



## **Strategy for the Management of Invasive Species On Massachusetts Audubon Society Wildlife Sanctuaries December 2002**

### **Introduction**

The Massachusetts Audubon Society identified invasive species as one of the five threats to biodiversity and the nature of Massachusetts in its 1999 strategic plan<sup>1</sup>. Nationally, conservationists frequently cite invasive species as second only to habitat loss as a threat to biodiversity. Perhaps more than 45% of federally listed endangered and threatened plant and animal species are threatened by invasive species<sup>2</sup>. It has been estimated that invasive non-native species cause environmental damages in excess of \$100 billion per year in the United States<sup>3</sup>. Nationally, invasive plants are estimated to infest 100 million acres and are spreading across three million additional acres every year<sup>4</sup>. In Massachusetts, a number of efforts are underway to address invasive species issues. The Executive Office of Environmental Affairs has created an Invasive Species Council, and four working groups have been established, dealing with invasive plants, aquatic invasive species, wildlife diseases, and invasive invertebrates. The commonwealth has developed a draft aquatic invasive species management plan<sup>5</sup> and a list of invasive and potentially invasive plant species<sup>6</sup>.

Invasive plant species have received the greatest amount of attention, but introduced animals and viral, bacterial, and fungal pathogens may also be invasive. Non-plant invasives, such as zebra mussels, European starlings, hemlock woolly adelgid, chestnut blight, or Dutch elm disease may represent a more pervasive threat to native species and natural communities than invasive plants.

For the purposes of this strategy we define invasive species as *non-native\* organisms that in certain circumstances are able to proliferate and significantly alter or degrade natural communities, or threaten native species, by displacement, superior competitive interactions, modification of ecosystem processes, or predation, or cause high mortality of native species.*

Some common attributes of invasive species include high reproductive rates, effective dispersal abilities, vegetative or clonal reproduction, habitat generalists, large range in area of origin, and high genetic variability. In determining which species we will consider invasive, we will be guided by the criteria developed to establish lists of invasive species for Massachusetts, including those prepared by the Massachusetts Invasive Plant Working Group, the Massachusetts Aquatic Invasive Species Working Group, and other relevant information.

This document outlines Mass Audubon's goals for managing invasive species on our sanctuaries, identifies the near-term implementation actions we will take over the next five years to understand and avert the most serious threats invasive species pose to our sanctuaries and to prevent new invasions, and enumerates measures and practices to build our capacity for invasive species management over the long-

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\* Non-native organisms were not present in a region prior to European settlement of Massachusetts. As used in this document, non-native organisms may include organisms that were present in parts of Massachusetts prior to settlement that have extended their range within the state since the time of settlement due to human activities.

term. This strategy is not intended to signify that invasive species management should be the highest or only priority for ecological management on Mass Audubon's wildlife sanctuary system.

We also recognize the need for and importance of dealing with invasive species on a statewide basis and in a comprehensive manner through ecological management, research, education, and advocacy. Mass Audubon will not limit its efforts to address invasive species problems to sanctuary management, and will work to address the statewide threats that invasive species pose to biological diversity through education and advocacy. In some cases and in some locations, we may decide that addressing invasive species threats beyond the borders of our sanctuaries should take precedence over management activities on our own lands.

## **Premises**

The following premises guided the development of this strategy:

- Eradication of all invasives on our sanctuaries is beyond the current capacity of Mass Audubon. We must therefore set priorities to ensure that our limited resources are effectively used to achieve invasive species management goals that will have the greatest ecological impact and avert the most significant invasive species threats to our sanctuary system. Examples of high levels of threat include invasives that threaten rare species or rare ecological communities or exemplary ecological communities.
- We recognize that our knowledge of the effects of invasive species on Massachusetts' natural communities and native species is incomplete. Although we lack perfect information, we will manage invasive species in accordance with the goals set forth in this strategy, and we will modify our strategy as new information becomes available. We will promote research on our sanctuaries to better understand the ecological effects of invasives and to identify effective management strategies.
- Invasive species management on Mass Audubon's sanctuary system will be implemented in accordance with the principles of adaptive management<sup>†</sup>, as described in Mass Audubon's Framework for Science, and an integrated pest management (IPM) approach. The feasibility of long-term success, maintenance requirements, and context within the surrounding landscape will be considered in assessing the value and priority of potential invasive species management projects.
- The presence of invasive species is often a symptom of underlying environmental changes, and frequently the result of anthropogenic disturbances. Management of invasive species will be undertaken with this in mind, and concerted efforts will be made to identify and address the cause of invasive species problems.
- Invasive species management will be undertaken within the larger context of habitat management, restoration or enhancement. We recognize that much of the Massachusetts landscape has been altered by human activity and that few natural communities remain unaffected by this activity. Restoration of our landscape to pre-colonial conditions is not feasible. At times, we will actively manage for habitats, such as cultural grasslands, that are largely composed of non-native species because we desire to achieve specific conservation goals (i.e. providing habitat for grassland birds). Management that encourages non-native, but non-invasive species may sometimes be necessary to achieve these goals.

