

# Valens Lake Conservation Area Invasive Species Prioritization Plan

---



## Contents

|                                                                              |    |
|------------------------------------------------------------------------------|----|
| Introduction.....                                                            | 1  |
| Using this Report.....                                                       | 1  |
| Hamilton Conservation Authority (HCA) Invasive Species Strategy (2016) ..... | 1  |
| Master Plan Directives.....                                                  | 1  |
| Objectives.....                                                              | 2  |
| Objective 1: Prevention .....                                                | 3  |
| Objective 2: Prioritization .....                                            | 4  |
| Integrated Pest Management Principles.....                                   | 5  |
| Significant Ecological Features.....                                         | 5  |
| Mapping .....                                                                | 6  |
| Invasive species found at VLCA .....                                         | 7  |
| Aquatic Species.....                                                         | 7  |
| Common Carp.....                                                             | 8  |
| Marbled Crayfish .....                                                       | 9  |
| Goldfish.....                                                                | 9  |
| Mystery Snails.....                                                          | 9  |
| Forest Pests and Diseases.....                                               | 9  |
| LDD Moth/Spongy Moth.....                                                    | 10 |
| Beech Leaf Disease (BLD) .....                                               | 10 |
| Beech Bark Disease (BBD) .....                                               | 10 |
| Oak Wilt .....                                                               | 11 |
| Spotted Lanternfly .....                                                     | 11 |
| Jumping Worms.....                                                           | 11 |
| Hemlock Woolly Adelgid (HWA) .....                                           | 12 |
| Terrestrial Species .....                                                    | 13 |
| Prioritization Framework .....                                               | 14 |
| Prioritization Criteria.....                                                 | 14 |
| Assembling the Framework .....                                               | 15 |
| Invasive Plant Priority List.....                                            | 18 |
| Invasive Species Management.....                                             | 25 |
| Management by Species.....                                                   | 25 |

|                                                                                     |    |
|-------------------------------------------------------------------------------------|----|
| Garlic Mustard ( <i>Alliaria petiolate</i> ).....                                   | 25 |
| Glossy Buckthorn ( <i>Frangula alnus</i> ) .....                                    | 25 |
| Invasive Honeysuckles.....                                                          | 26 |
| Phragmites/Common Reed ( <i>Phragmites australis</i> subsp. <i>australis</i> )..... | 26 |
| Multiflora Rose ( <i>Rosa multiflora</i> ).....                                     | 26 |
| Common Buckthorn ( <i>Rhamnus cathartica</i> ) .....                                | 27 |
| Scots Pine ( <i>Pinus sylvestris</i> ) .....                                        | 27 |
| Autumn Olive ( <i>Elaeagnus umbellata</i> ).....                                    | 27 |
| Winged Euonymus ( <i>Euonymus alatus</i> ).....                                     | 28 |
| English Ivy ( <i>Hedera helix</i> ) .....                                           | 28 |
| Common Burdock ( <i>Arctium minus</i> ).....                                        | 28 |
| Disposal of Invasive Plant Parts .....                                              | 29 |
| Herbicide Treatments .....                                                          | 29 |
| Monitoring.....                                                                     | 30 |
| Tracking and Work Planning .....                                                    | 30 |
| Restoration.....                                                                    | 30 |
| Plan Gaps and Blind Spots.....                                                      | 31 |
| Conclusion.....                                                                     | 31 |
| References.....                                                                     | 33 |

## Introduction

### Using this Report

This prioritization plan outlines actionable tasks for the management of invasive species within Valens Lake Conservation Area (VLCA, or “Valens”), and contains background information on a variety of topics relating to the creation of those action items. While the background information is valuable for thoroughly understanding effective and lasting invasive species management, it may be useful to refer directly to the recommended management activities.

The following sections contain direct instruction and/or crucial information:

- Objectives (page 2)
- Treatment/Control Priority List (page 18)
- Management by Species (page 25)
- Removal follow-up (page 29)

### Hamilton Conservation Authority (HCA) Invasive Species Strategy (2016)

In 2016 HCA developed an Invasive Species Strategy (the ‘Strategy’), a document that outlines the goals, objectives, and priorities for the management of invasive species on HCA lands. Invasive species are considered by the Ontario Ministry of Natural Resources (2012) to be plants, animals, aquatic life and micro-organisms that outcompete native species when introduced outside of their natural environment and threaten Canada's ecosystems, economy, and society. They can originate from across the country or across the globe. Invasive species are considered the second greatest threat to biodiversity after habitat loss (Ontario Ministry of Natural Resources, 2012). Therefore, it is imperative that HCA develop a plan for prioritizing the removal of invasive species from our Conservation Areas and managed properties.

The Strategy has seven main approaches to invasive species in the watershed. These include prevention, communication, best management practices, prioritization, action plans, collaboration and research and monitoring. The HCA Board of Directors approved this invasive species strategy in 2016. This was then incorporated into the larger strategic plan for HCA (2019-2023) under Natural Heritage Conservation, one of five priority areas set out in the plan. Prevention, prioritization and communication are the focus of this site-specific plan for VLCA.

### Master Plan Directives

The VLCA Master Plan, published in 2019, contains information on important ecological features such as natural heritage areas, significant wildlife habitat, and the location of species at risk and locally rare species. The prioritization framework in this

report considers these criteria. The master plan also lists the invasive species found in Valens at time of its completion. While those species are still present, the populations have since expanded, and new species have become more prevalent.

## Objectives

This Plan expands upon the approaches laid out in the 2016 Strategy, specifically as they apply to managing the invasive species at Valens Lake Conservation Area. The Plan seeks to accomplish three main objectives:

- **Objective #1 – Prevent the Introduction of New Invasive Species**  
As prevention is the most important method of controlling the spread of invasive species, all prioritization and management must put first the ability to stop the spread of invasive species into new areas. Opportunities to prevent the introduction of invasive species will be implemented, and management techniques that restrict the range of current invasives will be used.
- **Objective #2 - Prioritize Management for Species Present**  
As noted in the Strategy, there are many invasive plant species on HCA land, so prioritization must occur on both a species and property level. This report summarizes the current state of key invasive plant species at VLCA and provides a decision framework for which species and populations should be prioritized for management.
- **Objective #3 - Communicate with Conservation Areas for Effective Joint Management**  
Internal communication is also a key activity in the 2016 Strategy. This report seeks to provide useful and actionable information to the staff of VLCA, so that both Conservation Area Services (CAS) and Watershed Management Services (WMS) staff can work together to effectively manage invasive species on the property. This report considers feasibility and treatment methods to highlight areas where control efforts could be undertaken by summer contract staff. The creation of this report fulfills the 2016 Invasive Species Strategy directive to implement internal communication about invasive species management activities.

The task of managing invasive species is an HCA wide responsibility. The role of the invasive species technicians is to implement the relevant strategies and management plans related to invasive species, conduct mechanical and chemical removals of target species, and map locations of invasive species on HCA properties. This role takes the invasive species team across the watershed to complete work, and with this in mind, bringing CAS staff, from summer students to superintendents, on board is vital to the success of these efforts. Prioritization plans provide opportunities, knowledge, and a strategy for superintendents to self-regulate manageable invasive

species on their properties through removals and monitoring. By educating CAS staff and supporting local and watershed priorities, individual conservation areas can continue the work done by the invasive species team independently, allowing for more work to be done elsewhere in the watershed. Invasive species technicians will work to provide CAS staff with the necessary resources to conduct their own removals, while prioritizing areas that require support, such as chemical treatments, mapping emerging species, or coordinating larger scale removals with volunteers or other staff.

## **Objective 1: Prevention**

It is important to note that while management of existing invasive plants is critical, prevention is the most important method of controlling the spread of invasive species. Many of the introduced species are hardy species in their native home ranges and thrive in degraded ecosystems. When invasive species are introduced into other landscapes outside of their native range, it is their hardiness and lack of natural predators that makes it relatively easy for them to become established. Once established they are difficult to eradicate. Often, full eradication requires a large amount of time and energy and sometimes is not possible.

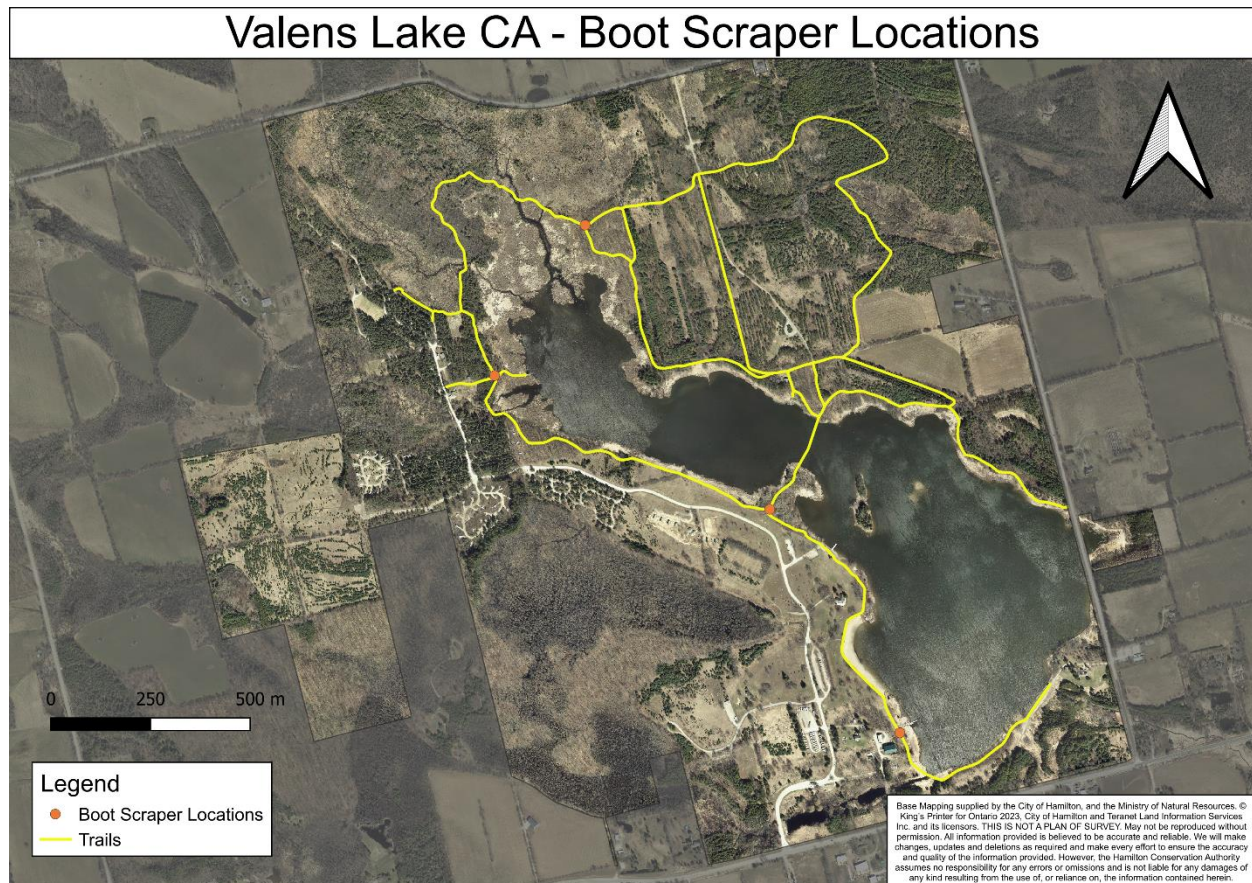
These species are introduced through several different pathways. For Conservation Areas and HCA owned properties, the pathways of introduction are mainly along trails, waterways, and road networks. Invasive plants can be introduced to the property or moved throughout the property by hikers, dogs and maintenance equipment.

