A Natural Features Assessment for the Shingleton Forest Management Unit

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Cover image: Extensive colonies of dwarf lake iris occur along Portage Bay Road.

Introduction

During the summer of 2008, the Forest, Mineral and Fire Management Division (FMFM) of the Michigan Department of Natural Resources (DNR) commissioned the Michigan Natural Features Inventory (MNFI) to conduct a rare species survey of two forest stands that had been prescribed for treatment in Delta County within the Shingleton Forest Management Unit (FMU).

The purpose of the MNFI survey was to search for populations of rare plant species that had been previously documented in the general vicinity and were noted as potentially occurring in the treatment area during the Shingleton Compartment Review. This report summarizes the findings of MNFI's surveys, discusses the threats to the ecological integrity of the stands, and provides site-specific management recommendations aimed at protecting biodiversity in the Garden Peninsula.

Methods

In preparing comments for the previous Shingleton Compartment Review for Compartment 96, MNFI botanists and ecologists analyzed compartment and stand maps, aerial photographs, and MNFI's Biotics database of rare species to determine which rare plant species could potentially occur within the compartment (MNFI 2008). Two species were identified as occurring within section 31, dwarf lake iris (*Iris lacustris*, state and federal threatened) and calypso orchid (*Calypso bulbosa*, state threatened), with both species having potential to occur in stands prescribed for treatment.

On July 1, 2008, MNFI received a formal request from FMFM for an Emergency Contingency survey for dwarf lake iris and calypso in Shingleton FMU Compartment 96, stand 58 and Compartment 97, stand 16. A survey for these rare plants was conducted on September 8, 2008. Rare plant surveys involved meander surveys, during which comprehensive species lists were compiled and microhabitats were systematically searched. Invasive plant species were also recorded, and the ecological characteristics of the stands and surrounding habitat were noted.

Results

Rare species

A large population of dwarf lake iris was documented in openings adjacent to Portage Bay Road, but no plants were found in the stands prescribed for treatment (Figure 1). Dwarf lake iris could be adversely impacted by timber harvest activities if openings along Portage Bay Road are used as staging areas, or if road maintenance activities are conducted, but otherwise should be unaffected by proposed management. Due to the timing of the request for a survey, it was not possible to conduct a thorough search for calypso, which flowers early in the year and has a narrow survey window of late May through mid-June (Higman and Penskar 1996).

Dwarf lake iris along Portage Bay Road.

Invasive species

Surveys also documented a significant population of the invasive shrub glossy buckthorn (*Rhamnus frangula*) in the stands prescribed for treatment. Glossy buckthorn is a rapidly spreading, highly invasive species that has the potential to outcompete native trees, shrubs, and herbaceous plants, eventually forming monocultures of low-quality wildlife habitat devoid of timber value. Aggressive control of glossy buckthorn is strongly encouraged prior to conducting other timber management activities. Please see the discussion section for more on the threats posed by glossy buckthorn as well as potential control strategies. A small population of European marsh thistle (*Cirsium palustre*) was also found in the treatment area. At present, this species is sparse and does not pose a threat to the resources in the compartment, but it should be monitored for potential spread.

