized in this document, with reference to data sources. How these data influenced the final listing recommendation must be clearly discussed. The procedure for review of listing proposals, and a detailed description of the criteria used in listing decisions, are described in detail in the document "Listing of Endangered, Threatened, and Special Concern Species in Massachusetts."

**Species Common Name:** _____ **Scientific Name:** _____

**Current status (circle one):**   Endangered   Threatened   Special Concern   Not listed

**Form completed by:** _____
                         Name                                          Date

The following materials must be completed and received by NHESP prior to completing this assessment, and must be attached to this assessment form. Check and add date to indicate materials have been received:

_____ **Listing, delisting, and status change proposal form,** complete with sufficient documentation (Date received: _____)

**Proposed status (circle one):**   Endangered   Threatened   Special Concern   Not listed

_____ **Independent assessment #1** (Name of external biologist: _____; Date received: _____)

_____ **Independent assessment #2** (Name of external biologist: _____; Date received: _____)

_____ **Independent assessment #3** (Name of external biologist: _____; Date received: _____)

_____ **(Optional) Independent assessment #4** (Name of external biologist: _____; Date received: _____)

<u>**Assessment of Criteria**</u>

This assessment must reference and summarize all available data relevant to the listing decision, including data provided by: (1) original listing, delisting, and status change proposal form; (2) comments from 3 external biologists; and (3) NHESP database and NHESP biologists.

**(A) Criteria determining <u>eligibility</u> of a species for the list**

(1) Taxonomic status.
   Is the species a valid taxonomic entity?  Cite at least one taxonomic authority.

(2) Whether the species is extant or historic.
   Has the species been conclusively documented within Massachusetts during the past 25 years?  Cite data sources (e.g., NHESP database).

(3) Whether the species is native or has been introduced.
   Is the species indigenous to Massachusetts?  Cite data sources.

(4) Presence of habitat in Massachusetts.
   Does breeding, or another critical part of the life cycle, occur in Massachusetts?  Cite data sources.

NOTE:  If the answer to any of questions (1) through (4) above is "no," then the species is ineligible for listing.

**(B) Criterion <u>mandating</u> inclusion of an eligible species on the list**

(5) Federal Endangered Species Act status.
   Is the species listed under the federal Endangered Species Act?  If so, is it listed as Endangered or Threatened?

NOTE:  If the answer to question (5) above is "yes," then the species must be listed in Massachusetts.  If the federal status is Endangered, the species must be listed as Endangered in Massachusetts.  If the federal status is Threatened, the species may be listed as either Endangered or Threatened in Massachusetts.

**(C) Criteria for possible inclusion of an eligible species on the list and determination of listing status**

(6a) <u>Rarity,</u> as determined by a limited number of occurrences or by occurrence in limited numbers in Massachusetts.
   Summarize available data on current number of occurrences (populations) or total population size in Massachusetts. Cite data sources (e.g., NHESP database), describe how the data were measured, and indicate the degree of accuracy of the data.  If the species is thought to be under-documented, include an assessment of the potential number of undocumented occurrences or individuals present in Massachusetts.

(6b)  <u>Restricted distribution</u>, as determined by limited or disjunct geographic range.
Summarize available data on geographic distribution, both globally and within Massachusetts.  Is the species at the edge of its range in Massachusetts?  Do Massachusetts population(s) represent a peripheral range disjunction?  Cite data sources, describe how the data were measured, and indicate the degree of accuracy of the data.

(7)  <u>Reproductive and population status and trend</u> in Massachusetts.
Summarize available data on trend (decreasing, stable, or increasing) in number of occurrences, population size, geographic distribution, or reproductive status.  What is the time period for which the trend is documented?  Is the trend current and ongoing?  Cite data sources, describe how the data were measured, and indicate the degree of accuracy of the data.

(8)  <u>Threats</u>, taking into account ecological specialization and intrinsic vulnerability.
Summarize any and all specific, documented threats to the species or its habitat.  Describe any degree of ecological specialization, or other factors, that make the species inherently vulnerable to these threats.  Are the threats current and ongoing?  Cite data sources.

## Listing Recommendations and Vote

**(1)  NHESP recommendation.**  Explain how the above assessments of rarity, trend, and threats were taken into account, and how these criteria were combined and weighted, in arriving at the NHESP recommendation.

Indicate NHESP recommendation:

_____  List as (circle one):   Endangered   Threatened   Special Concern

_____  Change listing status to (circle one):   Endangered   Threatened   Special Concern

_____  Do not list   or  _____ Remove from list

(Date of recommendation: _____)

**(2) Review by DFW Senior Staff.**  DFW Senior Staff must review the NHESP recommendation.  This assessment form (completed up to this point) must be provided to Senior Staff, along with the listing, delisting, and status change proposal form (complete with sufficient documentation), and comments from at least three external biologists.