A few key tasks can be implemented to help prevent the introduction of new invasive species to VLCA. Firstly, a clean equipment protocol should be used for all equipment new to the site that uses the trail or road system. In summary, a clean equipment protocol ensures that all equipment coming on to the property is clean of debris and soil before it uses the trails or road network. This will help prevent unwanted seeds and vegetative material introductions.

Clean equipment mandates also extend to recreation on the reservoir. As of January 2022, under the Invasive Species Act, boaters are required by law to remove or open drain plugs to allow water to drain from the boat and take reasonable precaution to remove all aquatic plants, animals and algae from the boat and equipment before transporting the boat overland and into another body of water. Wash stations should be installed at all boating areas across the HCA, including VLCA. Signs explaining the regulation should be posted at launching areas if not already present. In addition, it is recommended that a boat rinsing station be installed at the watercraft launch into the reservoir. This facility will enhance customer experience and increase the likelihood that patrons follow invasive species prevention regulations.

With a large trail system throughout the property, it is recommended that boot scraping stations be installed at high traffic areas and trail heads. This will provide a location for hikers to scrape their boots clean of dirt before and after they enter the trail system. Figure 1 shows recommended locations for installation, concentrated on the south side where trail users are most likely to enter the trails. The first station should be installed at the intersection where the south lakeside trail meets the fishing bridge trail. If supported by the budget, instructional or educational signage could also be installed near the boot brush station.

Figure 1: Proposed locations for boot scrapers at Valens Lake Conservation Area



## Objective 2: Prioritization

As HCA updates its Master and Management plans for properties, it has become apparent that invasive species plans at the site level are necessary. These plans help guide superintendents regarding how and where to start removing invasive species and when WMS staff can assist. Development of this prioritization plan considered the following strategies and tools, including integrated pest management, prioritization criteria, and significant ecological features. Details of how these were incorporated are outlined below.

## **Integrated Pest Management Principles**

Integrated Pest Management (IPM) is a list of principles which are built upon economically and ecologically sustainable approaches to controlling invasive plants. IPM is used to increase the efficacy and efficiency of treatment (Sherman, 2015). The following principle of IPM is used for the decision framework outlined later in this document:

“Making control decisions based on knowledge of potential damage, cost of control methods, and the environmental impact of both the invasive plant and the control decision” (Sherman, 2015, p. 11).

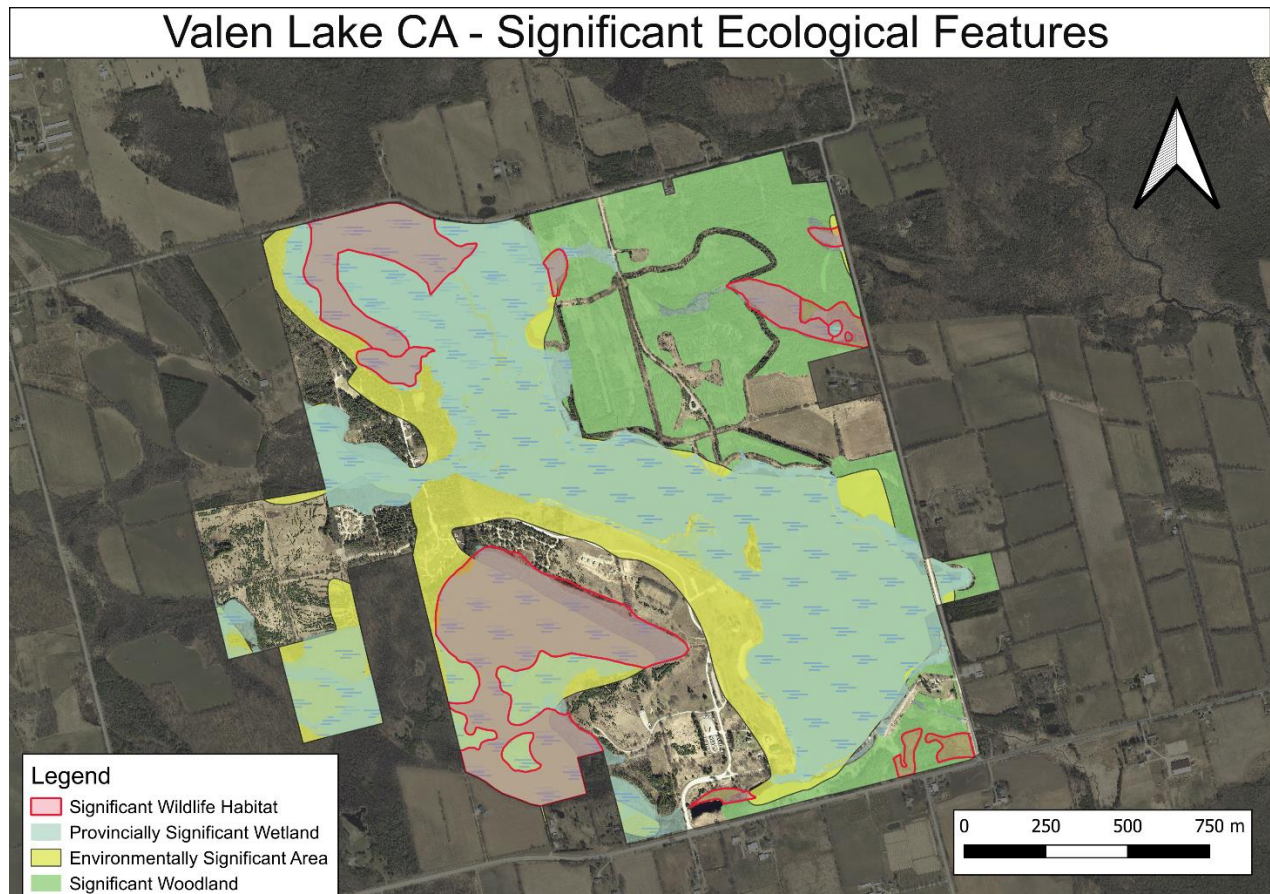
## **Significant Ecological Features**

As stated above, a primary strategy for prioritizing invasive plant species removal is to manage those near ecologically significant areas. As outlined in the master plan, ecologically significant areas at VLCA include (See Figure 2):

1. Valens Conservation Area Environmentally Significant Area (ESA) - The entire conservation area as well as two additional woodlots make up the ESA. It was designated for several reasons, including that: the riparian area serves as a link between natural features, it provides habitat for significant species, it contains important habitat for migratory bird stopover, it contains a locally rare biotic community, and the reservoir, wetlands, and marshes help maintain surface water quality.
2. Provincially Significant Wetland (PSW) - Occurs in low spots across the Northern and Western portions of the property, as well as in two isolated locations on the Eastern boundary. The reservoir is also a PSW. Wetland areas include silver maple and green ash swamps along with cattail marshes and swamp thickets. Three locally rare plant species can be found within the PSW.
3. Significant Woodlands - Most of the property owned by HCA at Valens is considered by the City of Hamilton to be significant woodland. Significant Woodlands are areas which are ecologically important in terms of features (species composition, age of trees and stand history) and function (contribute to the broader landscape because of their location, size or the amount of forest cover in the area) (City of Hamilton, 2022).
4. Species at Risk – Are species or plant or animal that is at risk of disappearing from the wild. VLCA is home to 12 species at risk (SAR). These inhabit both the wetlands and forests on the property. Seven SAR species breed on the property and the other five use the area for foraging or as a migratory stop.
5. Habitat for species of conservation concern is a type of Significant Wildlife Habitat (SWH). This type of habitat is protected and is another category that

can be used for prioritization. Species that fall under this category can be locally rare or provincially or globally rare but not designated a species at risk. The master plan identified three locally rare plants and six locally uncommon plants are found across the conservation area.

