



## **Invasive Species Observations in the West Hants Regional Municipality**



**Prepared by Nova Scotia Invasive Species Council  
Prepared for the West Hants Regional Municipality  
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## ***Invasive Species Observations in the West Hants Regional Municipality***

### **Summary**

From 2018-2023, 319 research-grade invasive species observations were uploaded to iNaturalist in the West Hants Regional Municipality (WHRM). Multiflora Rose was identified as one of the most problematic invasive species in the area. Only 16 observations have been uploaded to iNaturalist. However, this significantly underestimates the actual number of Multiflora Rose plants present.

Wild Parsnip was also identified as a problematic invasive species in the area. This species' sap can cause burns if exposed to skin and sunlight. A management plan for this species is recommended in the Tregothic Trail area, which has a dense population of the plant.

Other notable invasive plant species documented in the area include Japanese Knotweed, Glossy Buckthorn, and Common Reed.

In August 2023, Hemlock Woolly Adelgid was found in the Municipality. It is recommended that WHRM work with the local Canadian Food Inspection Agency to develop a strategy to combat this species. Several locations within WHRM were identified as areas with a high abundance of invasive species observations on iNaturalist. This includes the Tregothic Trail, Irishman's Road Recreation Site, Cheverie Salt Marsh Trail, Falmouth Boat Launch in Falmouth, and Smileys Provincial Park and Campground.

### **Introduction to Invasive Species and iNaturalist**

Invasive species significantly threaten native biodiversity and species at risk. Invasive species are plants, animals, and microorganisms introduced into areas beyond their native range, negatively impacting the environment, economy, or society. Invasive species cause harm in several ways. They can out-compete native species for resources such as food and space. These species can also reduce habitat quality and introduce diseases to native species. From an economic viewpoint, invasive species significantly impact productivity and profit in forestry, agricultural, and fishing industries. They can also damage infrastructure and reduce recreational opportunities.

Humans are primarily responsible for moving invasive species from one area to another. Many human-assisted pathways have permitted the introduction of invasive species in Nova Scotia. Examples of these pathways include (but are not limited to) horticultural trade, aquarium trade, the movement of shipping containers, ballast water tanks in cargo ships, recreational boating, and the release of species for hunting or angling purposes. Once established, invasive species can spread naturally or be moved further by human activities such as outdoor recreation, release of pets into the environment, or movement of firewood.

Reporting observations of invasive species is an essential tool to manage invasive species. The data gathered helps organizations such as the Nova Scotia Invasive Species Council (NSISC) monitor the introduction and spread of invasive species in Nova Scotia. The NSISC encourages the public to record their observations of invasive species on iNaturalist. This is a free citizen science website where users upload the species' names, locations, and photos of their observations of any wild organisms. Observations are then viewed by other iNaturalist users who verify the species identification. Projects can be created on iNaturalist, allowing users to monitor specific species at a particular location. The NSISC manages an "Invasive Species in Nova Scotia" project on iNaturalist. Any observation of an invasive species reported to iNaturalist in Nova Scotia is automatically added to this project. The NSISC uses this critical data and other resources to map invasive species distribution.

