# Land Management Plan

# For

# XX Property
# XX, YY, MA

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Prepared By

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## 1. INTRODUCTION

Polatin Ecological Services (PES) was asked to evaluate the southeast portion of the XX property for invasive exotic plant species and prepare a management plan for this approximately 5 acre portion. We spent 5 hours evaluating the site on October 31st, 2006 at which time we used a GPS unit (Garmin GPS Map 76) to delineate management area boundaries. In each management area we collected specific information pertaining to the invasive plant species present, their abundance, density, percent cover, stem diameter range, and heights. We also considered special features such as wetlands in our evaluation, in so far that wetlands would determine our suggested management activities.

The entire XX property consists of approximately 27.3 acres of woodlands and forested wetlands which will be more concisely described from a forestry perspective in the 2006 Forest Management Plan by licensed forester John XX. PES created a GIS map to accompany this management plan (PES November 6th 2006). This map includes the boundaries for the proposed management areas as well as the Department of Environmental Protection's (DEP) wetlands layer (10/2006 acquired through Mass GIS). The map is included as Figure 1 on page 12 of this document. This wetlands layer does not constitute official wetlands delineation for the site, however it is helpful to use the DEP layer to visualize the extent of wetlands present on the site and to inform this management plan. I believe the wetlands layer represented is fairly accurate for the 5 acres that I visited within the delineated management areas.

The forested wetlands represented on the map consist of *Red Maple Swamp* as defined by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) (Swain and Kearsley 2001). The NHESP information for *Red Maple Swamp* is included as Appendix B in that it provides a basic description for the reference ecosystem that can be potentially restored once the invasive plants are controlled. In addition, I observed a tussock sedge (*Carex stricta)* dominated wetland complete with hummock-hollow topography within a lower depression portion of the red maple swamp within Invasive Plant Management Area 4 (denoted on the map in Figure 1 with a purple star). From an ecological perspective I would rank this area as a priority for invasive plant control and habitat restoration activities.
Note: Reference ecosystems give us a target to shoot for when practicing ecological restoration.

We discovered eight invasive plants in the survey area. These plants include multiflora rose, Morrow's honeysuckle, Japanese barberry, glossy buckthorn, European linden, winged euonymus, Asiatic bittersweet, and purple loosestrife. All of these plants with the exception of European linden are considered "invasive" by the Massachusetts Invasive Plants Advisory Group (MIPWG 2003). I am including European linden for control in this management plan because I believe it is behaving like an invasive plant on the site. Furthermore, I have observed and controlled a one-half acre monoculture of the plant on a state hatchery property in Palmer, Massachusetts where forester XX also believed the plant exhibited invasive tendencies.

**Management Goal:** The goal of this plan is to restore the native plant community within the Invasive Plant Management Units in order to promote the natural regeneration of native species for present and future forest integrity. Invasive plants will be selectively removed over time in order to restore the biodiversity to these areas.

**Objectives:** Reduce invasive plant cover by 75% through management actions initiated in 2008, 90% by the end of the 2009 growing season, and 99% after 2010 follow-up treatments. Scouting and manual techniques (pulling) will be ongoing activities after the initial control techniques are completed.
Note: A good management plan always sets management goals and objectives.

## 2. OVERVIEW OF WEED MANAGEMENT APPROACH

Invasive plant control should be considered as part of an overall site management and restoration program. It is important to focus on the species and communities that are desirable to protect, rather than on simply eliminating weeds. In this plan we will set priorities for the control or elimination of invasive plants that have already established on the site, according to their actual and potential impacts on native species and communities, particularly on our conservation targets. We will suggest action only when careful consideration indicates leaving the invasive plant unchecked will result in more damage than controlling it with available methods.

We propose the use of an adaptive management strategy. First, we establish and record the goals for the site. Second, we identify species that block us from reaching these goals and assign them priorities based on the severity of their impacts. Third, we consider methods for controlling them or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fourth, we develop weed control plans based on this information. Fifth, the plan is implemented, and results of our management actions monitored. Sixth, we evaluate the effectiveness of our methods in light of the site goals, and use this information to modify and improve control priorities, methods and plans. Finally, start the cycle again by establishing new/modified goals.