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<sup>†</sup> Adaptive management is a process where the results of management efforts are continually analyzed and the approach and methods are adapted in accordance with what is learned from this analysis.

- Invasive species management efforts may also be undertaken where necessary to support or achieve important and clearly defined mission-related education and advocacy goals. In some cases, invasive species management projects may be implemented in support of program activities, such as maintaining specific habitat types where program activities are conducted.
- Invasive species are easiest to control before they become firmly and widely established. Therefore, implementing management measures aimed at eliminating or containing small infestations of invasive species before they become a serious threat is a high priority. Situations in which an invasive species is rapidly expanding will be a higher priority for management than those where invasive species populations are more stable.
- In accordance with the goals of our strategic plan, Mass Audubon will seek to share our knowledge of invasive species ecology and management with other public and private entities and to make our sanctuaries examples of land stewardship. We also seek to learn from the experiences of others with shared conservation goals.
- We recognize that in some instances, the use of pesticides may be necessary to achieve our invasive species management goals. Mass Audubon has revised and updated our policy on the use of pesticides to ensure that any such use will only occur as part of an integrated pest management approach and that all such uses will be carefully and thoughtfully reviewed and approved under the process established in the pesticide policy.

## **Goals**

Mass Audubon establishes the following goals for invasive species management on our wildlife sanctuary system in order of priority. These goals pertain only to the management of invasive species on our sanctuaries and not to other elements of the broader domain of ecological management, or with Mass Audubon efforts to deal with invasive species issues on a statewide basis through education and advocacy. They are not intended to signify that invasive species management should be the highest or only priority for ecological management on the Mass Audubon wildlife sanctuary system. Individual sanctuaries should use these goals as a guide for prioritizing their invasive species management efforts and goals.

- 1) Prevent the establishment of new populations of known or suspected invasives, including species not yet common in Massachusetts but known to be invasive elsewhere, from becoming established on sanctuary lands. Where feasible, new populations of invasive species will be controlled before they can become well established and widespread. In assessing the feasibility of controlling new populations of invasive species, factors such as the likelihood of long-term success, level of ecological threat posed by the invasive species and resources and level of effort required for effective control will be considered before initiating control measures.
- 2) Protect from invasive species encroachment all known populations of endangered, threatened, and special concern species, as designated by the Natural Heritage and Endangered Species Program (NHESP), based on NHESP data as well as other sources of information, including staff knowledge, sanctuary inventories, and other relevant information.
- 3) Protect rare and exemplary natural communities and suites of species from invasive species. The natural community classification system developed by NHESP<sup>7</sup> will be used as a general guide for

identifying priority communities. In general, all communities with S-rank<sup>‡</sup> designations S1, S2, and S3, and high quality examples of natural communities designated S4 and S5 will be protected from invasive species to the extent possible. The local and regional incidence of natural communities will be considered in prioritizing natural communities for protection. Efforts to protect natural communities from invasive species will not be limited to plant communities. Suites of rare or threatened non-plant species will also be protected.

- 4) Restore potentially high quality natural communities already degraded by invasive species where restoration is feasible, will have long-term benefits, and will not require significant ongoing maintenance, or where a long-term commitment to necessary maintenance is provided, giving priority to rarest communities in accordance with NHESP's S-rank and/or other relevant information.
- 5) Protect actively managed habitats where such habitats are being maintained to support species, or suites of species that are uncommon or rare in Massachusetts, or to preserve biologically or culturally important or unique landscape features.