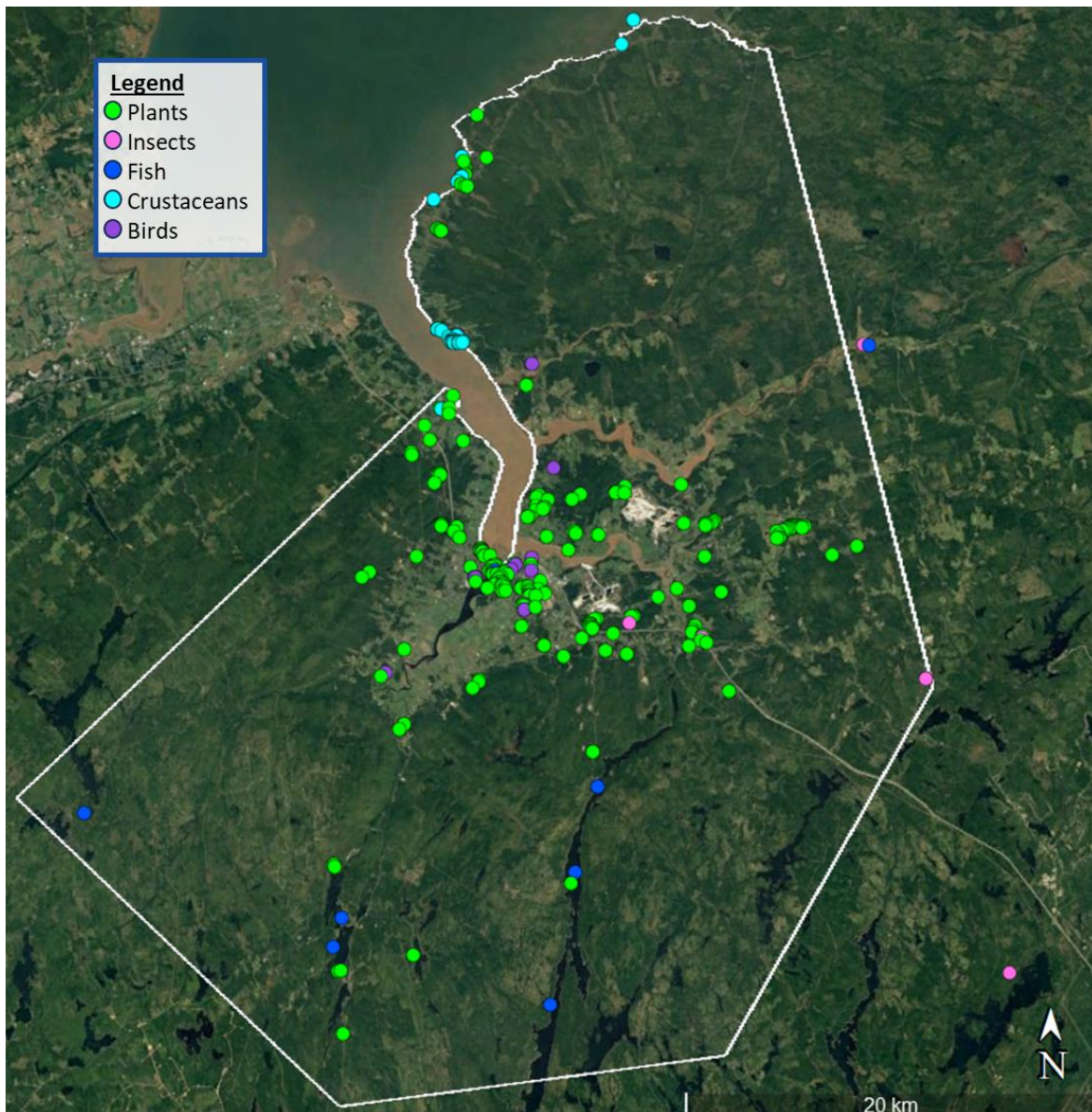
### **Methods for Establishing a Data Set**

In this project, iNaturalist was used to survey invasive species in West Hants Regional Municipality (WHRM). All research-grade observations within WHRM were extracted from iNaturalist in November 2023. The NSISC's iNaturalist project "Invasive Species in Nova Scotia" was used to filter for invasive species observations. Observations that were not research grade were excluded due to potential identification inaccuracies. For an observation to be considered research-grade on the iNaturalist platform, more than two-thirds of the identifiers must agree on the organism's identification. Observations that the location was obscured or had exceedingly large coordinate inaccuracy (>10 km) were also excluded due to the location's uncertainties. It could not be confirmed if these observations were actually within the West Hants Regional Municipality. If the centre of the observation was outside of WHRM but the range extended into the municipality, it was included in the data set.



### **Invasive Species Observations Overview**

A total of 319 research-grade invasive species observations were uploaded to iNaturalist in the WHRM from 2018-2023 (Figure 1). Plants were the most observed and species-rich taxon in the regional municipality. There were 251 observations, and 49 different invasive plant species were recorded (Table 1). Invasive crustaceans were the second most observed taxon, with 36 observations. However, only one invasive crustacean species was found (Table 3). Invasive birds were the third most observed taxon, with 12 observations. Only one invasive bird species was recorded (Table 4). There were nine observations of invasive insects and six different invasive insect species recorded (Table 2). Lastly, nine observations and two invasive fish species were recorded (Table 3).



**Figure 1.** iNaturalist invasive species observations in West Hants Regional Municipality from 2018 -2023. The points outside the regional municipal border have accuracy ranges extending within.

## Invasive Species Observations in the West Hants Regional Municipality

### Invasive Plant Observations

Ten of the 49 invasive plant species recorded were designated as high-priority by NSISC researchers (Table 1). This included Multiflora Rose, Purple Loosestrife, Wild Parsnip, Common Buckthorn, Japanese Knotweed, Common Reed, Norway Maple, Goutweed, Himalayan Balsam, and Glossy Buckthorn. These species were designated as high-priority due to their negative impacts on ecosystems, economies, and/or human health. Eleven plant species were defined as mid-priority, and 28 were listed as low-priority. Species in the mid-and low-priority categories still threaten ecosystems, economies, and/or human health but do not pose as significant a threat as high-priority species.