Figure 2: Map outlining the significant ecological features at Valens Lake Conservation Area



## Mapping

To determine a site level prioritization of the invasive species, extensive mapping was required. For invasive tree pests and diseases, the methodology is VLCA wide and focused on specific tree species or known disease pathways. For aquatic species, past electrofishing and aquatic plant surveys have identified common carp as the primary aquatic invasive threat at VLCA. Submergent Aquatic plant surveys have not been conducted recently, but Phragmites has been a current threat, and Eurasian milfoil is seen as a potential invader at VLCA. Mapping of these species will be considered for future work in collaboration with VLCA staff and the HCA aquatic ecologist. For terrestrial plant species, mapping was completed using data from the master plan and with supplemental mapping in the fall of 2023. First, all existing invasive species data was collected, with redundant or outdated data removed and current data ground-truthed by site visits. High human impact areas were mapped first due to the anticipated

distribution of invasive species, ease of access, and large size of developed areas. This included campsites, roads, trails, buildings, and reservoir infrastructure. The second aspect of mapping was to survey the natural areas at VLCA based on Ecological Land Classification (ELC) type by polygon. ELC areas are distinct ecological communities based on many characteristics including dominant plant species. The ELC type for ecosystems on the property was pulled from the VLCA master plan. Each ELC community was surveyed by transecting the area, along with a mapping of the edges of each community when possible. This gave an overall impression of the dominant invasive species present in each ELC polygon. While invasive species populations do cross over ELC community boundaries, there was a noticeable link between the distribution, density, and species present in each given ELC polygon. This methodology allowed for development of a map of priority areas and species at Valens Lake Conservation Area, with specific focus paid to swamps, marshes, reservoir areas, significant woodlands, and campgrounds. Large portions of the woodlands in the Northeast corner of Valens we not mapped. Many portions of this area were inaccessible, and upon a cursory survey, invasive species distribution was found to be uniform and abundant. These maps were then used to form part of the site level strategies used to focus control efforts.

## **Invasive species found at VLCA**

Invasive species are found throughout the HCA, with three main categories present in different amounts in the watershed; aquatic species, tree pests and pathogens, and plants. VLCA is home to a diverse range of ecosystems, including wetlands, plantation forests, swamps, campgrounds, and meadows. This diversity means the presence of all types of invasives are possible. Through mapping and data collection, high risk species either currently present, or with a strong risk for emergence at VLCA have been highlighted below. It is important to become familiar with these threats, as they may become more prevalent in the years following the publishing of this report, and CAS staff will often be the first to detect their presence.

### **Aquatic Species**

Aquatic fish species are monitored at Valens through electrofishing and Seining, done semi-annually, depending on resources and availability of equipment and boat operators. Currently, benthic and invertebrate sampling is not done at VLCA, though there may be opportunity to include this in future surveying if required, or if there is reason to suspect the emergence of invasive threats. Similarly, the potential for a submergent aquatic plant survey in the wetland and reservoir is also possible. Any invasive fish or invertebrates collected during monitoring should be humanely euthanized, not re-released into the waterbody. As with fish and invertebrates, managing already present aquatic invasive plants is especially difficult. Once an

invasive plant is established in a water system, eradication efforts are frequently impractical.

The impracticality of removing and monitoring aquatic species places a higher importance on preventing introductions. All equipment should be cleaned thoroughly before being used within the Valens Lake reservoir; this will help prevent the introduction of invasive species. Conversely, all equipment should be rinsed after use in the reservoir to prevent the movement of invasive species out. As a recreational lake, a hosing station should be installed at the launch point to support the new changes to the Invasive Species Act to prevent the movement of aquatic invasives. Specifically, Ontario Regulation 354/16 requires any person transporting their watercraft overland to a new body of water to thoroughly clean and wash their craft, removing any aquatic vegetation or animal life to prevent the spread of invasive species. Although VLCA's own boats stay within the reservoir, patrons bringing their own watercraft should be given a location and means to clean their equipment. A tiered approach to implementation of this initiative can be used, as the requirements and necessary work will take time and resources to implement. At minimum, signage emphasizing the importance of cleaning, draining and drying their equipment before and after entering the lake should be installed at major launch points. Additionally, signage should advise against using soap due to the risk of runoff and include the correct legal requirements related to boat washing. As of 2024, Fifty Point Conservation Area is currently installing a wash station and signage at their marina and may offer best practices and experience once the process is completed.

VLCA follows MNRF guidance on live bait for fishing in the reservoir. Live bait can be a potential source of new invasive species, such as non-native baitfish, and more recently, worms. With jumping worms (described in the next section) now being detected in Hamilton, there are more emerging threats that could be spread using live bait. It is recommended that VLCA staff and management continue to explore options to reduce the risk of invasive species spreading by live bait.

**Common Carp** are a known aquatic threat in the Valens reservoir. Not considered one of the four "Asian Carp", this invasive fish does originate in Eurasia, and poses many of the same risks that other invasive carp pose. They are fast growing fish that can get to be up to 40 kilograms in weight, living for as long as 40 years. In southern Ontario, these fish heavily disturb environments through their feeding mechanisms, digging up plants, which remove native vegetation, destroy other habitat for native fish, and create murky waters. They also prey upon other aquatic life including fish eggs, invertebrates, crustaceans, and insects. Common carp were found at Valens, where they showed destructive behavior; however, a die-off in 2018 sharply reduced the population. Since this is a known pest at VLCA, it is important to monitor reservoir

health and fish catches to watch for population resurgences or loss of aquatic vegetation to preserve the health of the ecosystem.

**Marbled Crayfish** are a medium sized crayfish that resulted from a mutation in other crayfish species in the European pet trade in the 1990's. They became popular for their size and variance in coloration, usually exhibiting the marbled pattern which gave them their name on their carapace. Marbled Crayfish are usually some shades of brown, but can also appear olive, blue, red, or tan. A single female can reproduce asexually, laying hundreds of eggs in a single season, allowing for a potential takeover of a variety of freshwater habitats, including wetlands, lakes, reservoirs, and ponds, with a preference for slow moving waters. Marbled crayfish were first detected in Canada in 2021, their ability to outcompete native species, rapidly grow and reproduce, and predate on small fish poses significant risks to Canadian freshwater ecosystems.

**Goldfish** are often introduced to an ecosystem by people who abandon them as pets. Able to handle fluctuations in water turbidity, temperature, and dissolved oxygen, they are extremely adaptable and can handle areas of poor water quality better than some native species. This allows them to outcompete native fish in urban or highly disturbed areas. Goldfish can also transmit parasites or bacteria to native fish species. In areas where their population is allowed to thrive, they feed heavily on fish eggs and larvae, as well as aquatic plants, and their feeding style can cause disturbances in the substrate and create murky waters.

**Mystery Snails** are another aquatic pest emerging from the pet trade. There are two main types, the Banded mystery snail and the Oriental mystery snail, although there are other types of invasive snails known to be in Ontario. Mystery snails can reproduce quickly, outcompeting native snails for food and habitat, and their diet of algae, eggs, and other vegetation has large-scale impacts on foundational elements of local ecosystems. Human impacts can also occur, as dense populations can lead to mass die offs, clogging drains, pipes, or other watercourse areas. Thriving in disturbed areas like many other aquatic invasives, they have been found along Lake Ontario

## **Forest Pests and Diseases**

Forest pests and diseases can include insects, fungi and pathogens. They are a risk to individual tree health and therefore the wider forest health of the HCA watershed. VLCA has a wide variety of ecosystems within the conservation area including large tracts of forested swamp and smaller sections of deciduous forest. Several forest pests and diseases have been detected within the watershed at various levels of severity, depending on their locations. The only invasive forest pest currently detected at VLCA is Spongy Moth, which is located within the deciduous forests and on the landscape trees near the beach. Of the six invasive pests listed, four are actively surveyed for; Spongy Moth, Beech Leaf Disease, Hemlock Woolly Adelgid, and Oak Wilt. The other species

are not currently surveyed for by invasive species or ecology staff but reports of their presence should be investigated if detected by CAS staff or conservation area guests. A map at the end of this section outlines where surveys for these pests take place.

**LDD Moth/Spongy Moth** formerly known as the European Gypsy Moth, is an established species of moth where the larvae feed on the leaves of over 200 tree species. Although the defoliation by spongy moths will not kill trees, co-occurrence with another stressor such as severe drought or Fall Cankerworm outbreaks may lead to tree decline. Spongy moth population sizes cycle every few years with a sharp increase before collapsing. During a peak year, the open canopy resulting from the severe defoliation can allow invasive plants to become more established in the understory. Manual removal of egg masses or caterpillars on select isolated trees can help mitigate damage. Egg mass removal is done by scraping them off the tree trunk between September – and March into a jar of soapy water and destroyed. Then from May – August burlap bands are then placed around the tree trunk and caterpillars are removed daily and placed in buckets of soapy water to kill them. Moths are surveyed for during the winter, where plots are chosen based on tree composition and location, and egg masses are counted to predict the next year's defoliation rates. At VLCA, surveys have historically been completed in oak stands and around the landscape trees near the access road and beach.

**Beech Leaf Disease (BLD)** is a disease that infects American beech trees and has been detected on HCA property. To date it has only been found in the Dundas Valley Conservation Area, so reducing the spread to other properties is most important. This disease is associated with nematodes that were likely transported by humans on contaminated wood. It spreads very quickly and where established it is known to affect nearly 100% of nearby American beech trees. Currently, no effective control or eradication measures have been developed. Symptoms of BLD in the early stages are a striping appearing on the leaves caused by a darkening between the leaf veins. This is best seen from the bottom-side of the leaf and through the summer and winter months. Most mortality occurs in saplings, happening as rapidly as one year. Older trees are slower to be infected, starting in the lower branches and working up. As the disease progresses, the leaves near the branch tips become shrivelled and discoloured and reduced bud and leaf production. There is a sugar maple forest with significant beech understory located north of the Tamarack Campground and east of the Trillium Campground, which should be monitored for the emergence of the disease. Should VLCA staff report potential cases of BLD, invasive species staff will begin surveys of the area for its presence or additional cases.