_____  NHESP recommendation approved by DFW Senior Staff

(Date of approval: _____)

**(3) Review by Natural Heritage & Endangered Species Advisory Committee.**  Indicate the recommendation of the Advisory Committee, after review of the NHESP recommendation (as approved by DFW Senior Staff).  This assessment form (completed up to this point) must be provided to the Advisory Committee, along with the listing, delisting, and status change proposal

form (complete with sufficient documentation), and comments from at least three external biologists.

_____ NHESP recommendation approved by NHES Advisory Committee.
    (Date of approval: _____)

_____ NHESP recommendation **not** approved and alternate recommendation made by NHES Advisory Committee.
    (Date alternate recommendation received: _____)

Any comments or materials provided by the Advisory Committee, including any alternate recommendation, must be attached or referenced here.  An alternate recommendation may necessitate re-assessment of the NHESP recommendation.

**(4) Public Hearing.**  NHESP recommendation (as approved by DFW Senior Staff), along with NHES Advisory Committee's approval or alternate recommendation, must be presented at a Public Hearing of the Fisheries and Wildlife Board.

_____ Public Hearing held and public input considered
    (Date of hearing: _____)

Any comments or materials that are received from the public, and are relevant to the listing assessment, must be attached or referenced here.  These comments or materials may necessitate re-assessment of the NHESP recommendation.

**(5) Vote by the Fisheries and Wildlife Board.**  Indicate the final vote of the Fisheries and Wildlife Board, based on the NHESP recommendation (#1 above) as approved by DFW Senior Staff (#2 above), review by the Natural Heritage & Endangered Species Advisory Committee (#3 above), and input from the Public Hearing (#4 above):

_____ NHESP recommendation approved by Fisheries and Wildlife Board.

_____ NHESP recommendation **not** approved by Fisheries and Wildlife Board.

    (Date of vote: _____)

Any comments provided by the Fisheries and Wildlife Board in conjunction with their vote must be attached or referenced here.

**Note:**  As provided in 321 CMR 10.03(9), any change to the List approved by DFW and the Wildlife Board after the Public Hearing must be adopted as an amendment to the MESA regulations at 321 CMR 10.00 in accordance with the provisions of M.G.L.c. 30A.

# Appendix C: Excerpt from the <u>Massachusetts Endangered Species Act</u> Relevant to Listing of Species

**CHAPTER 131A. MASSACHUSETTS ENDANGERED SPECIES ACT**

**Chapter 131A: Section 4. Determination of endangered, threatened or special concern status**

Section 4. The director shall conduct investigations and consult with the natural heritage and endangered species advisory committee established pursuant to section five B of chapter one hundred and thirty-one in order to determine whether any species of plant or animal constitutes an endangered or threatened species or species of special concern.

Criteria for determining endangered, threatened or special concern status shall be based on biological data including, but not limited to, reproductive and population status and trends, whether the species is native or has been introduced, vulnerability, as determined by threats to the species or its habitat, specialization, as determined by unique habitat requirements; restricted distribution, as determined by limited or disjunct geographic range and rarity, as determined by a limited number of occurrences or by occurrence in limited numbers.

The director shall list endangered, threatened and special concern species and shall review said list at least once every five years for the purpose of listing or delisting species. The burden of proof for delisting species shall be on the person requesting such change in status. The establishment of said list and any proposed changes thereto shall be by regulation after a public hearing and shall be subject to the provisions of chapter thirty A.

# Appendix D: Excerpt from the <u>Code of Massachusetts Regulations</u><br>Relevant to Listing of Species

**321 CODE OF MASSACHUSETTS REGULATIONS (CMR) 10.03**

**10.03: Listing of Species**

(1) Introduction. The list of Endangered, Threatened, and Special Concern species in effect prior to the effective date of 321 CMR 10.00, as amended by the Fisheries and Wildlife Board on December 30, 1991, is established within 321 CMR 10.90 as the first edition of the list. 321 CMR 10.03 establishes the procedures for amending and updating all subsequent editions of the list.

(2) Species Investigations. The NHESP shall conduct investigations, including but not limited to field surveys and reviews of museum collections, herbaria and published reports, in order to determine whether any species of plant or animal should be considered for listing.

(3) Eligible Species. Any species native to Massachusetts is eligible for listing.

(4) Federally Listed Species. Any species which regularly occurs within Massachusetts and which is listed as endangered or threatened under the provisions of the Federal Endangered Species Act shall be listed in an equivalent category on the state list found at 321 CMR 10.90; provided, however, that the listing of any species on the federal list as a Threatened species shall not limit the discretion of the Director to list said species as Endangered.