**Table 1.** Invasive plant species recorded on iNaturalist in the West Hants Regional Municipality from 2018 - 2023. Priority level was designated by considering invasive quality, ecosystem impacts, and the number of observations in the area. “\*” Indicates additional observations that were not on iNaturalist.

| West Hants Regional Municipality iNaturalist Invasive Plant Data 2018-2023 |                                                   |                        |                |
|----------------------------------------------------------------------------|---------------------------------------------------|------------------------|----------------|
| Common name                                                                | Scientific name                                   | Number of Observations | Priority Level |
| Multiflora Rose                                                            | <i>Rosa multiflora</i>                            | 16                     | High           |
| Purple Loosestrife                                                         | <i>Lythrum salicaria</i>                          | 9                      | High           |
| Wild Parsnip                                                               | <i>Pastinaca sativa</i>                           | 7                      | High           |
| Common Buckthorn                                                           | <i>Rhamnus cathartica</i>                         | 6                      | High           |
| Japanese Knotweed                                                          | <i>Reynoutria japonica</i>                        | 4*                     | High           |
| Common Reed                                                                | <i>Phragmites australis</i> ssp. <i>australis</i> | 3*                     | High           |
| Norway Maple                                                               | <i>Acer platanoides</i>                           | 3                      | High           |
| Goutweed                                                                   | <i>Aegopodium podagraria</i>                      | 3                      | High           |
| Himalayan Balsam                                                           | <i>Impatiens glandulifera</i>                     | 2                      | High           |
| Glossy Buckthorn                                                           | <i>Frangula alnus</i>                             | 1                      | High           |
| Black Locust                                                               | <i>Robinia pseudoacacia</i>                       | 13                     | Mid            |
| Creeping Jenny                                                             | <i>Lysimachia nummularia</i>                      | 7                      | Mid            |
| Black Knapweed                                                             | <i>Centaurea nigra</i>                            | 5                      | Mid            |
| Sycamore Maple                                                             | <i>Acer pseudoplatanus</i>                        | 4                      | Mid            |
| Japanese Barberry                                                          | <i>Berberis thunbergii</i>                        | 3                      | Mid            |
| Purple Crownvetch                                                          | <i>Securigera varia</i>                           | 2                      | Mid            |
| European Ash                                                               | <i>Fraxinus excelsior</i>                         | 2                      | Mid            |
| Reed Canary Grass                                                          | <i>Phalaris arundinacea</i>                       | 2                      | Mid            |
| Scots Pine                                                                 | <i>Pinus sylvestris</i>                           | 2                      | Mid            |
| Rugosa Rose                                                                | <i>Rosa rugosa</i>                                | 1                      | Mid            |
| Common Valerian                                                            | <i>Valeriana officinalis</i>                      | 1                      | Mid            |
| Colt's-Foot                                                                | <i>Tussilago farfara</i>                          | 32                     | Low            |
| Dame's Rocket                                                              | <i>Hesperis matronalis</i>                        | 18                     | Low            |
| Black Medick                                                               | <i>Medicago lupulina</i>                          | 13                     | Low            |
| Mezereon                                                                   | <i>Daphne mezereum</i>                            | 12                     | Low            |
| Bittersweet Nightshade                                                     | <i>Solanum dulcamara</i>                          | 11                     | Low            |

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| West Hants Regional Municipality iNaturalist Invasive Plant Data 2018-2023 |                              |                        |                |
|----------------------------------------------------------------------------|------------------------------|------------------------|----------------|
| Common name                                                                | Scientific name              | Number of Observations | Priority Level |
| English Oak                                                                | <i>Quercus robur</i>         | 9                      | Low            |
| Butter-and-Eggs                                                            | <i>Linaria vulgaris</i>      | 7                      | Low            |
| Manitoba Maple                                                             | <i>Acer negundo</i>          | 7                      | Low            |
| Common St. John's-Wort                                                     | <i>Hypericum perforatum</i>  | 6                      | Low            |
| Bull Thistle                                                               | <i>Cirsium vulgare</i>       | 5                      | Low            |
| Common Milkweed                                                            | <i>Asclepias syriaca</i>     | 5                      | Low            |
| Jointed Charlock                                                           | <i>Raphanus raphanistrum</i> | 5                      | Low            |
| Creeping Buttercup                                                         | <i>Ranunculus repens</i>     | 4                      | Low            |
| Large-Leaved Lupine                                                        | <i>Lupinus polyphyllus</i>   | 3                      | Low            |
| Canada Thistle                                                             | <i>Cirsium arvense</i>       | 2                      | Low            |
| Meadow Buttercup                                                           | <i>Ranunculus acris</i>      | 2                      | Low            |
| Perennial Sow Thistle                                                      | <i>Sonchus arvensis</i>      | 2                      | Low            |
| White Poplar                                                               | <i>Populus alba</i>          | 2                      | Low            |
| Apple-of-Peru                                                              | <i>Nicandra physalodes</i>   | 1                      | Low            |
| Common Hemp-Nettle                                                         | <i>Galeopsis tetrahit</i>    | 1                      | Low            |
| Cuckooflower                                                               | <i>Cardamine pratensis</i>   | 1                      | Low            |
| Fine-Leaved Sheep's-Fescue                                                 | <i>Festuca filiformis</i>    | 1                      | Low            |
| Great Willowherb                                                           | <i>Epilobium hirsutum</i>    | 1                      | Low            |
| Nipplewort                                                                 | <i>Lapsana communis</i>      | 1                      | Low            |
| Oregano                                                                    | <i>Origanum vulgare</i>      | 1                      | Low            |
| Red Odontites                                                              | <i>Odontites vulgaris</i>    | 1                      | Low            |
| Water Forget-Me-Not                                                        | <i>Myosotis scorpioides</i>  | 1                      | Low            |
| Watercress                                                                 | <i>Nasturtium officinale</i> | 1                      | Low            |