**Beech Bark Disease (BBD)** refers to the decline and death of beech trees as a response to an infestation of invasive insects, leading to fungal infection. Invasive beech scale insects cause damage to the bark of the trees, allowing for canker fungus to take

over. BBD is a staged disease, where as time and the disease progresses, large beech trees die and suckers are sent out which densely cover the undergrowth, pushing out other native vegetation. VLCA has been affected by BBD, like other conservation areas, which mature beech stands seeing removal after tree mortality. As the effects of BBD are ongoing, monitoring for hazard trees, restoration opportunities, and ongoing management are recommended approaches to dealing with the disease.

**Oak Wilt** is a fungal pathogen that targets all species of oak, however red oaks are more quickly and severely affected. This disease occurs predominantly in the Great Lakes Region of the United States and has moved into Canada with three detections in Ontario in 2023. This fungus has two known pathways of spread: underground by root connections, and by beetles which transfer spores from tree to tree during feeding. Discolouration of the leaves begins in the upper portion of the crown, turning them a bronze colour and causing premature leaf fall, which act as the first sign of infection. The fungus itself is found beneath the bark of the infected trees in the form of a dark mat, referred to as “pressure pads” that gives off a fruity scent. This scent is what attracts the insects to feed and spread spores to non-infected oaks. A survey of major oak stands on Valens Lake property was conducted in September 2023, with no cases found. Surveys will continue to be conducted over the coming years to monitor for this threat.

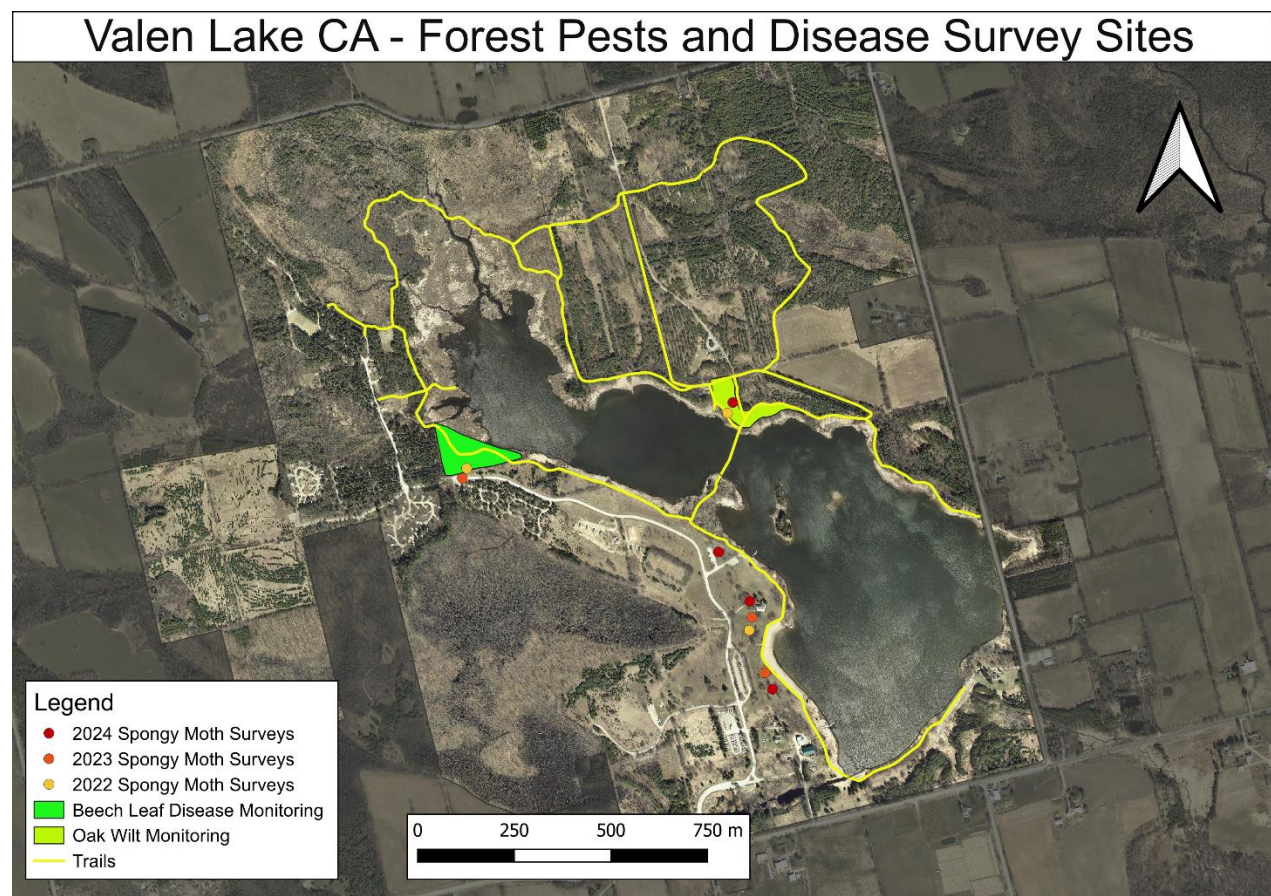
**Spotted Lanternfly** is an invasive insect that has yet to be confirmed in Canada. Approximately 25mm long, they have a unique patterning and colouring. Their front wings are light brown/grey, and the rear wings are red, both sets of wings have black spots near the front and black bands at the back. These insects pierce the bark of native hardwood and fruit trees to access the phloem and sap to feed. Nymph stage Spotted Lanternflies do the most damage by attacking a wide range of native hardwood and fruit trees. The adults primarily use the invasive Tree of Heaven as their host species on which they feed and lay eggs. By controlling the Tree of Heaven on HCA property we can disrupt the life cycle of the Spotted Lanternfly if it were to move into our region. If the Spotted Lanternfly were to arrive, it could weaken and or kill fruit trees, grape vines, and severely damage agricultural industries in Ontario. Signs and symptoms of the spotted lanternfly include muddy-grey egg masses on host trees. The base of the tree can become covered in a soot-coloured mold because of the secretions from the Spotted Lanternfly.

**Jumping Worms** are a recently detected invasive species on HCA land, currently only found in the Dundas Valley Conservation Area. These worms can quickly degrade the quality of forests. They consume the top layer of organic material on the forest floor, degrading soil quality and making it difficult for plants to remain rooted. In Canada, the adult worms do not survive the winter, but their eggs do which allows for the life cycle to continue. Jumping worms can be easily distinguished for their fast

moving and thrashing bodies and by their clitellum, a collar-like band around their bodies. The clitellum on a jumping worm is a white to light grey that wraps around their entire body. Their presence can also be detected by the changes in soil texture, jumping worm waste resembles coarse coffee grounds which lies on the top layer of soil. Removal of this species once it is established is not possible.

**Hemlock Woolly Adelgid (HWA)** is an aphid-like insect that attacks and kills hemlock trees. It is currently found in Hamilton on property owned by Royal Botanical and Gardens and is established in several other areas of Southern Ontario. These insects attach and feed at the base of the hemlock's needles, extracting sap and nutrients and eventually killing the trees. HWA's egg sacs, which look like very small cotton balls or clumps of snow, can be found at the base of needles. When looking for possible HWA examine the underside of hemlock branches between November to May when the woolly sacs develop and become more prominent. After a spring rainstorm, it is good to look on the bark of the hemlocks and examine any fallen branches for the woolly sacs.

Figure 3: Map of survey locations for pests at Valens Lake Conservation Area



## Terrestrial Species

Based on survey data collected between January 2021 and October 2023, there are 25 different invasive plant species that are mapped at Valens. Invasive terrestrial plants are the most extensive at VLCA representing many different species with various life histories. Simply listing the invasive plant species and their recommended removal action is too broad a measure. Prioritization within the plant species was required. To do this, both HCA's top 10 invasive plant species list and the Urban Forest Associates (UFA, 2018) invasive species of southern Ontario list were reviewed. As a result, only species considered invasive and of higher priority are included. The UFA use four categories to organize invasive species based on their degree of negative effect to local ecosystems. The following explains their categorization from 1-4.

Category 1 - Aggressive invasive exotic species that can dominate a site to exclude other species and remain dominant on the site indefinitely.

Category 2 - Exotic species that are highly invasive but tend to only dominate certain niches or do not spread rapidly from major concentrations.

Category 3 - Exotic species that are moderately invasive but can become locally dominant when the proper conditions exist.

Category 4 - Exotic species that do not pose a serious threat to natural areas unless they are competing directly with more desirable vegetation.

Table 1 then uses the UFA list and HCA's top 10 invasive plant species list to place the 25 species into a category.

Table 1: Invasive species found at Valens Lake Conservation Area

| <u>Common Name</u>     | <u>Scientific Name</u>       | <u>HCA<br/>Terrestrial<br/>Top 10</u> | <u>HCA Aquatic<br/>Top 10</u> | <u>UFA 2018</u> |
|------------------------|------------------------------|---------------------------------------|-------------------------------|-----------------|
| Autumn Olive           | <i>Elaeagnus umbellata</i>   |                                       |                               | Category 1      |
| Birdfoot Trefoil       | <i>Lotus corniculatus</i>    |                                       |                               | Category 2      |
| Bittersweet Nightshade | <i>Solanum dulcamara</i>     |                                       |                               | Category 3      |
| Black Locust           | <i>Robinia pseudo-acacia</i> |                                       |                               | Category 2      |
| Canada Thistle         | <i>Cirsium arvense</i>       |                                       |                               | Category 1      |
| Colt's Foot            | <i>Tussilago farfara</i>     |                                       |                               | Category 4      |
| Common Buckthorn       | <i>Rhamnus cathartica</i>    | X                                     |                               | Category 1      |
| Common Burdock         | <i>Arctium minus</i>         |                                       |                               | Category 4      |
| Common carp            | <i>Cyprinus carpio</i>       |                                       | X                             | N/A             |
| Dames Rocket           | <i>Hesperis matronalis</i>   |                                       |                               | Category 1      |
| Phragmites             | <i>Phragmites australis</i>  | X                                     | X                             | Category 1      |
| Common St. John's-wort | <i>Hypericum perforatum</i>  |                                       |                               | Category 4      |