Based on these priorities, and in recognition of our limited resources for managing invasive species, and competing ecological management and land stewardship needs, we understand that in many locations, and under certain conditions, we will not manage invasive species. Examples include: occasional removal of invasive species from common or low-priority degraded habitats; removal of invasives from areas where, due to surrounding conditions, reestablishment is highly likely; and management of invasive species where effective control measures are not available, or where risks and benefits are highly disputable. We will carefully evaluate all proposed invasive species management efforts to ensure that Mass Audubon's limited resources for invasive species management are being effectively allocated to achieve the greatest ecological benefit in accordance with the goals of this strategy. Low priority invasive species control measures may not be implemented if, after careful analysis, we find that they divert resources from higher priority invasive species management projects.

### **Near-term Implementation of this Strategy**

Over the next five years (FY04-FY09) Mass Audubon will do the following to implement this strategy:

#### ***Implementation Process:***

- 1) Survey and Inventory Invasives on Sanctuaries: The Conservation Science and Ecological Management Division (CSEMD) working with the Programs Division will locate and map the rare species and important natural communities we have identified as priorities for protection and the invasive species populations that may threaten them. Sanctuary inventories and inventories of lands targeted for protection will be prioritized in accordance with the goals established in this strategy, using NHESP's element occurrence records and Mass Audubon's Priority Habitat Data Layer (developed for the Mass Audubon Land Protection Strategy) as a general guide. Staff knowledge and other relevant factors will also be used to prioritize inventory needs. Information on invasive species threats and management efforts will be incorporated into Mass Audubon's developing Geographical Information System (GIS).
- 2) Prioritize Invasive Species Management Projects: CSEMD, in consultation with the Programs Division, will identify and develop a priority list of invasive species management projects based on

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<sup>‡</sup> S-rank is a system developed for Natural Heritage programs by The Nature Conservancy. S-rank reflects the community's rarity and threat within Massachusetts, with regard to its regional rarity and threat. S-ranks range from S1 (most rare and vulnerable) to S5 (most common and secure).

information gathered from the survey and inventory of invasives on sanctuaries, NHESP element occurrence records, specific information in ecological management plans, staff knowledge, and other relevant sources. Invasive species threats will be assessed in accordance with the goals established in this strategy. The priority list will be reassessed each year as part of the annual planning process.

- 3) Incorporate High Priority Invasive Species Management Projects into Annual Plans: The CSEMD and the Programs Division will incorporate priority invasive species management projects into their annual plans as budget and staff resources allow.

### ***Implementation Measures and Practices:***

- Identify Invasive Species Research Needs and Priorities: The CSEMD and the Programs Division will identify and regularly review and update invasive species research needs and priorities and make these needs known to researchers. CSEMD will develop appropriate research and monitoring protocols to guide the invasive species research and management efforts at Mass Audubon wildlife sanctuaries.
- Train Staff and Volunteers to Detect Invasive Species Threats Early: To facilitate early detection of new populations of invasive species, Mass Audubon will provide training through our Natural History Training Programs and other training opportunities to staff and volunteers to recognize invasive species already detected in Massachusetts and species believed to be potential invasives should they become established here.
- Prevent the Introduction and Spread of Invasive Species: The CSEMD and the Programs Division will identify and implement sanctuary management measures that will minimize the introduction, establishment and spread of invasive species. Information on these measures will be incorporated into the Invasive Species Management Handbook.
- Develop a Corps of Volunteers to Assist in Invasive Species Management: Increase efforts already underway at some sanctuaries to engage volunteers in invasive species management. Develop and implement programs that inform volunteers of invasive species and ecological management issues, provide a hands-on ecological management opportunity and training for participants, and generally support Mass Audubon's conservation and habitat protection goals.
- Develop a Policy on the Use of Biological Control Measures: CSEMD will evaluate the risks and benefits of biological control of invasive species and develop a policy regarding the use of biological control agents on Mass Audubon sanctuaries to complement our existing policy on pesticide use.

### **Building Our Long-term Capacity for Invasive Species Management**

Mass Audubon recognizes that the management of invasive species on our wildlife sanctuary system requires a long-term commitment extending well beyond the next five years. The following capacity building measures and practices will be implemented to improve our ability to manage invasive species over the long-term. The implementation of these measures and practices will begin immediately.