(5) Criteria for Listing Species. The criteria for determining Endangered, Threatened, or Special Concern status shall be based on biological data, including, but not limited to:
(a) taxonomic status;
(b) reproductive and population status and trends;
(c) whether the species is native or has been introduced;
(d) vulnerability, as determined by threats to the species or its habitat;
(e) specialization, as determined by unique habitat requirements;
(f) restricted distribution, as determined by limited or disjunct geographic range; and
(g) rarity, as determined by a limited number of occurrences or by occurrence in limited numbers.

(6) List Categories.
(a) Endangered. The Director shall list as Endangered any species of plant or animal in danger of extinction throughout all or a significant portion of its range and species of plants or animals in danger of extirpation as documented by biological research and inventory.
(b) Threatened. The Director shall list as Threatened any species of plant or animal likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and any species declining or rare as determined by biological research and inventory and likely to become endangered in the foreseeable future.

(c) Species of Special Concern. The Director shall list as a species of Special Concern any species of plant or animal which has been documented by biological research and inventory to have suffered a decline that could threaten the species if allowed to continue unchecked or that occurs in such small numbers or with such a restricted distribution or specialized habitat requirements that it could easily become threatened within Massachusetts.

(7) Proposals for Listing or Delisting Species. Any person may propose the addition or deletion of species to or from the list, or for changes in classification of listed species. The burden of proof for delisting species shall be on the person requesting such change in status. Proposals must be submitted in writing to the Director and must contain the following information:
(a) the date submitted; the proponent's name, signature, address, and telephone number; and the association, institution, or business, if any, represented by the proponent.
(b) the common and scientific name of the species;
(c) the listing category being proposed;
(d) a detailed justification of the proposed listing or delisting action, including the past and present population status and distribution in Massachusetts, and any known or suspected threats;
(e) information on the known status of the species throughout its range;
(f) supporting documentation (for example, literature citations, copies of written reports, letters from scientific authorities, maps, or species records, if appropriate); and
(g) other information requested by the Director.

(8) Review of Proposals. Within 21 days of receipt of a proposal and after consultation with the Natural Heritage and Endangered Species Program, the Director shall determine whether sufficient evidence has been submitted to warrant a review of the species' status. Upon a determination that sufficient evidence has been submitted, the Director shall refer the proposal to the Natural Heritage and Endangered Species Advisory Committee for its review. The committee, in conducting its review, may seek the advice of additional persons and shall advise the Director concerning appropriate action. The Director may then recommend any changes to the Fisheries and Wildlife Board. Upon a determination that insufficient evidence has been submitted to warrant further review, the Director shall so notify the person proposing the changes in the list and send a copy to the Natural Heritage and Endangered Species Advisory Committee.

(9) Public Hearing. The establishment of the Massachusetts list of Endangered, Threatened, and Special Concern species, and any proposed changes thereto, shall be by regulation after a public hearing subject to the provisions of M.G.L. c. 30A. Not less than 21 days prior to the public hearing, the Director shall make available a summary of the biological data upon which the listing proposal is based. The Director shall submit to the Secretary of EOEA in time for publication in the Environmental Monitor at least 21 days prior to the public hearing a notice of such hearing and the availability of such summary of biological data.

(10) List Review Frequency. The Director shall review the list of Endangered, Threatened, and Special Concern species, in consultation with the Natural Heritage and Endangered Species Advisory Committee, at least once every five years for the purpose of listing or delisting species.

(11) The List. The official Massachusetts list of Endangered, Threatened, and Special Concern species is found at 321 CMR 10.90.

**Appendix E: "Guidelines for Dealing with Peripheral Populations"**
**Northeast Nongame Technical Committee[1], 29 March 1990**

A difficult aspect of developing and maintaining state lists of endangered and threatened species is the question of how to treat populations that occur at the edge of a species' range. Species decline in abundance at the edges of their ranges. A species that occurs peripherally in a state may range from locally common to extremely rare. Rare peripheral populations are often considered for state listing, in large part because of their rarity. Arguments for and against including peripheral populations on state lists of endangered and threatened species are discussed below. These are followed by recommended guidelines for dealing with peripheral populations in the listing process.

Genetic considerations – It has been argued that peripheral populations should be candidates for state listing because their preservation is essential to preserving the entire compliment of genetic diversity that exists across a species' range. This argument is based on the notion that because peripheral populations are often adapted to extreme of habitat or climate, these populations are likely to be genetically unique, or may exhibit genetic differentiation in the future.