|                     |                                                        |   |   |            |
|---------------------|--------------------------------------------------------|---|---|------------|
| Cow-vetch           | <i>Coronilla varia</i>                                 |   |   | Category 1 |
| Crown-vetch         | <i>Vicia cracca</i>                                    |   |   | Category 2 |
| English Ivy         | <i>Hedera helix</i>                                    |   |   | Category 3 |
| Garlic Mustard      | <i>Alliaria petiolata</i>                              | X |   | Category 1 |
| Glossy Buckthorn    | <i>Rhamnus frangula</i>                                |   |   | Category 1 |
| Goldfish            | <i>Carassius auratus auratus</i>                       |   | X | N/A        |
| Guelder-rose        | <i>Viburnum opulus</i>                                 |   |   | Category 4 |
| Honeysuckle Species | <i>Lonicera tatarica</i> ,<br><i>Lonicera morrowii</i> | X |   | Category 1 |
| Multiflora Rose     | <i>Rosa multiflora</i>                                 |   |   | Category 1 |
| Orchard Grass       | <i>Dactylis glomerata</i>                              |   |   | Category 3 |
| Purple Loosestrife  | <i>Lythrum salicaria</i>                               |   | X | Category 1 |
| Scots Pine          | <i>Pinus sylvestris</i>                                |   |   | Category 2 |
| Spotted Knapweed    | <i>Centaurea maculosa</i>                              | X |   | Category 3 |
| Winged Euonymus     | <i>Euonymus alatus</i>                                 |   |   | Category 3 |
| Yellow Hawkweed     | <i>Hieracium caespitosum</i>                           |   |   | Category 3 |
| Yellow Sweet-clover | <i>Melilotus officinalis</i>                           |   |   | Category 2 |

## Prioritization Framework

With key species of terrestrial plants, along with pests, pathogens, and aquatic threats identified, these species need to be ranked and prioritized accordingly. To meet our second objective of prioritization, the preceding summary of the state of invasive species has been analyzed and ranked according to the methodology below. For this ranking, only terrestrial plants have been considered. In some cases, terrestrial plants can be more accessible to map, easier to remove from a CAS perspective, and depending on species, can be controlled with less support from the invasive species team. Should new invasive threats such as high-threat pathogens (oak wilt) or aquatic species (goldfish, marbled crayfish) be discovered at VLCA, this plan may be amended to best address those emerging species.

## Prioritization Criteria

Invasive species management documents from organizations across Ontario were reviewed in the development of prioritization criteria for this plan. These include *A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario* (Credit Valley Conservation et al., 2016), as well as the City of Mississauga's Invasive Species Management Plan and Implementation Strategy (2021). Both plans provide criteria for deciding control priority of invasive plant populations. The criteria are not standard

across publications since each organization's priorities are different, however there are many commonalities. The following have been identified and chosen as key site-level strategies for HCA's approach to prioritizing invasive species management:

1. Focus removal efforts in areas where invasive species populations are small and are just starting to establish.
2. Protect rare species and ecological community types, as well as ecologically significant areas.
3. Target removals where it is most feasible, and cost of control is lowest.
4. Preferentially remove species which are more likely to spread and permanently dominate an invaded area.
5. Immediately remove species that pose a human health risk, if possible.

These criteria are not objectively weighted, rather, they are used to categorize and understand the different populations of invasive species at VLCA. These criteria are reflected in the framework created below.

### Assembling the Framework

The creation of a decision framework for treatment of invasive species is one of the central goals for this document. The tables and maps within this section will provide a list of action items for future management of invasive plant species at Valens Lake Conservation Area. To develop a prioritization framework and categorize each plant species within it, several factors were considered that are both spatial and ecological. These are adapted from the site level strategies discussed in the previous section. First the invasive plant populations are examined and divided by population size. Secondly qualitative characteristics are reviewed regarding each invasive plant species. These characteristics include background information on each species which includes ability to spread, ability to dominate once established, and other factors that dictate treatment type and difficulty. Finally, the ecological features listed in the overview are reviewed to prioritize the most sensitive features. This allows for the creation of priority classes. Five distinct priority classes emerged in the creation of this decision framework, and have the following qualitative characteristics:

- **Class 1:** Small to medium populations of high priority species (UFA Category 1, very high spread potential).
- **Class 2:** Small populations of other species with low time commitment for removal.
- **Class 3:** Populations threatening areas of high ecological value and are not yet strongly established. Smaller populations are priority but consider large populations where targeted management could have a positive impact. Areas of significance are ranked within this category.
  - **A:** Species-at-Risk Habitat and Significant Wildlife Habitat.
  - **B:** Land that is both Provincially Significant Wetland and Significant Woodland.

- **C:** Provincially Significant Wetland.
- **D:** Significant Woodland.
- **Class 4:** Populations in highly trafficked areas such as trails. Smaller populations are priority but consider large populations where targeted management could have a positive impact.
- **Class 5:** Large populations that border on less impacted natural areas (begin with controlling individuals closest to the less impacted area and move towards the center of the population).

All mapped populations at VLCA have been sorted into Priority Classes. Maps of the locations of treatment priority class 1 and 2 are also included. At this point, the amount of work required for the management of these species and areas should be sufficient for the immediate future, so maps of the remaining priority classes are not included in this report. Should work be completed on the classes 1 and 2, maps of the next classes can be provided. Species are given codes on the map for ease of display. A given population might meet the criteria of multiple classes, for example being a small sized high priority species while also threatening significant habitat. In this case, the population is assigned the highest class it fits into. Alternatively, a population may be too large to be approached. In this case, a portion of the population that meets the criteria of a Priority Class is identified and given treatment priority with specific instructions. In the following tables, some entries may have additional species in brackets, which indicates an area that is of high priority but contains multiple species to address.

Prioritization within populations of invasive species should also be utilized when undertaking management. Although each area is unique and species respond differently, there are guiding principles that extend to all treatment types. Always begin at the edges of a large population and work in to prevent further spread. Target fruiting plants first in both large and small populations to further prevent spread. If the population is bordering or inside a sensitive or important ecosystem, remove plants in that area first before addressing the rest of the population. If a population crosses multiple boundaries for sensitive ecosystems at Valens, the population should be addressed in the same fashion as the priority list above. In cases where new invasive species are detected in areas being treated for a larger population, the emerging species should take priority.

When managing invasive species inside the HCA, different staff and departments can undertake different work and roles to best eliminate, manage, and prevent the spread of invasive species. WMS staff, including the ecology team and invasive species technicians and CAS staff are at the forefront in efforts to curb invasive species. CAS staff can assist with identification, removals, and restoration efforts of manageable invasive species in their respective areas. These can include hand pulling invasive

groundcovers and herbaceous plants, such as Garlic Mustard and Goutweed, digging up or wrenching woody shrubs, and helping in reseeding and replanting efforts. For larger removals, the application of herbicides, or aquatic/wetland invasives, the invasive species technicians can be leveraged to complete removals.

## Invasive Plant Priority List

Table 2: Priority Class 1 invasive species for Valens Lake Conservation Area, with location description and treatment recommendations.

| Invasive Species                | Map Code      | Location                                                                                                       | Treatment Type                                      | Treatment Timeline    |
|---------------------------------|---------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------|
| Phragmites                      | P-1 to P-15   | Throughout reservoir near edges and across Valens Road in secondary pond.                                      | Foliar spray, cut-to-drown                          | 3-5 years, begin 2024 |
| Phragmites                      | P-16 and P-17 | Two populations roadside off Valens Rd. and Regional Rd. 97 on HCA land.                                       | Foliar spray                                        | 3-5 years, begin 2024 |
| Phragmites                      | P-18 to P-20  | Small populations in the swamp in Northwest corner of property. Very difficult to access.                      | Cut to drown, foliar spray depending on water level | 3-5 years, begin 2024 |
| Autumn Olive                    | AO-1 and AO-2 | In meadow areas behind cabins.                                                                                 | Pull, basal bark spray                              | 2-4 years, begin 2024 |
| Autumn Olive (Common Buckthorn) | AO-3 and AO-4 | On sides of main road just past gatehouse when entering the park. Scattered throughout meadow area.            | Pull, basal bark spray                              | 2-4 years, begin 2024 |
| Garlic Mustard                  | GM-1 to GM-5  | By workshop and barn, road to workshop, beach house, isolated areas in campground, and around rental property. | Pull                                                | Ongoing, begin 2024   |
| Glossy Buckthorn                | GB-1          | South of road between gatehouse and workshop.                                                                  | Pull, basal bark spray                              | 3-5 years, begin 2024 |
| Honeysuckle Species             | H-1           | South of road between gatehouse and workshop.                                                                  | Pull, basal bark spray                              | 3-5 years, begin 2024 |

Table 3: Priority Class 2 invasive species for Valens Lake Conservation Area, with location description and treatment recommendations.

| Invasive Species | Map Code | Location                                                                  | Treatment Type                 | Treatment Timeline       |
|------------------|----------|---------------------------------------------------------------------------|--------------------------------|--------------------------|
| Common Burdock   | CB-1     | Next to boardwalk trail in marsh area North of reservoir.                 | Pull, potentially foliar spray | Ongoing, begin 2024      |
| English Ivy      | EI-1     | Emerging from mulch pile South of road between gatehouse and workshop.    | Pull                           | 1-2 years, begin 2024    |
| Winged Euonymus  | WE-1     | Single shrub at border of maple swamp and woodland in centre of property. | Pull                           | 1 year, complete in 2024 |

Figure 4: Map of Priority Class 1 Invasive Species at Valens Lake Conservation Area