We set priorities in the hope of minimizing the total, long-term workload. Therefore, we act to prevent new infestations and assign highest priority to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site. We also consider the difficulty of control, giving higher priority to infestations we think we are most likely to control with available technology and resources.

To develop the management control plan, literature and other reference sources were reviewed for each of the plants listed above. Their biology, origin and distribution, and possible control options (biological, herbicide, and mechanical) were taken into account. Control priorities were developed using the National Park Service's Alien Plant Ranking

System (APRS) (Hiebert and Stubbendieck 1993). The APRS is used to develop a quantifiable methodology for ranking individual invasive species for control within a given area. This process analyzes each invasive species based on interactions between significance of impact and feasibility of management or control. The data forms containing the assessed characteristics for each species is located in Appendix A. The results of the analysis are shown in Table 1**.**
Note: This NPS method for ranking invasive plants is enormously helpful when evaluating multiple invasive plants on larger parcels.

A realistic and effective invasive plant control program usually takes a minimum of three years. Even after this initial period it will be necessary for someone to keep an eye out for new invasive plant patches and manage them appropriately. Usually it is enough to hand pull small seedlings as they are discovered just as one would do in a garden setting. Without this vigilant attention to scouting, the initial three year investment in management can be lost within 5 years. Many invasive plant seeds are dispersed by wind and birds. If there are invasive plants in the surrounding landscape then it is likely that they will find their way back. Another confounding factor involves the seed's longevity for different species of plant. An extreme example involves the invasive plant Scotch broom on the west coast of the US whose seeds can remain viable under ideal conditions for up to 70 years. For the most part, many woody plant seeds in the Northeast can remain viable in the soil for up to 7 years.
Note: Invasive plant management is a longterm investment. Eradication of an invasive plant on a property is usually not possible. Control is possible. Aftercare is very important to keeping the site clean after the initial work is completed. Training volunteers to scout the property for new infestations, mapping, and reporting to the coordinator is key to the process. This way small scale inexpensive activities can be coordinated to prevent further spread.

**Integrated Vegetation Management (IVM):** Integrated Vegetation Management (IVM) is a subset of Integrated Pest Management (IPM). IPM can simply be defined as a systematic approach to common sense pest management. The IPM approach gained an audience in the 1960's in response to the increasing failures of agricultural pest control efforts that relied too heavily on pesticides. In effect, pest managers realized that many methods used prior to the availability of pesticides were still viable, and a balanced approach combining proven techniques and the new man-made pesticides was more effective and environmentally sound than sole reliance on pesticides.

IVM can be thought of as preventive maintenance for vegetation. Listed below are some fundamental principles of an IVM program:

- Whether a plant needs to be controlled depends on where it is, and what it is.
- Non-problem (desirable) plants provide a valuable service by occupying space that a pest plant might otherwise occupy.
- Therefore, the preservation of desirable plants is equally important as controlling pest plants.

- Invasive weeds are a form of pollution. Keeping your weeds out of adjacent properties is an integral part of IVM.

A fundamental aspect of IVM is using as many approaches as possible, in a coordinated fashion. Weed control methods can broadly be grouped into the following categories:

- *Cultural* - practices that promote the growth of desirable plants, which reduces the opportunities for weeds to grow.
- *Mechanical* - physical damage or removal of all or part of the weed. Cutting and grubbing are common examples.
- *Biological* - using one organism to control another. Classic examples are the release of insects to feed on specific plants, such as purple loosestrife. Dense groundcover that excludes weeds can be a form of biological control.
- *Chemical* - the selective and judicious use of herbicides.

We will recommend management actions that combine approaches tailored to exploit weaknesses in the individual invasive plants. Herbicides are very powerful tools in invasive plant management and should be used sparingly at the most effective time based on the phenology of the individual plant species. For example, the cut stump method of herbicide application applies a concentrated solution of herbicide to freshly cut plant stems which absorb the herbicide directly into the root system where it can systemically act on the entire root system.