## *Invasive Species Observations in the West Hants Regional Municipality*

### **High-Priority Invasive Plant Species** **Multiflora Rose** (*Rosa multiflora*)

**Description:** Multiflora Rose is a multi-stemmed woody climbing shrub with clusters of white-pink five-petaled flowers that bloom from late May through June (See Photo 2). Small red rose hips are produced in late August. Leaves are compound, with 5–11 oblong, oval leaflets with serrated edges. It has arching stems that give it a fountain-like growth pattern. These stems are green to red with stiff, curved thorns.



**Photo 1.** A dense wall of Multiflora Rose along the Tregothic Trail in Windsor NS.

**Habitat & Impact:** Multiflora Rose is well adapted to various environments and can invade pastures, fields, open woodlands, forest edges, roadsides, wetland edges, and fencerows. This species is an aggressive grower. It can outcompete most native plants and reduce biodiversity in habitats where it is established (See Photo 1).

**Pathways of Spread:** New Multiflora Rose plants can form from cut stems and roots. Birds and other animals will feed on the rose hips, dispersing the seeds far distances. Seeds can exist in the soil for up to 20 years. This species can also be a desired ornamental plant due to its abundant flowers. Many gardeners plant this species in their gardens, unaware of its invasive qualities.

**Distribution:** Based on the iNaturalist records, discussions with the public, and preliminary survey observations, Multiflora Rose is a dominant invasive plant in WHRM. The locations of the 16 iNaturalist observations of Multiflora Roses are shown in Figure 2. Ten of the 16 iNaturalist records are found within the communities of Windsor and Falmouth, indicating a high abundance of this species in these communities (Figure 2). The Tregothic Trail, Cheverie Salt Marsh Trail, and Falmouth Boat Launch are examples of areas with well-established Multiflora Rose populations. The 16 iNaturalist observations are substantially less than the true number of Multiflora Rose plants in the area. With over 2000 iNaturalist observations as of November 2023 in Nova Scotia, this species is one of the most documented invasive species on the iNaturalist platform. Due to the large amount of Multiflora Rose in the province and WHRM, eradication is not possible. However, management at a local scale can help reduce the presence of this species.



**Photo 2.** Multiflora Rose flowers and rose hips.



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**Management:** Preventing further spread of Multiflora Rose should be a priority. Early detection and removal of Multiflora Rose before it is established is the most cost-effective way to manage this species. Newly established plants can be removed by pulling (See Photo 3). The soil should be loosened to remove as many roots as possible. After removal, the site should be monitored for resprouting. Cutting young plants back will not kill the plant and will only encourage resprouting.



