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**January 2010 note: this document is provided for reference purposes only. The MA Wetlands Restoration Program (WRP) merged with the Riverways Program in 2009 to create the Division of Ecological Restoration (DER). DER currently is not supporting new beetle releases. References to WRP and available assistance in this document are outdated and no longer accurate. However, much of the information is still relevant and useful.**

**Massachusetts Office of Coastal Zone Management - Wetlands Restoration Program  
PURPLE LOOSESTRIFE BIOCONTROL PROJECT SUMMARY  
August 2008**

This summary document provides background information on the invasive, exotic purple loosestrife plant. It also briefly reviews the use of biocontrol measures in Massachusetts to control purple loosestrife. These measures have been administered since 2000 through a purple loosestrife biocontrol project managed by the Wetlands Restoration Program in the Massachusetts Office of Coastal Zone Management.



Photo credit: Vermont  
Department of Environmental  
Conservation.

### **Background**

Purple loosestrife (*Lythrum salicaria*) is an invasive wetland plant originally from Europe and Asia. In the United States, there are no native insect species that control purple loosestrife populations. As a result, the plant spreads rapidly and causes significant negative impacts, including reduced native plant coverage, lower plant diversity, and impaired wildlife habitat.

Viable options for managing purple loosestrife via conventional means (water level management, burning, herbicides, manual removal, and cutting) have proven extremely difficult and impractical on a large scale. An alternative is the biological control of purple loosestrife via intentional introduction of natural predators.

Extensive studies found two beetle species in Europe that feed and breed exclusively on purple loosestrife and that control populations there. These beetles (*Galerucella* sp.) have been extensively tested in the United States since 1986 to assess their safety and efficacy as biocontrol agents, leading to a 1992 approval by the United States Department of Agriculture of their use for biocontrol purposes. Published literature indicates that no significant long-term impacts on native plant species have been observed. The beetles prefer to eat purple loosestrife and will successfully reproduce only on that plant.

In as little as three years, treatments can have a dramatic impact on purple loosestrife populations. While these natural predators cannot eliminate purple loosestrife entirely, they have been shown to reduce the density of the plant (by up to 90% in some studies) and allow re-establishment of native wetland vegetation. Beetle populations are controlled by purple loosestrife availability and will increase or decrease in proportion with the plant's abundance. When the population of purple loosestrife in a wetland is reduced by effective biocontrol measures, beetle populations will decline or move to other infestations.

These beetles have been used successfully in the United States to control purple loosestrife infestations since the early 1990s. Treatments have occurred in all of the New England states, including Massachusetts, where beetles were first released on National Wildlife Refuges (Great Meadows NWR and Parker River NWR).

### **Massachusetts Wetlands Restoration Program – Purple Loosestrife Biocontrol Project**

The Wetlands Restoration Program (WRP) initiated a purple loosestrife biocontrol project in 2000. The overall goal of the biocontrol project is to enhance the health, condition, and diversity of habitats and native species within wetlands that have been degraded by purple loosestrife infestations. As of 2008, WRP has facilitated beetle releases at 43 sites in Massachusetts (see Table 1 & Figure 1). Volunteer organizations have been involved in beetle rearing, beetle release, and spring and fall site monitoring. In 2008, WRP initiated pilot partnerships with the Neponset and Nashua River Watershed Associations that increase regional capacities to monitor and control purple loosestrife infestations. These two regional organizations treated a total of nine new sites in their first year of project implementation.

Extensive monitoring of treatment sites has occurred to document the effects of the beetles on purple loosestrife growth and the establishment of beetle populations. Several sites in Massachusetts have shown successful reductions in purple loosestrife coverage and vigor after multiple beetle releases over three to four years (Figures 2 & 3).



*Students at Diamond Middle School in Lexington measure the height of purple loosestrife plants in a monitoring quadrat in the fall of 2002.*

WRP and partners coordinate with the Massachusetts Natural Heritage Program and local conservation commissions during the review process for proposed release sites.

Conservation commissions are provided with detailed information about the biocontrol program and data specific to sites in their jurisdiction. WRP and local volunteers will continue to monitor selected release sites for three or more years. A summary report of monitoring results is provided to state agencies and the conservation commission in each town where a release has occurred.

### **Future directions**

WRP has received funding through a United States Fish and Wildlife Service Cooperative Agreement to Coastal America Foundation to support biocontrol project expansion at a limited number of sites. WRP plans to foster additional expansion of treatment sites through capacity building within regional organizations, as piloted by the initial two watershed groups in 2008. The project will continue to encourage a volunteer-based model and will partner with schools and conservation organizations to help raise and release beetles and monitor treatment sites.

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**Figure 1: Map of WRP facilitated biocontrol treatment sites**