Our recommendations for the herbicide type and solution are derived from the *Rights-of-Way Sensitive Area Material List (February 2007)* http://www.mass.gov/agr/pesticides/rightofway/Sensitive_Area_Materials.htm. The general use herbicides recorded on this list pose very little risk to the health of humans, wildlife, and sensitive resources such as wetlands. The recommended solutions are derived from the lowest rate recommended on the herbicide label.

## 3. INVASIVE PLANT SPECIES OF CONCERN

**Note: There were originally 7 invasive plants on the subject property, but I only used multiflora rose for the sample below.**

Make sure the recommendations are grounded in citable literature, research and/or the verifiable experiences of land managers.

### Multiflora rose *(Rosa multiflora)*

Multiflora rose is a member of the Rosaceae (Rose) Family. It is a perennial shrub that forms dense, impenetrable clumps of vegetation. Isolated plants can produce clumps up to 33-feet in diameter. Bushes can grow to a height of 6 to 10-feet and occasionally upwards of 15 feet.

The number of stems for each plant varies from few to many. Stems originate from the base, and are erect and arching to more or less trailing or sprawling. Stems grow to 13-feet long and are armed with stout recurved prickles. Leaves are alternate, pinnately compound, and 3 to 4-inches long with 5 to 11 (usually 7 or 9), 1 to 1.6-inch long leaflets. Flowers are 0.5 to 0.75-inches across and number 25 to 100 or more in long or pointed panicles. Fruits are globular to ovoid, 0.25-inches or less in diameter. Seeds are angular achenes (Munger 2002b).
Individual plants may produce up to 500,000 seeds per year. Most plants develop from seeds that fall relatively close to the parent plant. Some seeds are dispersed by birds and mammals. Fruits remain on the plant and dry to a dense, leathery capsule. Seeds may remain viable in the soil for 10 to 20 years, but detailed information on seed longevity is lacking. Multiflora rose also reproduces asexually by root suckering and layering.

*Origin and Distribution*

Native to Japan, multiflora rose occurs throughout eastern North America from Newfoundland and Nova Scotia south to northern Florida, and west to Minnesota, Nebraska, and Texas. It is also distributed along the West Coast from British Columbia to California. The origins of multiflora rose in North America stem from its use as a rootstock species for ornamental roses and as a fencerow plant (Munger 2002b).
Multiflora rose frequently colonizes roadsides, old fields, pastures, prairies, savannas, open woodlands, and forest edges, and may also invade dense forests where disturbance provides canopy gaps. It is most productive in sunny areas with well-drained soils. Multiflora rose is tolerant of a wide range of soil and environmental conditions, but is not found in standing water or in extremely dry areas. Its northern distribution is thought to be limited by intolerance to extreme cold temperatures, but specific information is lacking (Munger 2002b).

*Management Considerations and Options*

Multiflora rose is a serious pest plant in many areas of North America. It can invade pasture areas, degrade forage quality, reduce grazing area and agricultural productivity and cause severe eye and skin irritation in cattle. Multiflora rose can spread rapidly, severely restricting access to pasture and recreational areas with "impenetrable thickets". Its characteristic dense growth of foliage and stems inhibits growth of competing native plants (Munger 2002b).

*Physical Control – Manual/Mechanical Methods*

Multiflora rose can be controlled by periodic mowing or cutting of individual plants. For pre-existing infestations, 3 to 6 mowings or cuttings per year, repeated for 2 to 4 years, is recommended. Painting or spraying cut stems with herbicides expedites control by killing root systems and preventing resprouting. Another approach is to follow an initial mowing with a foliar application of herbicide once plants have resprouted (see herbicide control section below). In high quality natural areas, cutting individual stems may be preferable to mowing, since repeated mowing might damage sensitive native plants. Mowing equipment may be susceptible to frequent flat tires from multiflora rose thorns. Periodic annual mowing can also prevent multiflora rose seedlings from becoming established. Removal of entire plants may be feasible in high quality natural areas when populations

are sparse enough. Removal of the entire root system is required to ensure no regrowth from suckering (Munger 2002b).