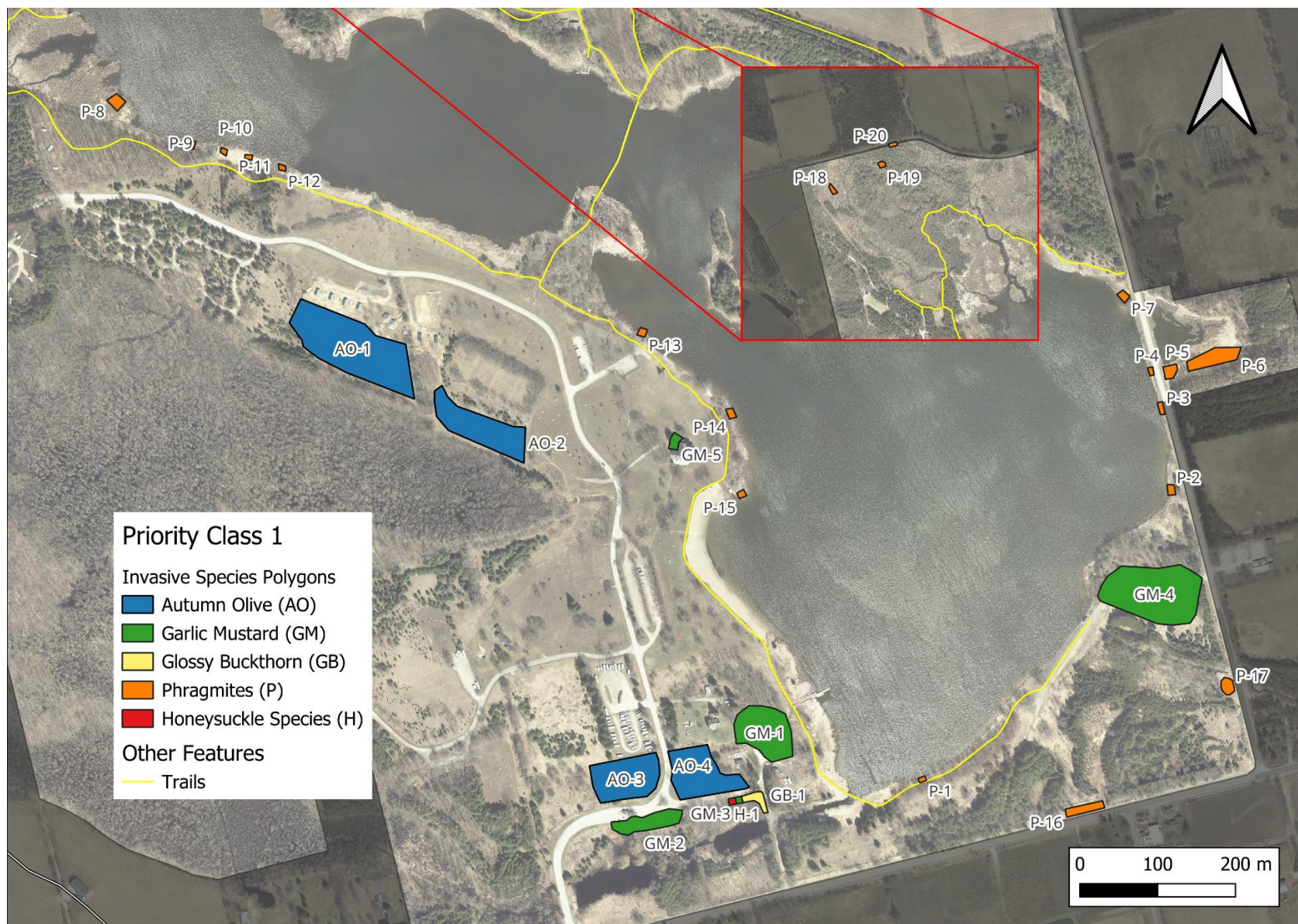


Figure 5: Map of Priority Class 2 Invasive Species at Valens Lake Conservation Area

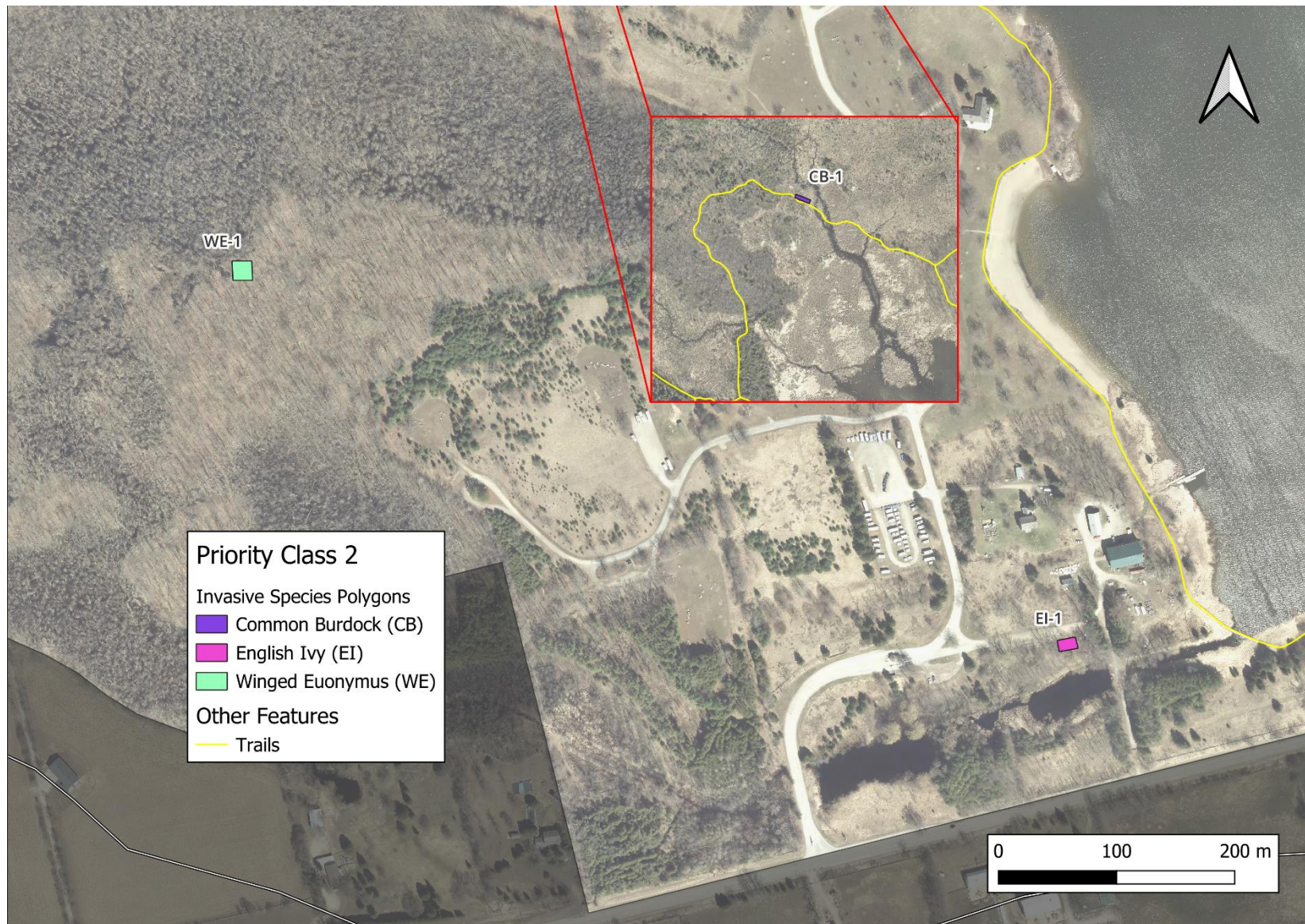


Table 4: Priority Class 3 invasive species for Valens Lake Conservation Area, with location description and treatment recommendations.

| Invasive Species                                        | Map Code | Location                                                                                                                                                                                                                                  | Treatment Type                          | Treatment Timeline                                              |
|---------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|
| Common Buckthorn (Autumn Olive and Honeysuckle Species) | N/A      | Present on border of maple forest Southeast of central swamp, and also in small adjacent coniferous plantation. Shrubs largely present on trail sides of Forest Edge trail, start removal deeper in forested area and work towards trail. | Pull                                    | Ongoing, begin after major progress on priority classes 1 and 2 |
| Glossy Buckthorn                                        | N/A      | Maple swamp in the Southwest corner of the property. Contains a small pocket of drier ground with very few invasive species.                                                                                                              | Pull                                    | As above                                                        |
| Glossy Buckthorn                                        | N/A      | In small swamp area towards Northeastern corner of the property.                                                                                                                                                                          | Pull, basal bark spray, cut-stump spray | As above                                                        |
| Glossy Buckthorn                                        | N/A      | Large population encroaching from Northwest into marsh at North end of reservoir. Start control at swamp-marsh boarder and push boundary back away from marsh.                                                                            | Pull, basal bark spray, cut-stump spray | As above                                                        |
| Autumn Olive (Common Buckthorn)                         | N/A      | On trail sides near intersection of Boardwalk and Woodland trail. Start removal of shrubs closest to boardwalk and move Eastward toward forest to prevent encroachment into marsh.                                                        | Pull, basal bark spray, cut-stump spray | As above                                                        |
| Common Buckthorn                                        | N/A      | Present in forest South of walk-in sites in Southwestern corner of the property.                                                                                                                                                          | Pull, basal bark spray, cut-stump spray | As above                                                        |
| Scots Pine (Glossy Buckthorn, Common Buckthorn)         | N/A      | Marsh on Eastern side of the property by Valens Road. Scots Pine population in centre of wetland, also encroaching from plantation to the North. Both Buckthorn species encroaching from North, South, and West.                          | Pull, basal bark spray, cut-stump spray | As above                                                        |

Table 6: Priority Class 5 invasive species for Valens Lake Conservation Area, with location description and treatment recommendations.