This argument is only partly true, and is truer for some taxonomic groups than others. As long as populations are not reproductively isolated from other populations, they are likely to contain all of the same alleles, i.e. all of the alternatives forms of a given gene, found across that species' range. Low amounts of genetic interchange, as little as one individual migrating between populations per generation, are often sufficient to maintain the presence of all the same alleles in both populations (Allendorf 1983). Thus, a peripheral population is unlikely to contain alleles that are unique to a species, unless it is reproductively isolated from other populations of that species. On the other hand, small, reproductively isolated populations may actually lose some of their genetic diversity through alleles lost to founder effects or genetic drift (Frankel and Soulé 1981).

However, genetic differentiation in the form of changes in allele frequencies often occurs between populations, even if there is considerable exchange of genetic material between the populations. Divergence in allele frequencies has been documented in plant, fish, and invertebrate populations separated by as little as 100 m (Liu and Godt 1983). Genetic differentiation through divergence in allele frequencies is most likely to occur in relatively sedentary species, such as plant, reptiles and amphibians, small mammals, and many invertebrates, and in populations that are isolated from conspecifics by distance or other geographic or ecological barriers (e.g. habitat gradients or environmental extremes). This suggests that a peripheral population of bog turtles, salamanders, or orchids is more likely to have diverged genetically than might a peripheral population of migrant birds. In particular, populations that exhibit adaptive genetic differentiation in response to extremes of habitat or environment may represent unique genotypes worthy of preservation (Liu and Godt 1983).

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[1] A technical committee of state wildlife biologists reporting to the Directors of state Fisheries and Wildlife Agencies in the Northeast. This committee is currently known as the Wildlife Diversity Technical Committee.

<u>A first line of defense</u> – Another argument that favors preserving peripheral populations is that such action will guard against erosion of a species' range and that efforts to preserve peripheral populations provide a first line of defense that protects more central portions of a species' range. Also, because peripheral populations often occur near the edge of a species physiological or ecological tolerances, these populations may be more susceptible to limiting factors, and may serve as an early warning signal for threats that might eventually affect the species through all or a major portion of its range.

Again, these arguments may be only partly true. Because species' ranges often expand and contract over time, periodic fluctuations in peripheral populations, including local pioneering or extinctions, can be expected. Where peripheral populations occur at densities too low to constitute viable populations, extensive management to preserve or increase these populations may be futile or, at best, a bad risk, and may contribute little to the overall welfare of the species. In addition, the factors most responsible for limiting a peripheral population may not be the same factors that control populations near the center of the species' range. It should be axiomatic, then, that the welfare of a species <u>per</u> <u>se</u> is more dependent on the status of populations near the center of its range than on the persistence of peripheral populations.

<u>State versus regional priorities</u>

Perhaps the most common argument put forth for preserving peripheral populations is that of preserving biological diversity within state borders. State endangered species laws have been developed to preserve biological diversity at the state level; they complement federal endangered species legislation that seeks to preserve species at the national level. A mandate of most state endangered and nongame wildlife programs is to preserve the full native fauna and flora within their states. If one seeks to preserve the full compliment of a states' biological diversity, then this must include all species that occur in that state even those that are considered peripheral.

The counter argument recommends that conservation focus on the preservation of species and regional populations, rather than on local and peripheral populations. As stated previously, the welfare of a species is more dependent on what happens to it near the center of its range or across a large portion of its range, rather than at its periphery. Thus, scarce conservation resources should not be directed at peripheral populations at the expense of managing core populations or significant portions of regional populations that may occur within a given state. Although the latter may be more common, they are, in the long run, of greater value to species preservation.

<u>Summary</u>

Given these considerations, we recommend that each species with peripheral populations be considered on a case-by-case basis during a state's listing process. The following general guidelines are suggested as a way to bring additional uniformity to the listing of peripheral populations.

a) A species that occurs near the edge of its range in a state should not be given precedence in the listing process over a candidate species whose range is more nearly centered within that state. A species should be secured across the central portions of its range before substantial management attention and resources are directed at its periphery. This may require regional coordination between state wildlife agencies, the U.S. Fish and Wildlife Service, and private conservation organizations.

b) Precedence should be given to peripheral populations of species that have an established history of occurrence within a state and are stable or declining, rather than to peripheral populations that are increasing in abundance or expanding their range and pioneering into new areas.

c) Precedence should be given to peripheral populations that have the greatest likelihood of genetic uniqueness. These include disjunct populations, peripheral populations of relatively sedentary species, and populations that exhibit differential adaptation to extremes of habitat or environment.

d) Given that state lists of endangered and threatened species often serve to prioritize management and recovery actions, designate which taxa will receive special regulatory protection, and focus public attention, managers should recognize the constraints that apply when developing conservation programs for peripheral populations. Peripheral populations may be severely limited by habitat, climate, or other factors, and may occur at levels that are near or below those required for long-term viability. Even intensive management may have little chance of increasing the abundance or expanding the range of a peripheral population or even insuring its continued viability.

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