*Physical Control – Prescribed Burning*

In fire-adapted communities, periodic prescribed burns will presumably retard multiflora rose invasion and establishment, although descriptions of the use of prescribed burning for control of multiflora rose are lacking (Munger 2002b). Burning is not an option on the XX site due to the close proximity of homes.

*Biological Control – Insects/Pathogens*

Presently, three biotic agents have become destructive pests on multiflora rose and show potential to provide eventual significant biological control. They are:

- Rose rosette disease, a mite-vectored virus
- Rose seed chalcid, a torymid wasp that infests and kills developing rose seeds
- Rose stem girdler, a beetle whose larvae girdles and kills plant canes.

Most attention to date has centered on rose rosette disease, but the rose seed chalcid also may have major future impact in biocontrol (Munger 2002b). The small population size and isolated populations of multiflora rose on the site would not support insect populations and thus biocontrols are not recommended for this species.

*Biological Control – Grazing*

The small population size of multiflora rose on the site in combination with the fact that this species can cause severe eye and skin irritation in cattle prevents grazing from being recommended for control.

*Herbicide Control*

Where appropriate, herbicides may be an effective means of controlling multiflora rose, especially when used in combination with other methods. Table 1 contains a list of herbicides that have been tested and judged effective for controlling multiflora rose in North America, as well as a brief discussion of important considerations regarding their use. This is not intended as an exhaustive review of herbicide control methods. For more information regarding appropriate use of herbicides against invasive plant species in natural areas, see The Nature Conservancy's Weed Control Methods Handbook (Tu et al. 2001).

**Table 1.** Herbicides effective at controlling multiflora rose.

| Herbicide | Considerations |
|---|---|
| Glyphosate | Glyphosate is a post-emergent herbicide recommended for "cut-stem" method. It is a non-selective herbicide that kills most plants. It has low toxicity to animals and rapidly binds to soil particles making it relatively immobile. It can also be broadcast at a rate of 2 quarts per acre or as a 1 percent spray-to-wet foliar application. |
| Triclopyr | Triclopyr is recommended for "cut-stem" method and for dormant-season basal bark treatment. It may volatilize when exposed to high temperatures (80 to 85°F). It is selective against dicots. The ester formulation of triclopyr can be persistent in aquatic environments and should not be applied in wetland habitats. |
| Dicamba and Dicamba plus 2,4-D | Dicamba is selective against broadleaf vegetation. It is best applied during flowering and rapid growth (May-June). It is also recommended for dormant-season basal bark treatment. Dicamba may volatilize when exposed to high temperatures (80 to 85°F). It is highly mobile in soil and may contaminate ground water. We do not recommend this herbicide for the XX site. |

Applying herbicides to cut stems can hasten mechanical control by translocating herbicides to root systems and preventing resprouting. In addition, applying herbicides directly to the target plant in this manner reduces damage to surrounding native plants, and presumably reduces off-target effects. Cut-stem treatment is effective late in the growing season (July-September) (Munger 2002b).

Foliar spraying is effective throughout the growing season as long as leaves are fully formed. Some herbicides may volatilize when temperatures exceed 80 to 85°F and are best applied in early spring. Some variation in herbicide effectiveness during different stages of the growing season has been observed, but is probably not related to differences in carbohydrate reserves (Munger 2002b).

Dormant season application is also effective, and further reduces nontarget mortality. Basal bark treatment, applied to the lower 18 to 24 inches of the stem and onto the root crown, is a recommended herbicide control method for dormant season application. Plants should be dormant and several weeks from bud break (usually January- March), and treatments should only be conducted when soil is not frozen, snow-covered, or water-saturated to avoid runoff. Follow-up monitoring and retreatment during the subsequent growing season may be required to ensure effectiveness (Munger 2002b).

Herbicides tend to kill rose plants from the peripheral roots inward toward the crown. Thus, subsequent mechanical mowing or pulling of treated plants often eliminates any remaining live plant parts and hastens re-establishment of grass cover. Because dead

topgrowth also protects emerging rose seedlings, promptly removing it facilitates future field maintenance (Munger 2002b).