| <b>Invasive Species</b>                                                    | <b>Map Code</b> | <b>Location</b>                                                                                                         | <b>Treatment Type</b>                   | <b>Treatment Timeline</b>                                     |
|----------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------|
| Common Buckthorn (Autumn Olive, Glossy Buckthorn, and Honeysuckle Species) | N/A             | Fruiting females on trail sides on Southwestern shore of reservoir, from Aspen Cove Group site to canoe launching area. | Pull, basal bark spray, cut-stump spray | Ongoing, begin after major progress on priorities 1, 2, and 3 |
| Common Buckthorn (Autumn Olive and Honeysuckle Species)                    | N/A             | Fruiting females on trail sides on entire Northeastern shore of reservoir.                                              | Pull, basal bark spray, cut-stump spray | As above                                                      |
| Common Buckthorn (Autumn Olive, Glossy Buckthorn, and Honeysuckle Species) | N/A             | Fruiting females on trail sides within entire forested area on Northeastern corner and Eastern side of the property.    | Pull, basal bark spray, cut-stump spray | As above                                                      |

Table 6: Priority Class 5 invasive species for Valens Lake Conservation Area, with location description and treatment recommendations.

| <b>Invasive Species</b> | <b>Map Code</b> | <b>Location</b>                                                                                                         | <b>Treatment Type</b> | <b>Treatment Timeline</b>                                           |
|-------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------|
| Common Buckthorn        |                 | Eastern edge of Trillium campsites where buckthorn density is much lower. Start on Eastern edge and remove moving West. | Pull                  | Ongoing, begin after major progress on priority classes 1,2,3 and 4 |

|                  |  |                                                                                                                                                                                |                                         |          |
|------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------|
| Common Buckthorn |  | Western edge of the Fox Run group campsite. Surrounding area is very dense with buckthorn, however the edge of the campsite is less impacted and could be a good access point. | Pull, basal bark spray, cut stump spray | As above |
|------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------|

These tables and maps serve as the starting point to any management completed at VLCA, either by invasive species or CAS staff. The invasive terrestrial plants and the specific populations highlighted are, for the most part, feasible to be addressed by VLCA staff using manual removal techniques. Several of these populations may already be actively managed by VLCA staff, such as garlic mustard, and in these cases, it is encouraged that this work be continued. Areas highlighted that should be removed by invasive species technicians are the stands of phragmites, which will require either an in-water cut to drown, or an herbicide spray. Additionally, the invasive species team may complete basal bark sprays in the fall and winter months depending on priorities and other demands. Any recommended treatment involved herbicide must be left to a licensed pesticide applicator. Should the VLCA staff require additional support or wish to collaborate on a removal, invasive species technicians will be available to schedule an event when the schedule allows. For removals that will require a cut stump herbicide treatment, which may occur when cutting down woody invasives such as buckthorn, please notify the invasive species team to arrange a collaborative effort so proper follow-up treatment is completed.

## **Invasive Species Management**

As management of different invasive plant species can vary, a description of the 11 species highlighted for prioritization is given below for clarity. There are several general management guidelines provided following these profiles which can be uniformly applied to all species, including disposal, herbicide treatments, and restoration efforts.

### **Management by Species**

#### **Garlic Mustard (*Alliaria petiolate*)**

Garlic mustard is a biennial plant that produces seed in its second year. It can grow in a variety of conditions making it a very good invader in diverse habitats. It easily outcompetes other native ground cover and can change the soil environments to favour its growth over others. Hand picking between April and June, before the plant goes to seed is the optimal time for removal. With a dedicated effort over 5 years removal of this species can be achieved, provided no large-scale unintentional introductions occur.

#### **Glossy Buckthorn (*Frangula alnus*)**

Glossy buckthorn is a member of the buckthorn family that grows in wetlands and in moist woods forming dense thickets that shade out native species, producing a red berry that ripens to dark purple in late summer and is eaten by birds. It is very invasive due to its high seed production and tolerance for varied growing conditions. It tends to

be a weak plant and is easily pulled by hand or with an extractigator (weed wrench). Some of the plants are small and can be removed by hand, with optimal timing between April and November. Once pulled, plants can be piled with their roots exposed and off the ground to promote drying and prevent re-rooting. For larger trees and large infestations chemical removal is usually necessary. This includes a cut stump spray or a basal bark “hack and squirt” application of herbicide in the fall. Any treatment should start by focusing on fruiting female trees to prevent further spread.

### **Invasive Honeysuckles**

There are six native species of honeysuckle and 10 non-native species. Four of the non-native species are considered invasive, which include Tartarian (*Lonicera tatarica*), Amur (*L. maackii*), Morrow (*L. morrowii*) and Bells (*L. x bella*) honeysuckles. Hand pulling small plants can be very effective. An extractigator (weed wrench) can be used on medium sized plants. This is best done in the fall if spring ephemeral flowers (eg: Trilliums and Trout Lilies) grow in the area. The entire root system must be removed otherwise new stems will form in the spring. Once pulled, plants can be piled with their roots exposed and off the ground to promote drying and prevent re-rooting. For larger bushes or ones located in sensitive areas, cutting followed by an application of herbicide on the cut stumps is also effective in late summer and early fall.

### **Phragmites/Common Reed (*Phragmites australis* subsp. *australis*)**

This species of common reed from Eurasia is a highly aggressive perennial grass that spreads quickly and out competes other native species in wetland habitats. It forms large monocultures that decrease plant biodiversity and create poor habitat for wildlife. Ecology staff began removal of this plant from the reservoir with contractors in 2020 and was managed by staff in subsequent years. Effective control strategies have included drowning of stems when water levels are high (June-September) or herbicide application in dry periods for these wetland communities (August-October). Continued efforts should result in eradication of phragmites in the reservoir in 3-5 years.

### **Multiflora Rose (*Rosa multiflora*)**

Multiflora rose is a prolific seed producer and can shade and crowd out native species. It can be difficult to control as seeds have high germination rates and the plant re-sprouts vigorously when from a cut stem or when its roots are disturbed. Hand-pulling is an effective tool before berries are produced (April – August). Larger plants can be dug out using a combination of an extractigator and a shovel. Foliar application of herbicide works best on multi-stemmed plants or large plants that have been repeatedly cut with no chemical control. Trail side, large multiflora rose could be mown using heavy machinery and followed up with a foliar application. Foliar application works best between July and mid-September, but caution must be taken during breeding bird season when nesting birds may be found within the branches of multiflora rose. Any of these processes could take one to two years to see success because multiple stemmed

specimens generally have a very large root system. Cutting the stems at the base and applying an herbicide is a secondary option for larger specimens outside of the breeding bird season. Cut stump treatment should be applied from September to December.

### **Common Buckthorn (*Rhamnus cathartica*)**

Listed as noxious weed under the Weed Control Act, common buckthorn is a small tree or shrub that was introduced to Ontario from Eurasia. It was widely planted in farm hedgerows and fencerows as a wind break. Birds and small mammals feed on the berries of this plant. Buckthorn can be removed by hand pulling for smaller plants and by using an extractigator (weed wrench) on medium sized trees. Larger trees can be treated with a basal bark herbicide application in the fall. Re-planting with native trees and shrubs will also be required to shade out emerging common buckthorn. This species is dominant in many of the vegetation communities at VLCA. Sustained and continued effort will need to be applied to reduce the overall dominance. Adhering to the priority plan, presented above will be important. In addition, large tree control should, focus on fruiting female trees which are a major vector of spread.

Following the completion of removals recommended in the Treatment/Control Priority List, a phased plan will need to be developed for the campground as the buckthorn forms the screen or buffer between many campsites. Removals can be achieved with additional plantings below these pines, in the campground, as the plants are removed. Timing of this may be limited to the low occupancy season. Starting on the far north end of the campsite where the buckthorns are sparser, working south to the denser campsites. Before construction take place on the new campsites in the western 60-acres, effort to reduce the heavy fruiting trees is essential to prevent the spread through the construction of the new campsites and into the surrounding forests.

### **Scots Pine (*Pinus sylvestris*)**

Scots pine are very hardy and can grow in many different environments, often escaping from plantations. Spread through seed cones, it invades open areas such as meadows, prairies and woodlots with little subcanopy. Seedlings form dense monocultures which out compete native tree species. Hand pulling seedlings, digging out saplings and cutting or girdling large trees are effective controls since Scots pine does not re-sprout when cut. When pulling remove as much of the roots as possible and tamp down the soil after. Replanting of native species can help to reduce the number of new seedlings. Scots pine seeds stay viable in the soil for many years and will continue to sprout after initial removal. Scots pine can be left to decompose on its own if there are no seeds present.

### **Autumn Olive (*Elaeagnus umbellata*)**

Autumn olive is a common invasive shrub at VLCA. It is found along trails and prefers sunnier areas, which is reflected in its distribution. It succeeds in a range of soil

types but grows especially well in riparian areas. It out-competes native trees and shrubs forming dense thickets. Its water loving and nitrogen fixing roots can threaten the hydrology and soil composition wherever it establishes. Smaller plants can be removed with tools like an extractigator (weed wrench) but the roots make it difficult to manually remove as it ages. Treat with a cut-stump or basal bark herbicide application during summer and fall months (June – October). Focus on any larger, fruit bearing trees to prevent further spread before tackling the smaller stems.

### **Winged Euonymus (*Euonymus alatus*)**

Also known as burning bush, this shrub is generally slow growing, but has still managed to escape from cultivated areas and gardens to become invasive. It grows in a wide range of habitats and can handle a variety of moisture, soil, and shade conditions. Although slow spreading, birds eat the berries and spread the seeds over wide areas. For removals, hand pulling can occur throughout the warmer months and is the recommended form of removal for small populations. Shovels may be required in addition to extractigators (weed wrenches) to ensure the roots have been completely removed. Should the population persist, chemical treatments including cut stump spray (April-November) and basal bark (May-September) are viable.