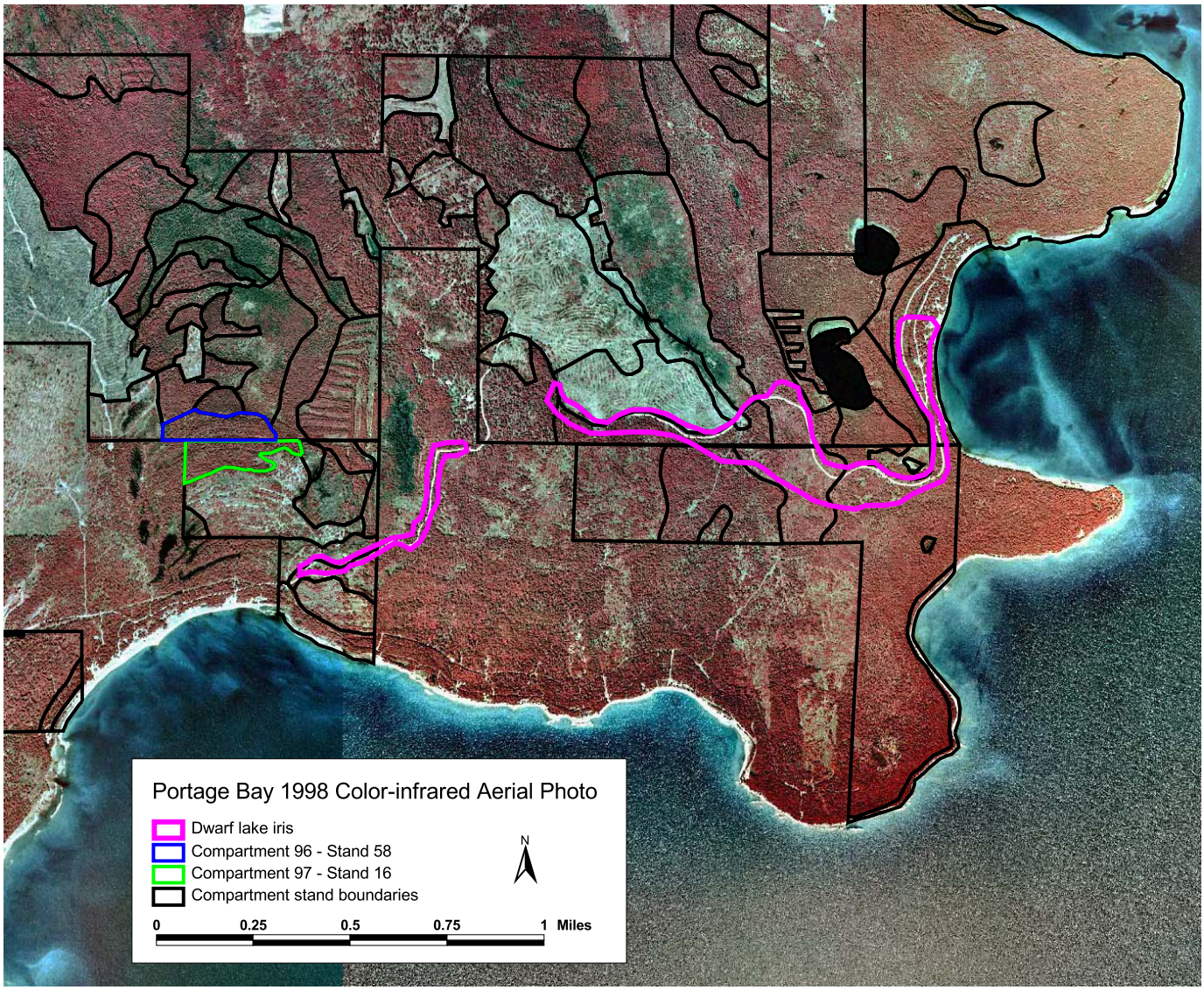

Figure 1. Location of dwarf lake iris along Portage Bay Road in the Garden Peninsula.

Site Description

The stands prescribed for treatment are part of a wooded dune and swale complex natural community. An alternating series of relatively dry, sandy ridges and wet swales parallel Kregg Bay on Lake Michigan to the south. The dry sandy ridges are dominated by black spruce (*Picea mariana*), northern white-cedar (*Thuja occidentalis*), and balsam fir (*Abies balsamea*), along with lesser amounts of white pine (*Pinus strobus*) and red pine (*P. resinosa*). The ground layer on the ridges is dominated by Canada blueberry (*Vaccinium myrtilloides*), trailing arbutus (*Epigea repens*), and bracken fern (*Pteridium aquilinum*).

Swales are dominated by black spruce and northern white-cedar, along with a high diversity of native shrubs including speckled alder (*Alnus rugosa*), Labrador tea (*Ledum groenlandicum*), Michigan holly (*Ilex verticillata*), mountain holly (*Nemopanthus mucronata*), American mountain-ash (*Sorbus americana*) and black chokeberry (*Aronia prunifolia*). Glossy buckthorn is also found in the shrub layer in the swales. Sphagnum mosses (*Sphagnum* spp.) are prevalent in the ground layer along with herbaceous species such as dwarf raspberry (*Rubus pubescens*), goldthread (*Coptis trifolia*), creeping snowberry (*Gaultheria hispidula*), bunchberry (*Cornus canadensis*), blue flag (*Iris versicolor*), and rough goldenrod (*Solidago rugosa*). In all, 48 native species were documented from the two stands (Appendix 1).