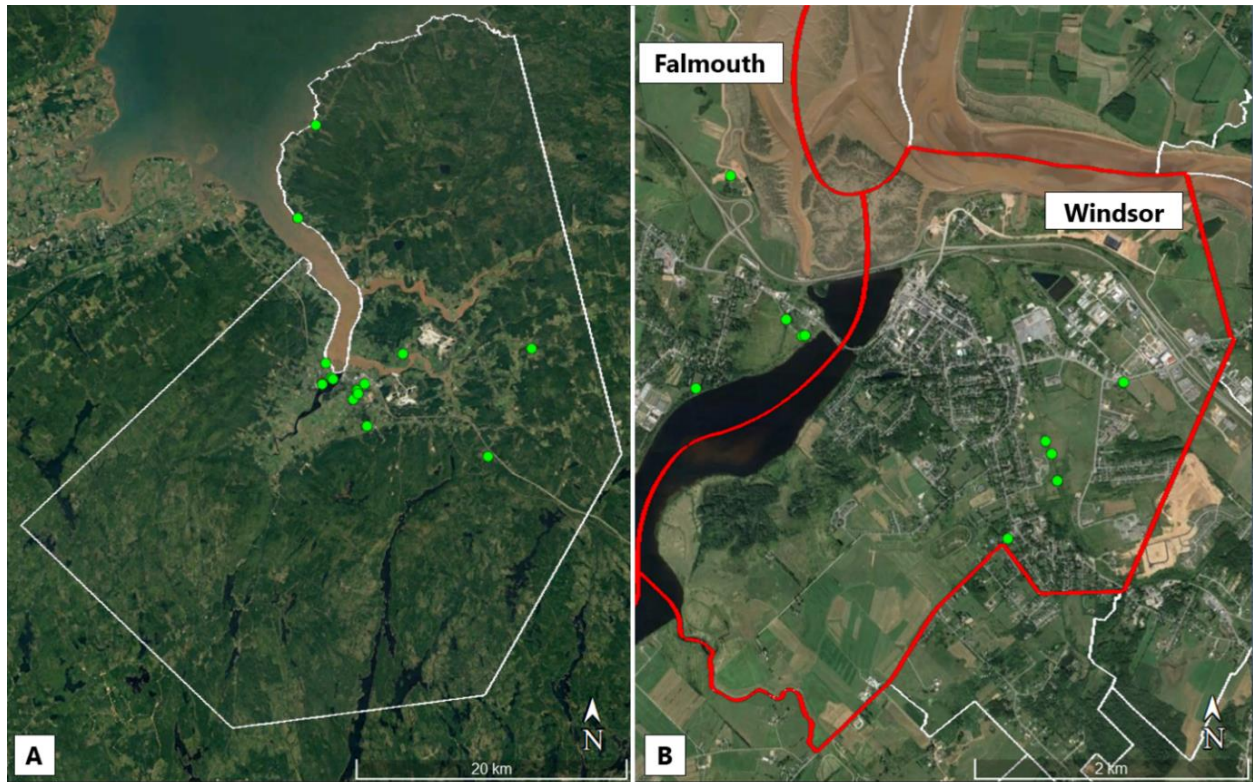
**Photo 3.** A young Multiflora Rose plant.

Removal of established populations of Multiflora Rose is challenging and requires several years of management. Repeated treatments will be necessary. Sites should be prioritized based on natural heritage (e.g. rare species or communities), resources (e.g. forestry or agriculture) or personal (e.g. recreation, aesthetics).

Due to thorns, protective gear such as gloves and protective eyewear should be worn when managing this plant species. Cutting/mowing can reduce the spread of Multiflora Rose but is unlikely to eliminate the plant. Cutting Multiflora Rose promotes rapid resprouting. Cutting/mowing the plant 3-6 times annually for at least four years is required to deplete the energy reserves in the roots. Plants should be cut as close as possible to the ground. Cutting/mowing should be done in early summer and continued into the fall. Applying a systemic herbicide directly to the cut stumps results in a more effective treatment. Herbicides such as glyphosate should be applied directly on the cut stumps within minutes after the plant has been cut. It is recommended to apply the herbicide treatment later in the season (July to September) or when the plants are dormant in the winter months. The herbicide is ineffective if applied in the spring when sap flows upwards from the roots. Applying the herbicide directly to cut stumps rather than a foliar spray allows the applicator to specifically target the Multiflora Rose and reduce off-spray. Mulching Multiflora Rose using large machinery can be used to control this plant. This treatment should be applied annually in late winter to early spring before the emergence of the leaves. Mulching should be completed over several years to exhaust the roots.

Pulling and digging Multiflora Rose can be effective for controlling smaller populations (< 300 m<sup>2</sup>) or individual plants. Pulling can be conducted at any time of the year. It is best to be completed after rain so the soil is moist and pliable. A lever-based tool such as an Extractigator can help remove larger shrubs that cannot be removed by hand. If all the roots are removed, additional treatments will not be required. After removal, the site should be monitored for resprouting. Prescribed burning is not recommended due to its ineffectiveness and location. Girdling is also not recommended due to the high number of small stems that make this method impractical.

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**Figure 2:** A) iNaturalist Multiflora Rose observations in the West Hants Regional Municipality from 2018 - 2023. B) Ten of the 16 observations can be found in Windsor and Falmouth communities. Imagery created using Google Earth.