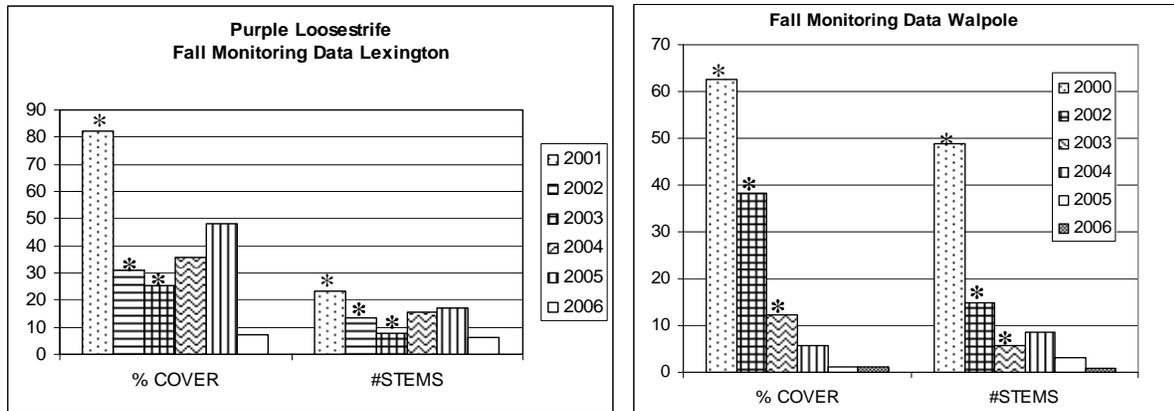


**Table 1: WRP facilitated biocontrol treatment sites.**

Site Name	Town	Project Proponent	Release Year(s)	#Beetles
Great Hill Reserve	Acton	Acton Conservation Stewardship Committee	2001, 2002, 2003, 2004, 2006	35,000
Daniels Property	Ayer	Nashua River Watershed Assoc. (NRWA), Squannassit-Petapawag ACEC Stewardship Comm. (S-P ACEC SC)	2008	Uncertain*
Glen Urquhart Wetland	Beverly	Glen Urquhart School	2008	Uncertain*
Waring School	Beverly	Waring School	2001, 2002, 2003, 2007, 2008	15,000
Mass Audubon Endicott Sanctuary	Beverly/Wenham	Mass Audubon, Glen Urquhart School	2007, 2008	9,500
Bolton Flats	Bolton	Natural Heritage and Endangered Species Program (NHESP)	2006, 2007, 2008	Uncertain*
Boston Nature Center	Boston	Mass Audubon	2008	5,000
Chandler Pond	Boston	Pond association	2002, 2003, 2004	15,000
Fowl Meadow and Brookwood Farm	Boston, Canton, Milton	Neponset River Watershed Association, Department of Conservation and Recreation (DCR)	2008	80,000
Fresh Pond	Cambridge	Cambridge City Water District	2007, 2008	Uncertain*
Great Brook Farm	Carlisle	DCR	2006, 2007, 2008	Uncertain*
Archer Meadowbrook Preserve	Chelmsford	Chelmsford Conservation Land Trust	2007, 2008	Uncertain*
Essex Ag Technical High School	Danvers	Essex Ag Technical High School	2008	Uncertain*
Cutler Park	Dedham	No Nasties Stream Team, DCR	2006, 2007, 2008	27,500
National Seashore	Eastham	Cape Cod National Sea Shore (NPS)	2005, 2006, 2007	30,000
Coastal Ponds	Falmouth	Invasive Species Committee	2006, 2007	Uncertain*
Lake Ripple	Grafton	Grafton Conservation Commission	2007, 2008	5,000
Gamlin Conservation Area	Groton	NRWA, S-P ACEC SC	2008	Uncertain*
Nashua River Rail Trail	Groton	Groton School, NRWA, S-P ACEC SC	2006, 2007, 2008	Uncertain*
Pine and Curtis Properties	Groton	NRWA, S-P ACEC SC	2008	Uncertain*
Third Herring Brook^	Hanover		2003, 2004	17,500
Diamond School	Lexington	Diamond School	2001, 2002, 2003	25,000
Ricci Field	Lincoln	Lincoln Conservation Dept.	2008	Uncertain*
Drumlin Farm	Lincoln	Mass Audubon	2008	5,000
Stebbins Wildlife Refuge	Longmeadow	Local land steward	2000, 2001, 2004	22,000
North Cemetery	Lunenburg	NRWA, S-P ACEC SC	2008	Uncertain*

Site Name	Town	Project Proponent	Release Year(s)	#Beetles
Cedar Swamp	Manchester-Essex	Manchester-Essex Conservation Trust	2008	2,500
Lake Garfield	Monterey	Pond association	2004, 2005, 2006	14,500
Sullivan's Ledge Middle Marsh	New Bedford	New Bedford Conservation Commission	2005, 2007	25,000
Weir Hill Reservation	No. Andover	Trustees of Reservations	2006, 2007, 2008	Uncertain*
Stony Brook	Norfolk	Mass Audubon, DCR	2006, 2007, 2008	14,050
Martins Pond	North Reading	Pond association, Merrimack College	2002, 2005, 2006, 2007, 2008	Uncertain*
Norris Reservation	Norwell	Trustees of Reservations	2008	5,000
Nissittissit WMA	Pepperell	NHESP, NRWA, S-P ACEC SC	2008	Uncertain*
Old Colonial Road	Stockbridge	Berkshire Natural Resource Council	2006, 2007	10,000
Hayes Meadow Conservation Area	Sudbury	Curtis Middle School	2007, 2008	Uncertain*
Rice City Pond	Uxbridge	Uxbridge High School	2005, 2006	Uncertain*
West Hill Dam	Uxbridge	US Army Corps of Engineers	2007, 2008	Uncertain*
Turners Pond	Walpole	Town of Walpole	2000, 2001, 2002	30,000
Paintshop Pond, Wellesley College	Wellesley	Wellesley College	2007	Uncertain*
McLeod Property	Woburn	Private landowner	2001, 2002	20,000
* # of beetles uncertain because sourced through rearing. ^ site abandoned due to permanent inundation.				

**Figure 2: Results from fall monitoring at two treatment sites.** Average percent cover and average total number of stems of purple loosestrife for five 1 m<sup>2</sup> monitoring quadrats at each site. \* indicate years with beetle releases.



**Figure 3: Photo comparison of the Walpole site 2 and 4 years after initial treatment.** Purple loosestrife dominates Quadrat #2 in 2002 but is not present in 2004, when native sensitive fern is the dominant plant. Sites like these will continue to be monitored to document the vegetation that colonizes treatment areas following beetle releases.



Quadrat #2, 2002

Quadrat #2, 2004