To the south of stand 16 are a series of dry ridges that were harvested for timber in the past 10 to 20 years. A severe lack of tree regeneration and very low stocking was noted in this area. Due to its relatively small size and previous management history, the wooded dune and swale complex does not qualify as an element occurrence natural community.

Large colonies of dwarf lake iris occur in openings along Portage Bay Road.

Discussion

Rare species

The dwarf lake iris element occurrence documented along Portage Bay Road is one of just nine A-ranked occurrences in the state. Although dwarf lake iris is also found in Wisconsin and Ontario, Michigan is the stronghold of the species with 80 extant occurrences. Highly ranked due its large population size, large spatial extent, and high-quality habitat, this occurrence is highly significant from both a state and global conservation perspective. Dwarf lake iris thrives in upland calcareous soils beneath an open to semi-open canopy and is most often found beneath northern white-cedar and balsam fir (Penskar et al. 2001). It is very tolerant of mild physical disturbance such as windthrow, and management that creates or maintains an open canopy may benefit iris (NatureServe Explorer 2008). However, operations that cause severe soil disturbance such as road grading or use of iris openings as staging areas should be avoided. As long as these activities are confined to areas without dwarf lake iris, the species should not be harmed by the proposed management. In addition, conducting timber operations in the winter when the ground is frozen and covered with snow will further minimize soil disturbance.

Threats

The primary threat to the ecological integrity of the stands is posed by the invasive shrub glossy buckthorn. Due to its rapid growth and ability to cast dense shade, glossy buckthorn outcompetes native trees, shrubs, and herbaceous plants (Czarapata 2005). As a result, the ability of other tree species to regenerate can be severely impaired over the long term. Originating from Europe and Asia, glossy buckthorn was brought to the United States in the 1800s for landscaping purposes. With its rapid growth, tolerance of a wide variety of moist soil conditions, abundant seed production, and bird-dispersed fruit, glossy buckthorn has spread rapidly. It is particularly pernicious in calcareous wetlands but tolerates an array of substrates and is aggressive in uplands as well. A deciduous shrub or small tree, it grows up to 20 feet tall, and often has multiple stems at the base with an open spreading crown and a trunk that can grow up to 10 inches in diameter (Borland et al. 2008). Leaves are simple, alternate, oblong, 1.0 to 2.5 inches long, with untoothed margins, and are frequently shiny or glossy. Often leafing out prior to other plants in the spring and holding its leaves longer in the fall, glossy buckthorn effectively has a longer growing season and therefore exerts a competitive advantage over other species. Easily recognized in winter, mature stems have prominent white lenticels on the bark, and a flexible, naked brown bud that looks furry due to its lack of bud scales.

Although tolerant of shade and filtered light conditions, glossy buckthorn exhibits the most aggressive growth and prolific fruit production when receiving ample sunlight. Currently poised in the sapling layer, it would likely be released in the event of a harvest. Since opening the canopy may exacerbate the buckthorn problem, it is strongly recommended that timber operations in swales be delayed until a proper control strategy can be enacted. More information on control of glossy buckthorn can be found in the Management Recommendations section below.

Glossy buckthorn can be identified by its shiny alternate leaves and gray bark with prominent white lenticels. Photo of bark by John M. Randall, The Nature Conservancy.

The second threat to the ecological integrity of the forest in the compartment is a high level of deer browsing. This was evident on tree seedlings which had been repeatedly browsed, as well as on mature trees exhibiting a high browse line. Moreover, high deer densities likely contributed to the regeneration failure noted in the previously harvested stand (18) immediately south of the stand (16) prescribed for treatment in compartment 97. Other factors may have contributed to the lack of regeneration as well. It is strongly recommended that the DNR make a full assessment as to the reasons behind the previous regeneration failure and take steps to mitigate these factors in prescribed stands above and beyond planting additional trees as noted in the compartment review comments.

Adjacent stands showed signs of regneration failure, likely due to excessive deer browsing.

Management recommendations

Long-term control of glossy buckthorn is critical to the health of the forests in this compartment and throughout the Garden Peninsula. Failing to address this threat may have long-term impacts on timber and wildlife resources. Elsewhere in the Upper Peninsula, glossy buckthorn has become a severe problem at the Seney Wildlife Refuge, and in the northern Lower

Glossy buckthorn threatens the ecological integrity of forest resources in the Garden Peninsula.