**Note: There is a lot of information here. Perhaps more than you need in most cases.**

*Urgency:* Results from the Alien Plant Ranking System indicate a high level of urgency to control multiflora rose on the XX property (see Appendix A and Table 1 for more information).

*Current distribution on property:* Multiflora rose was observed in Management Areas 1, 2, and 3 (Figure 1). It is the dominant plant in the wetlands present in IPM Area 2 and if left untreated can potentially invade IPM Area 4 wetlands. Since the plant has the competitive ability to exist in both wetlands and uplands, there is potential for the plant to further invade other areas.

## 4. RESULTS FROM RANKING CRITERIA

Results from the Alien Plant Ranking System (Hiebert and Stubbendieck 1993) are represented in Figure 1 and Table 2. The ranking data sheets are provided in Appendix A.

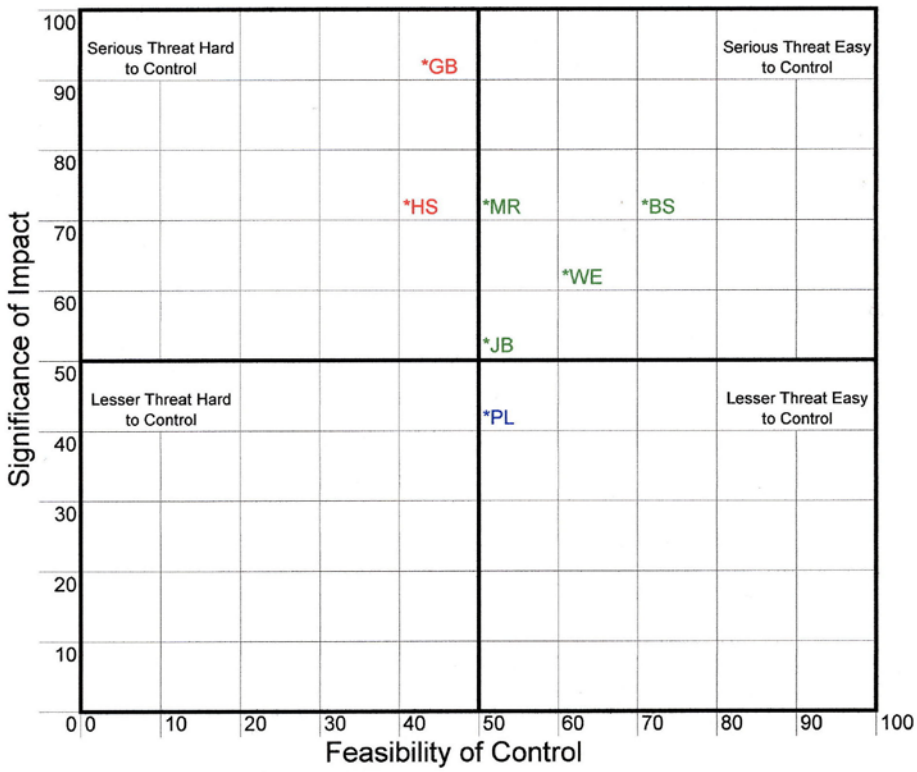


Figure 1. Invasive Plant Ranking Graph for XX property.

**Table 2**. Ranking of invasive plant species at XX property, XX, MA.

| Species | Current level of impact | Innate Ability to become a Pest | Total | Feasibility of Control | Urgency |
|---|---|---|---|---|---|
| Multiflora rose | 21 | 41 | 62 | 21 | High |
| Morrow's honeysuckle | 24 | 37 | 61 | 28 | High |
| Japanese barberry | 6 | 17 | 23 | 55 | Low |
| European linden | NA | NA | NA | NA | NA |
| Glossy buckthorn | 23 | 41 | 64 | 17 | High |
| Winged Euonymus | 13 | 27 | 40 | 25 | Medium |
| Asiatic bittersweet | 15 | 43 | 58 | 20 | High |
| Purple loosestrife | 26 | 14 | 40 | 35 | Medium |