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### **Wild Parsnip (*Pastinaca sativa*)**

**Description:** Wild Parsnip is a tall biannual/perennial herbaceous plant that, when flowering, can reach 0.5 to 1.5 m tall. It produces abundant small yellow flowers that form an umbrella-shaped inflorescence (see Photo 5). Its flower stem is hollow with deep grooves. It has alternate pinnately compound leaves with distinct saw-toothed edges. In its first years of growth, it grows as a short rosette (radial spreading leaves) and does not produce a flowering stalk (see Photo 6).

Wild Parsnip has a thick funnel-shaped taproot that stores energy.

**Habitat and Impacts:** Wild Parsnip prefers full sun but can also be found in semi-shade habitats. It favours disturbed sites such as roadsides, trails, shorelines, ditches, beaches, railway embankments, etc. In disturbed habitats, Wild Parsnip outcompetes native vegetation, resulting in dense patches of this invasive species. It reduces the quality of agricultural forage crops for livestock and displaces plants such as Goldenrods, which are more pollinator-friendly. This invasive plant species is a concern for human health. Its sap contains toxic compounds called furanocoumarins that can cause severe rashes, burns, or blisters if the sap contacts skin and is exposed to sunlight.

**Pathways of Spread:** Wild Parsnip can only be spread by its seeds, which can remain viable in the soil for up to five years. A single plant can produce, on average, 975 seeds. Wind, water, animals, and humans disperse these seeds. Wild parsnip is a monocarpic perennial, which means it dies once the plant flowers and fruits. This plant takes two or more years to flower.

**Distribution:** The seven iNaturalist records indicate it is primarily found along the Tregothic trail system and surrounding areas in Windsor (Figure 3). This plant has formed dense patches along the Tregothic Trail (see Photo 4). In addition to the iNaturalist records, it can also be found growing along Payzant Dr. and in the field West of Avon View High School. It can also be found growing near the parking lot of Windsor Elementary School. More extensive surveys would be needed to determine the severity of this plant species in other communities in the West Hants Regional Municipality.

**Management:** Due to the threat to human health and closeness to two schools, Wild Parsnip is listed as the highest priority for management. Management should take place on an overcast day to lessen exposure to the sunlight. When managing this species, wearing protective clothing



*in Windsor NS.*



**Photo 5.** Wild Parsnip flowers.



**Photo 6.** The rosette of a young Wild Parsnip plant before reaching maturity and flowering.



## ***Invasive Species Observations in the West Hants Regional Municipality***

such as waterproof gloves, long-sleeved shirts and pants, and eye protection is essential. A disposal waterproof spray suit coverall is ideal. Tape sleeves at the wrists to prevent sap from getting under clothing. Clothing and gear should be removed carefully to avoid exposing bare skin to sap on clothing and gear. First, wash the rubber gloves with soap and water. Then, with the rubber gloves still on, remove protective clothing. Wash the rubber gloves a second time before removing them. Place non-disposable clothing in the laundry and wash with soap and water immediately. Protective eyewear should be removed last. If skin is exposed to the sap, wash the area with soap and water immediately. Avoid further sun/UV exposure to the affected area for at least 48 hours. Seek medical attention if burns develop. If there is a chance that the eyes are exposed to the sap, rinse them with water immediately and seek immediate medical attention.

Preventing the development of seeds is a priority for managing Wild Parsnip. These plants can only be spread by seed production, and once seeds develop, the plant dies. Cutting back the flowering phase of the plants can be an effective way to manage populations if cut at the correct time of the year. Mowing or hand-cutting can be used. Plants should be cut when the flowers have developed and before they are beginning to form into seeds. If the cutting is too late and the seeds have developed, it will contribute to the further spread of Wild Parsnip in the area. Cutting the plants for at least five years will be necessary to deplete the seed bank. Mowing will spray sap in the area. Therefore, caution must be used. When conducting management, the area must be closed off to the public, and workers must wear protective clothing as described previously. Mowers and other equipment must be thoroughly cleaned to remove the sap and prevent further spread. New flowering stems will likely grow after the first cut. The site should be monitored to determine if additional mowing is necessary for that year. After an area has been cut, barriers and warnings should be put in place to prevent people from walking in the area, as the sap can still be harmful to exposed skin.

Pulling the plants can also be an effective method to control Wild Parsnip. This method is best used for small patches but can also be applied to larger patches. It is best applied after rain so the soil is soft or during a drought when the tap root has shrunk. Another effective method is completely severing the underground taproot using a hoe or other sharp tool. The cut should be made 2.5-5 cm below the soil. Both hand removal methods should be applied when the plant is in flower but before it has gone to seed. These methods will require direct contact with the plant, and proper protective gear must be worn. Tarping the area after management can help reduce the regrowth. This can be applied to both pulling and mowing/cutting treatments. A tarp made of a dark material should be placed over the entire area and left for the remainder of the growing season. The tarp should exceed the treated area by 50 - 100 cm. Following treatments may still be necessary.