Peninsula, it has completely overrun areas formerly dominated by native wetland shrubs, and threatens to interfere with regeneration of northern white-cedar.

The first step in establishing a plan to control invasive species is determining the extent of the problem. Buckthorn is known to occur in the general region of the Garden Peninsula, but the size and distribution of the invasion is currently unknown, making it difficult to accurately assess the relative importance of controlling the species in these particular stands compared to other areas. Therefore, it is highly recommended to conduct a ground-based survey to inventory the location, extent, and relative patch size of glossy buckthorn within the stands prescribed for treatment, other stands in the compartment, and other compartments in the Shingleton FMU. Once the full spatial extent of the infestation is known, a control strategy can be developed that most efficiently addresses the larger scale problem. Failure to fully assess the problem is one of the leading causes of failure in invasive species control.

It is often important to prioritize areas for control. High-value areas with minimal invasion should take

Diverse structure and species composition characterizes the forest in Compartment 96 stand 58 and Compartment 97 stand 16.

priority over low-value areas that are already highly degraded. In particular, known locations of high-quality natural communities and threatened or endangered species should be treated first. The spatial extent of the invasion should be used to prioritize control efforts as well. Outliers and large, fruiting individuals should be addressed first to contain the spread, and larger concentrations should be addressed later (Czarapata 2005).

The most effective means of controlling glossy buckthorn involves a combination of cutting and the use of herbicides. Saplings and small trees can be hand-cut, followed by an immediate application of a concentrated herbicide to the cut stump. Cut-stump treatments are effective anytime between July and March. Herbicides with the active ingredient triclopyr (Garlon) or glyphosate (RoundUp, Rodeo, etc) are effective. If left untreated, cut stumps will vigorously resprout, and will have to be treated with a foliar herbicide. An alternative that avoids hand-cutting is to conduct a basal bark application using triclopyr mixed with an oil-based carrier. Basal bark treatment can be conducted any time during the year except when snow prevents the wetting of the bark down to the root collar (Czarapata 2005).

Controlling invasive species such as glossy buckthorn must be viewed as a multi-year effort. It is critical to monitor the effectiveness of control efforts and conduct follow-up treatment when necessary. Severely infested areas will have a large seedbank, and seedlings released by the removal of larger shrubs must be dealt with promptly. After addressing high-priority sites, lower-priority areas can be subsequently targeted.

Finally, every effort should be made to minimize the spread of glossy buckthorn to new areas. In particular, this should include contract specifications with timber operators that require the thorough cleaning and washing of equipment, especially vehicle tires or treads which have the potential to pick up seeds and transport them to other sites (USDA Forest Service 2001). Equipment should be cleaned before entry into stands and prior to moving to new areas.

It is strongly recommended that surveys for invasive species like glossy buckthorn be incorporated into the forest inventory process throughout the Shingleton FMU in order to address threats before they become widespread problems. Control of small infestations is feasible if invasions are detected early, but become exponentially more costly and more difficult if invasive species are allowed to spread (Figure 2). Implementing an "early detection, rapid response" program is critical to successfully limiting the impact of invasive species on timber and wildlife resources.

Overall, invasive species are likely to grow in importance as they become more widespread and awareness of their potential negative impacts deepens. Efforts should be made to educate all field staff on the identification and control of invasive species in order to detect invasions early and treat them before they become problematic and adversely impact timber, wildlife, natural areas, and rare species.

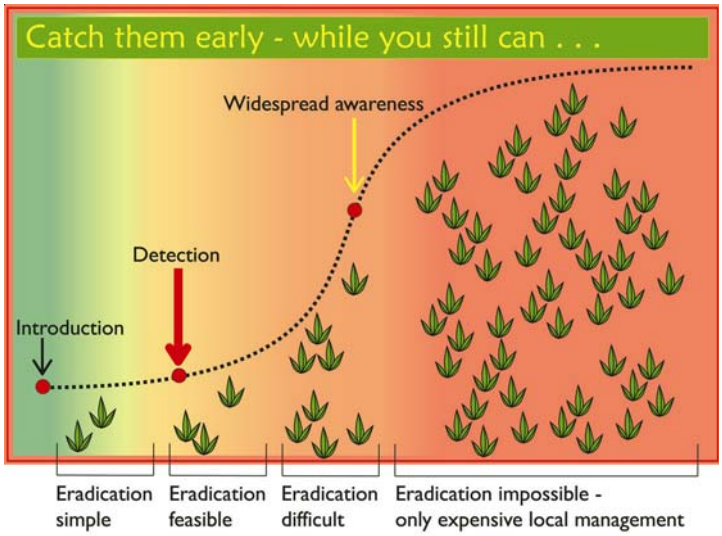

Figure 2. Controlling invasive species is much more cost-efficient before they become widespread problems.