### **English Ivy (*Hedera helix*)**

Invasive groundcovers and creeping vines are common terrestrial invasive species on HCA lands. English ivy is such a species. It forms dense monocultures, smothering other groundcovers and plants, and can also climb up trees and cause mortality by choking them and covering their foliage. English ivy can easily escape from gardens through long, snaking runner vines, or via seed dispersal from birds eating their fruit. Management of English ivy varies by population size, but manual removal techniques are effective in eliminating most populations. English ivy can be pulled by hand, with trowels being used to supplement efforts and ensure roots are fully removed. This method can eliminate patches within three years if done thoroughly. Smothering is also effective, using cardboard and mulch or landscape tarp to cover the affected area. Depending on the size of the infestation, this method works well in late spring after the plant has used its energy reserves to sprout and can eliminate an infestation after two years. Chemical treatments can be used, but this option is costlier and does not significantly reduce time for eradication. However, for a large infestation, a foliar spray is effective. These sprays are more effective if the ivy has been cut or mowed prior to treatment and must be applied with a surfactant/penetrant as the waxy coating on English ivy leaves resists herbicide.

### **Common Burdock (*Arctium minus*)**

Common burdock is a biennial plant, which has two different appearances depending on its life stage. Young plants are low to the ground with large leaves in a rosette shape, before growing a tall stem in its second year of growth. The prickly burs

produced by burdock can contain up to 15,000 seeds, with burs getting stuck to people and animals. These dense burs can also entangle birds and bats, leading to mortality, while also crowding out other native meadow species. Mowing is the most effective tool for dealing with common burdock. Seed head cutting can be employed if full removal is not possible, ideally in June and again in August to prevent seeding. Most plants can also be dug up, with smaller plants being hand pulled. It is important to ensure the entire taproot is included. Chemical treatments can include herbicide treatment via foliar spray on first year rosettes but is not significantly more effective than manual controls.

## **Disposal of Invasive Plant Parts**

Proper disposal of invasive plants helps to prevent them from further spread. All fleshy/herbaceous plants and plant parts (eg: seed and flower heads, fruits, roots) should be carefully placed into black garbage bags and left in direct sun for a minimum of two weeks to kill all plant parts before sending them to the landfill. Woody stems from honeysuckles, multiflora roses and buckthorn can be left with the dirt removed from the roots and raised off the ground to dry out and then either decompose on their own, be chipped, or burned. If they are to be chipped, remove any seeds or fruit from the plant to ensure they are not spread because seeds can stay viable for years. Any species chemically treated, particularly woody and tall herbaceous grass, should be left for the season. They can be left to naturally decompose or can be cut and mowed down by staff if necessary.

## **Herbicide Treatments**

Herbicides applied to invasive species will be overseen by the invasive species team and must be completed by licensed pesticide applicators. Treatments include basal bark, where the herbicide is applied to the outside of the stem near the base; cut stump, applying herbicide to the exposed inner bark after cutting; foliar spray, using a backpack sprayer to apply herbicide to leaves and branches; and injection via an injecting device and herbicide capsules. Common herbicides applied by the invasive species team include Garlon RTU and Glyphosate, depending on the plant being targeted. Herbicide will be applied at times suggested by species specific best management practices, along with consideration for other environmental factors such as breeding birds, risk of indirect application and herbicide drift, and proximity to open water and inhabited areas. All pesticide applications will be properly signed, with signs posted one day before application and left up for one day following application. VLCA will also be notified anytime invasive species staff will be on site to spray.

## Monitoring

Successful invasive species management requires follow-up monitoring at all removal sites and continued removal of re-sprouting invasive plants. It takes multiple years to deplete seed banks and completely exhaust root systems. Eradication may be possible for some of these species, but long-term management of more established species will be needed, like common buckthorn. Yearly monitoring of removal locations should be well documented. It is useful to keep track of what areas have been treated, the method of removal, the amount of plant material removed, and with what degree of success the removal saw over the long term. This can be accomplished through notetaking, mapping, photo-monitoring, and collaboration with the invasive species team. This ensures that the energy of Valens staff is best used, and removals are optimized for long-term success. Monitoring of treated areas should occur for five years to ensure no re-introductions occur.

Monitoring is also key for early detection of emerging species. Any new or suspected invasive species detected at VLCA should be communicated to the invasive species team and prioritized accordingly.

## Tracking and Work Planning

A key element to successful implementation of this plan is the tracking and communication of work undertaken by both CAS staff and invasive species technicians. As work may be done throughout the year, it is recommended that the invasive species team reaches out to VLCA managers at the end of each calendar year with a summary of work completed, taken from their work logs and work plans. This can include the area and species removed or managed, number of stems or area size, when the work was completed, and the type of management (pesticide, mechanical, etc.). CAS staff can also share what work they were able to complete throughout the year, with a focus on the same measurables. This will allow staff to track which priority classes or species have been treated, what work is ongoing, what has been completed, and what areas should be targeted next.

## Restoration

Controlling invasive plants helps maintain species diversity and enhances natural areas, but promoting restoration and re-planting is equally important. Prioritizing restoration in key areas is as important as removals for maximizing efficiency and long-term success.

Removals of invasive species with no follow-up often allows for equally invasive and aggressive species to move into cleared areas, creating a new problem to solve for managers and staff. Removals should be followed by a coordinated replanting plan,

which could include native trees, plants or shrubs, that will not only prevent re-invasion of invasive species, but also provide ecological and human benefits. Examples of this type of work would be replanting campsite boundaries after a buckthorn removal with native fruiting shrubs and trees to provide privacy to campers, create food and habitat for native species, and prevent re-establishment of invasive shrubs.

Seeding is another method of restoration. If there is a lack of resources for replanting, seeding the area with a native seed mix can be used as a cover crop until other species can establish. These do not need to be complex; they should be used to cover the area to prevent re-invasion. Collecting and spreading seeds from one location at VLCA to another is a straightforward and cost-effective restoration technique.

## **Plan Gaps and Blind Spots**

When making a prioritization plan, it is important to acknowledge both the benefits and challenges surrounding the chosen approach and result. Due to the size of VLCA, plants were not mapped individually, but areas were mapped for species abundance and distribution. This high-level approach can miss detail and nuance on the more micro scale since distribution in large areas will not be uniform. Mapping of VLCA was completed over a 3-week period at one time of the year, along with verifying older data. This created a snapshot that may not be fully reflective of some species such as Garlic Mustard, which is at its most robust and widespread early in the Spring. For treatment purposes, it is important to note that invasive species diversity, distribution, and density can vary throughout treatment areas. Although invasive plants are generally grouped in similar area types and conditions, not all variance is accounted for, and some areas may contain features such as water, rough terrain, or slopes that make types of treatment challenging or even inadvisable. Additionally, since the prioritization framework only includes terrestrial plants, forests pests, diseases, and aquatic invasives are missed in the scope of this plan due to the complexity or lack of options for treatment. This plan acknowledges that these threats exist, and should they become relevant to VLCA, they will be addressed appropriately. Best practices for treatment, removal, prioritization, and mapping are always changing. This plan has been put together using the recommended practices as they exist at the time, which are constantly subject to change and development.

## **Conclusion**

The prioritization of invasive species management at Valens Lake Conservation Area is a multi-year effort. Terrestrial plants are a key threat and can be removed with relative ease with the correct tools and time allotted. Aquatic threats and terrestrial pests and diseases are more difficult but need to be considered and monitored going

forward. Once Category 1 and 2 populations are under control, populations in categories 3, 4 and 5 can be managed. Additionally, monitoring of pests and aquatic invasives should be a year-round initiative. Removing current invasive plants and preventing new ones from being introduced into the conservation areas will support HCA's Invasive Species Strategy, and by extension, the organization's Strategic Plan.

## References

- Asian Carp Canada. (2024). *Common Carp (Cyprinus carpio)*. <https://www.asiancarp.ca/asian-carps/common-carp/>
- City of Hamilton. (2022). *Urban Hamilton official plan*. <https://www.hamilton.ca/sites/default/files/2023-08/uhop-volume1-chapterg-glossary-apr2023.pdf>
- City of Mississauga. (2021). *Invasive species management plan and implementation strategy*. <https://www.mississauga.ca/publication/invasive-species-management-plan-and-implementation-strategy/>
- Credit Valley Conservation, Ontario Federation of Anglers and Hunters, Ontario Invasive Plant Council, & Ontario Ministry of Natural Resources Invading Species Awareness Program. (2016). *A landowner's guide to managing and controlling invasive plants in Ontario*. [https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/35266\\_LandOwnerGuide\\_June262013\\_FINAL\\_WEB.pdf](https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/35266_LandOwnerGuide_June262013_FINAL_WEB.pdf)
- Department of Fisheries and Oceans. (2022). *Chinese Mystery Snail, Banded Mystery Snail and New Zealand Mud Snail*. <https://www.dfo-mpo.gc.ca/species-especes/publications/ais-eae/identification-gc/page06-eng.html>
- Hamilton Conservation Authority (HCA) (2016). *HCA Invasive species strategy*. Retrieved October 20, 2023.
- Invasive Species Centre. (2024). *Marbled Crayfish*. <https://www.invasivespeciescentre.ca/invasive-species/meet-the-species/fish-and-invertebrates/marbled-crayfish/>
- Ontario Ministry of Natural Resources. (2012). *Ontario invasive species strategic plan*. <https://www.ontario.ca/page/invasive-species-strategic-plan-2012>
- Ontario Phragmites Working Group (2016). *Site prioritization tool for control of invasive phragmites*. [https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/OPWG\\_PrioritizationTool\\_May52016\\_FINAL.pdf](https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/OPWG_PrioritizationTool_May52016_FINAL.pdf). Retrieved September 18, 2023.
- Sherman, K. (2015). *Creating an invasive plant management strategy: A framework for Ontario municipalities*. Ontario Invasive Plant Council. [https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/PlantManagementStrategy\\_2015\\_March172015\\_D3\\_PRINTFINAL.pdf](https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/PlantManagementStrategy_2015_March172015_D3_PRINTFINAL.pdf)

Toronto and Region Conservation Authority (2020). *TRCA invasive species management strategy*. Retrieved March 2, 2023.

Urban Forestry Associates (2018). *Invasive species*.  
<http://ufora.ca/index.php/resources/invasive-species/>. Retrieved October 2023.