Applying a systemic herbicide using foliar or wick treatments is a viable method for controlling Wild Parsnip. The herbicide should be applied in the spring when the plants have newly formed flower stalks. The herbicide should not be applied when the plants are flowering. They will still likely be able to produce seeds, rendering the application pointless. Spraying the rosettes (first-year growth) in the fall is another viable time for an herbicide application. This will reduce the number of flowering plants in the following year.

Burning is not recommended for the control of Wild Parsnip. This has the potential to release the sap into the air, exposing individuals downwind and can cause harmful skin reactions.



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**Figure 3:** A) iNaturalist Wild Parsnip observations in the West Hants Regional Municipality from 2018 - 2023. B) All seven observations are near the Tregothic Trail in Windsor. Imagery created using Google Earth.

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

**Description:** Glossy Buckthorn is a single to multi-stem shrub or small tree that can reach heights of 6 m. It has glossy alternative oval leaves with smooth edges and strong venation, as shown in Photo 8. It has greyish-brown bark with spotted white lenticels; if it is scratched, the inner layer is yellow-green. It produces smaller five-petaled white to greenish-white flowers. Glossy Buckthorn produces 6-10 mm red berry-like fruit that darkens to black as the fruit matures. Unlike other buckthorns, it lacks terminal thorns at the end of branches.

**Habitat and Impacts:** This invasive shrub can dominate wetlands and forest understories, outcompeting native plant species and reducing biodiversity. It is tolerant of acidic conditions and well adapted to invade a wide variety of natural habitats in the Maritimes.

**Pathways of Spread:** Some species of birds consume the fruit and spread the seeds long distances. Cut stems, or roots can also grow new Glossy Buckthorn plants.

**Distribution:** Only one observation of Glossy Buckthorn has been recorded in the West Hants Regional Municipality. This observation is remote and found on an island in the Panuke Lake system (Figure 4). Another observation was documented in WHRM but was excluded because the observer obscured the location in iNaturalist. It is unknown if this observation was in West Hants or Kings County. More Glossy Buckthorn plants likely exist unrecorded in the region due to the species' ability to spread long distances by birds. Once Glossy Buckthorn is established, removing it will be difficult and costly. The low number of observations in the regional municipality provides an excellent opportunity to control this species before it gets established, as it has in other areas in the province, such as Kings County (Figure 4B).

**Management:** Due to the low number of observations of Glossy Buckthorn documented in the regional municipality, removing this species should be a priority. Glossy Buckthorn plants observed in WHRM should be removed as soon as possible to prevent further spread and reduce management costs. Glossy Buckthorn is easiest to observe in fall as this species tends to hold on to its leaves longer than native species. Removing Glossy Buckthorn in spring when the leaves begin to emerge is recommended for easier identification. Pulling should be focused on young plants. Plants up to 1 m in height or a stem diameter of 1 cm can be removed by pulling if the soil is moist. Loosening the soil around the roots before pulling will help remove the plant. Removing as many of the roots as possible is essential to prevent resprouting. Removal of the root crown



**Photo 8.** Key features of Glossy Buckthorn, smooth glossy alternative leaves with strong venation, speckled bark, and its five petaled flowers.

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is of particular importance. A lever-based plant extractor tool such as the Extractigator can assist with pulling out larger plants. This tool can remove shrubs up to a diameter of 5 cm.

Cutting Glossy Buckthorn plants is not recommended because it encourages vigorous resprouting from the stump. However, applying a systemic herbicide directly to the stump after it has been cut can reduce resprouting and be an effective treatment option. It is recommended to apply the herbicide treatment later in the season (July to September) or when the plants are dormant. The herbicide is ineffective if applied in the spring when sap flows upwards from the roots.

Once above-ground vegetation is removed, routine mowing can reduce the vigour of sprouts regrowing over time and maintain open areas by controlling seedlings. This control method will not kill Glossy Buckthorn. It will only prevent further seed production and should be used with another control method.