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Appendix 1. Species list

A list of plant species observed was compiled for the site. Only one survey was conducted in early fall, and the species list should not be considered a thorough inventory or a comprensive survey for all rare species. Non-native species are listed in all caps. In the lifeform column, the abbreviations are as follows: Nt - native; Ad - adventive (non-native); P - perennial; B - biennial. Thus, Nt Shrub is a native shrub, Nt P-Forb is a native perennial forb, etc.

Scientific name	Common Name	Lifeform
Abies balsamea	balsam fir	Nt Tree
Acer rubrum	red maple	Nt Tree
Alnus rugosa	speckled or tag alder	Nt Shrub
Amelanchier arborea	juneberry	Nt Tree
Aralia nudicaulis	wild sarsaparilla	Nt P-Forb
Aronia prunifolia	black chokeberry	Nt Shrub
Aster lateriflorus	side-flowering aster	Nt P-Forb
Betula papyrifera	paper birch	Nt Tree
Calamagrostis canadensis	bluejoint grass	Nt P-Grass
Carex intumescens	sedge	Nt P-Sedge
Chelone glabra	turtlehead	Nt P-Forb
CIRSIUM PALUSTRE	EUROPEAN MARSH THISTLE	Ad B-Forb
Clintonia borealis	bluebead lily	Nt P-Forb
Coptis trifolia	goldthread	Nt P-Forb
Cornus canadensis	bunchberry	Nt Shrub
Cornus stolonifera	red-osier dogwood	Nt Shrub
Danthonia spicata	poverty grass	Nt P-Grass
Diervilla lonicera	bush honeysuckle	Nt Shrub
Dryopteris carthusiana	spinulose woodfern	Nt Fern
Epigaea repens	trailing arbutus	Nt Shrub
Gaultheria hispidula	creeping snowberry	Nt Shrub
Glyceria striata	fowl manna grass	Nt P-Grass
Gymnocarpium dryopteris	oak fern	Nt Fern
Ilex verticillata	Michigan holly	Nt Shrub
Iris versicolor	wild blue flag	Nt P-Forb
Juniperus horizontalis	creeping juniper	Nt Shrub
Ledum groenlandicum	Labrador tea	Nt Shrub
Lonicera canadensis	American fly honeysuckle	Nt Shrub
Lycopodium annotinum	stiff clubmoss	Nt Fern Ally
Maianthemum canadense	Canada mayflower	Nt P-Forb
Nemopanthus mucronata	mountain holly	Nt Shrub
Osmunda cinnamomea	cinnamon fern	Nt Fern
Osmunda regalis	royal fern	Nt Fern
Picea mariana	black spruce	Nt Tree
Pinus resinosa	red pine	Nt Tree
Pinus strobus	white pine	Nt Tree
Polygala paucifolia	gay-wings	Nt P-Forb
Pteridium aquilinum	bracken fern	Nt Fern
Rhamnus alnifolia	alder-leaved buckthorn	Nt Shrub
RHAMNUS FRANGULA	GLOSSY BUCKTHORN	Ad Shrub
Ribes lacustre	swamp black currant	Nt Shrub
Rubus flagellaris	northern dewberry	Nt Shrub
Rubus pubescens	dwarf raspberry	Nt P-Forb
Solidago rugosa	rough goldenrod	Nt P-Forb
Sorbus americana	American mountain-ash	Nt Tree
Thuja occidentalis	northern white-cedar	Nt Tree
Trientalis borealis	starflower	Nt P-Forb
Trillium cernuum	nodding trillium	Nt P-Forb
Vaccinium myrtilloides	Canada blueberry	Nt Shrub
Viburnum lentago	nannyberry	Nt Shrub