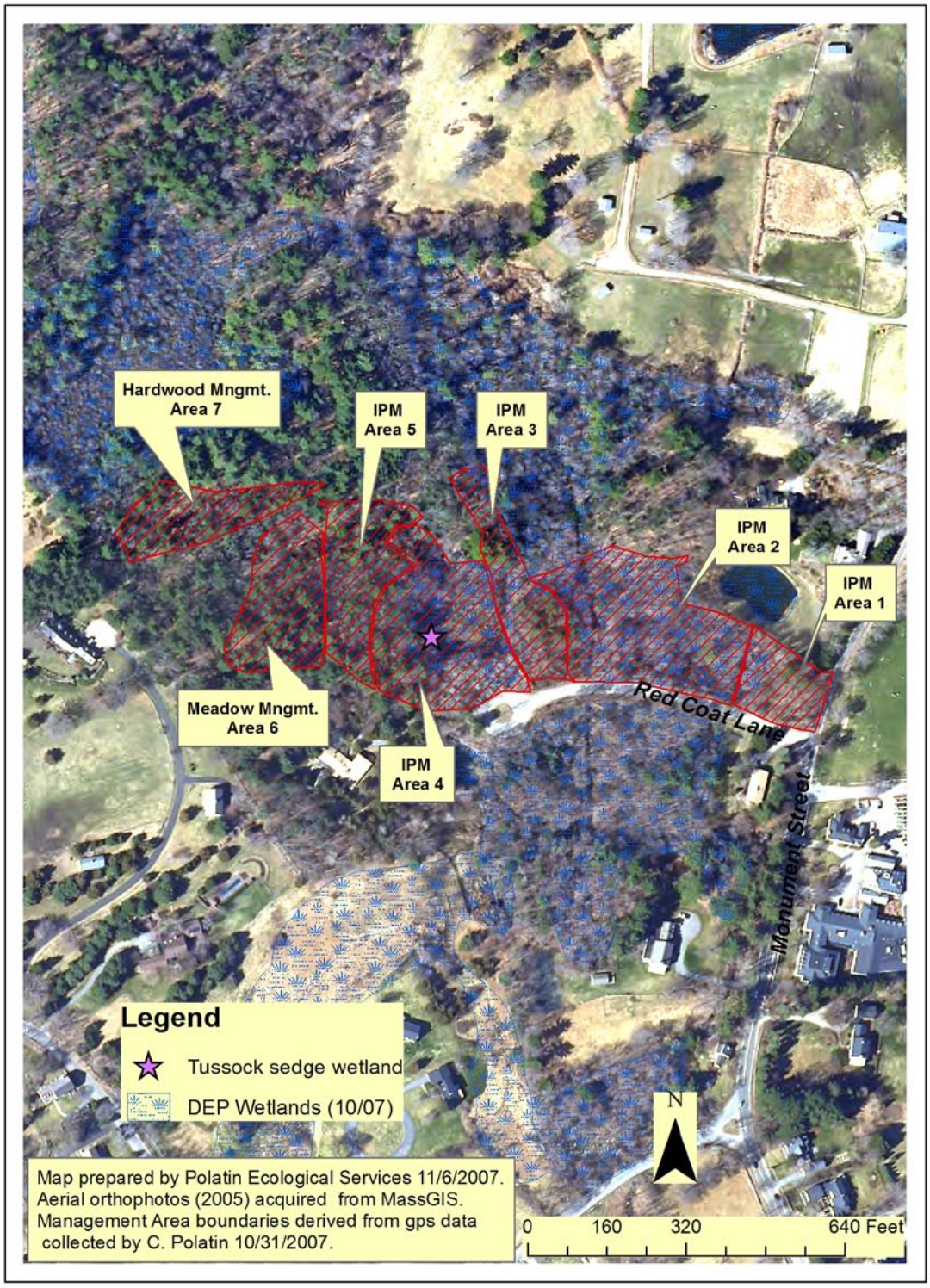


Figure 1. Invasive plant management areas within southeast portion of XX property, XX, MA.