- Update Ecological Management Plans: Many existing ecological management plans recommend invasives species management measures inconsistent with the goals of this strategy. For example, many plans call for invasives species management wherever invasive species are found. Where such recommendations exist, the goals of this strategy will take precedence. All future ecological management plans will incorporate the goals of this strategy.

- Implement Sanctuary-based Invasive Species Research: Projects designed to provide information on invasive species ecology and management that may be helpful in informing future management efforts will be encouraged. Partnerships with academic institutions and other conservation organizations will be encouraged to promote research on invasive species on Mass Audubon wildlife sanctuaries. Where feasible and appropriate, staff responsible for an invasive species research and/or management project will be encouraged to publish their results in journals on ecological restoration and present their results at meetings.
- Seek Funding to Implement Invasive Species Management: Mass Audubon will seek grant funding to supplement internal ecological management resources to support the implementation of high priority invasive species management projects.
- Incorporate Invasive Species Issues into Education and Advocacy Programs: Where feasible, our sanctuaries should be used as classrooms to educate members, the local community and the general public on the ecological effects of invasive species and management needs and measures. Education and advocacy efforts should be implemented in a manner that supports sanctuary invasive species management priorities.
- Compile and Share Information to Enhance Invasive Species Management Efforts: CSEMD will maintain and update the Invasive Species Management Handbook containing information on the ecology and management of common invasive species, and additional information deemed useful to land managers and property staff involved in managing invasive species on the Mass Audubon wildlife sanctuary system. Summaries of invasive species management projects completed by or currently being implemented on Mass Audubon sanctuaries, including project personnel and contact information, will be incorporated into the handbook. CSEMD will maintain summary information and files containing documentation and project reports pertaining to invasive species management to facilitate and inform future invasive species management project planning and implementation.
- Partner to Enhance Invasive Species Management Efforts: Mass Audubon will share information on, and seek partnerships for, invasives species management with other conservation landowners, academic institutions, and government agencies.
- Share Resources to Address High Priority Invasive Species Management Needs: Mass Audubon will encourage and facilitate the sharing of resources, including labor, equipment, and expertise, among sanctuaries and regions to expedite the implementation of high priority invasive species projects. Existing invasive species management resources (equipment, personnel with specialized knowledge and skills) will be identified and made known to all sanctuaries. Invasive species management resource needs will be identified.

### **Strategy Evaluation**

CSEMD and Programs Division will evaluate this strategy annually and modify it as deemed appropriate to ensure that Mass Audubon is effectively addressing the threat posed by invasive species to its sanctuary system. Progress toward strategy implementation will be assessed annually and a summary of accomplishments and prioritized needs will be prepared by CSEMD in consultation with Programs Division. Regional scientists will work with sanctuary directors and other land managers to identify priority invasive species management projects. The regional scientists will annually compile summary information on invasive species management at each sanctuary and assess progress toward achieving the goals of this strategy.

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<sup>1</sup> Massachusetts Audubon Society. 1999. Shaping the Future: A Strategic Plan for 2000-2010.

<sup>2</sup> Wilcove, D., D. Rothstein, J. Dubow, A. Phillips and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *BioScience* 48:607-615. See also: Wilcove, D., D. Rothstein, J. Dubow, A. Phillips and E. Losos. 2000 Leading threats to biodiversity. In: *Precious heritage: The status of biodiversity in the United States*. The Nature Conservancy. Oxford University Press.

<sup>3</sup> Pimentel, D., L Lach, R. Zuniga, and D. Morisson. 2000. Environmental and economic costs of nonindigenous species in the United States. *BioScience* 50:53-56.

<sup>4</sup> Bureau of Land management. 1996. Partners against weeds – an action plan for the Bureau of Land Management.

<sup>5</sup> Massachusetts Aquatic Invasive Species Working Group. 2002. Draft Massachusetts Aquatic Invasive Species Management Plan. Massachusetts Office of Coastal Zone Management. Boston

<sup>6</sup> Plant Evaluation Subcommittee of the Massachusetts Invasive Plant Working Group. September, 2002. The Evaluation of Non-native Plant Species for Invasiveness in Massachusetts (Draft).

<sup>7</sup> Swain, P. C. and J. B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, MA