## 4. DESCRIPTION/PRESCRIPTION FOR MANAGEMENT AREAS

### Invasive Plant Management Area 1

*Description of area:* Approximately 0.59 acres. Southeast corner is the intersection of xx Street with xx Lane. A diversity of invasive plants are present in abundance with little to no native component in understory. The IPM Area 1 western boundary is the wetland line; therefore all of IPM Area 1 appears to be outside of the wetlands.

*Invasive plants present with measurements:*

| Invasive plant | *Density cover class | Stem diameter | Height range | Notes |
|---|---|---|---|---|
| Japanese barberry | 2: low | <1” | 2’ | None |
| European linden | 4: medium/high | 1-2” | 5-11’ | None |
| Morrow’s honeysuckle | 4-5: medium/high | 1” | 3-5’ | None |
| Glossy buckthorn | 3: medium | <1” | 6”-2’ | Many seedlings |
| Multiflora rose | 3: medium | <1” | 1-3’ | None |
| Winged euonymus | 2: low | <1” | 6”-1’ | seedlings |

*Daubenmire (1959) cover class system (Class 1: 0-5%; Class 2: 6-25%; Class 3: 26-50%; Class 4: 51-75%; Class 5: 76-95%; Class 6: 96-100%).

*Management Recommendations:*

1. Cut stems >1” diameter and paint stems with 25% Garlon 4 in basal oil solution with indicator dye. Stems should be hauled out to xx Lane and chipped at a staging area. Wood chips should be used on the property trails to minimize soil compaction and prevent trail erosion. *Timing:* This application is very effective at any time except for spring when the sap is rising (March/April).
2. Foliar spray invasive plants <1” diameter with 2-5% Garlon 3A, surfactant, indicator dye, and drift control agent. *Timing:* Best effect is between June and early August.
3. Mow/cut material that was foliar sprayed at least 6 weeks after the foliar application.
4. Follow-up herbicide applications will be necessary

### Invasive Plant Management Area #2

*Description of area:* Approximately 1.95 acres. IPM Area 2 appears to be nearly all a red maple swamp wetland (see Appendix B for natural community information). For mapping purposes and based on the uniformity of the habitat and invasive plants present I extended the management unit west of the brook (running north to south). The worst threat to this area is the high density of multiflora rose which dominates the understory (Figure 2).

*Invasive plants present with measurements:*

| Invasive plant | *Density cover class | Stem diameter | Height range | Notes |
|---|---|---|---|---|
| Japanese barberry | 1: very low | <1” | 2’ | None |
| European linden | 2: low | 1” | 3-6’ | Occurs on fringe upland portions |
| Morrow’s honeysuckle | 2: low | 1” | 3-5’ | Several very large plants (>2” diam., >7’ tall) |
| Glossy buckthorn | 2: low | <1” | 6”-2’ | None |
| Multiflora rose | 5: high | <1” | 1-3’ | There are large rose plants (>6’) along north central portion of mngmt. unit. and along brook. |

*Daubenmire (1959) cover class system (Class 1: 0-5%; Class 2: 6-25%; Class 3: 26-50%; Class 4: 51-75%; Class 5: 76-95%; Class 6: 96-100%).

*Management Recommendations:*

1. Cut stems of invasive plants 1” diameter or greater and paint stems with 50% Rodeo herbicide in water solution with indicator dye. Stems should be hauled out to XX Lane and chipped at a staging area. Wood chips should be used on the XX property trails to minimize soil compaction and prevent trail erosion. *Timing:* This application is very effective at any time except for spring when the sap is rising (March/April).
2. Foliar spray invasive plants <1” diameter with 2-5% Rodeo, surfactant, indicator dye, and drift control agent. *Timing:* Best effect is between June and early August.
3. Mow/cut material that was foliar sprayed at least 6 weeks after the foliar application.
4. Follow-up herbicide applications will be necessary

*Notes:*

IPM Area #2 is within a wetland therefore we are recommending use of the wetland-approved herbicides Rodeo or Accord Concentrate (active ingredient=glyphosate) (EPA Reg. No. 62719-324) along with a specific wetland surfactant called Chemsurf 90 non-ionic surfactant.

## REFERENCES

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