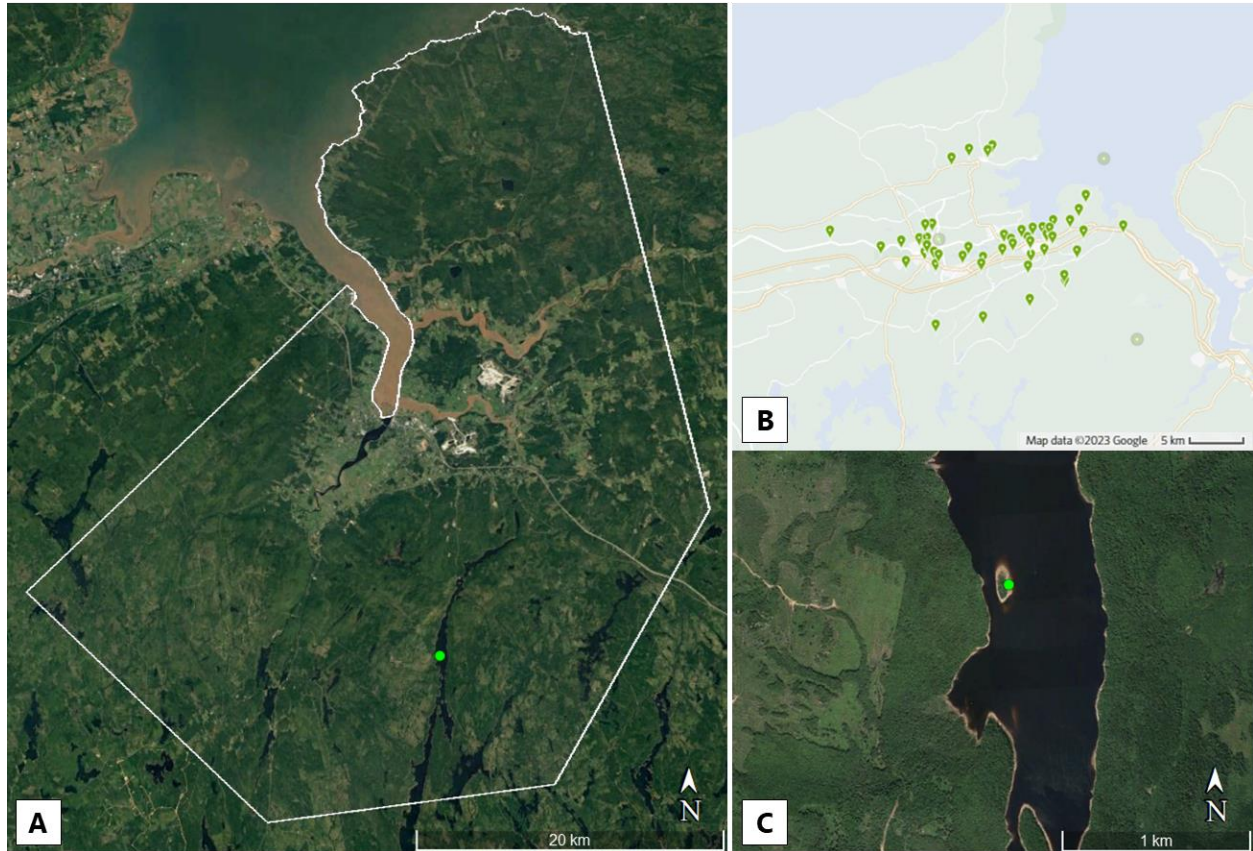
Girdling is an effective method to control large Glossy Buckthorn plants. Girdling reduces resprouting compared to cutting and does not require an herbicide treatment. Cut a 5 cm band that goes completely around the base of the plant. The outer bark and green cambium layer should be removed but avoid cutting into the hard core of the trunk. Cutting into the hard core can promote resprouting. If the cut is not deep enough, the plant can heal. It is essential to girdle all stems/trunks connecting to the roots. This method is ineffective if the flow between the roots and leaves is not severed. A second girdling in the following year may be required. Over time, the canopy and roots die, making it easier to pull out. Girdled Glossy Buckthorn should be completed in the spring to reduce the number of fruits produced. Sites that have been girdled should be routinely monitored, and any regrowth below the cut must be removed.

Prescribed burning can be used to control glossy buckthorn. However, using prescribed burning to control Glossy Buckthorn in WHMA is not recommended. Burning will kill new seedlings and younger shrubs. It will not impact larger glossy buckthorn plants. Therefore, burning should only be used in combination with the other methods of control previously mentioned. In addition, due to the competitive nature of glossy buckthorn, there is typically little understory vegetation to fuel the fire. Burning should be applied yearly or every other year for 5 – 6 years to achieve eradication. Burning the site in the years following the first burn is essential. Following a burn, the regrowth can be worse than the previous infestation.

Removed Glossy Buckthorn should be left at the site if possible. Plant material should be placed in a pile and monitored for growth. If the plants have been pulled, keep the roots from touching the ground to prevent regrowth. Once the plant material dries, it can be disposed of. Plants removed before the fruit develops can be chipped safely with a low risk of spread.



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**Figure 4.** A) iNaturalist Glossy Buckthorn observations in the West Hants Regional Municipality from 2018 - 2023. B) iNaturalist Glossy Buckthorn observations found in Wolfville and Kentville where the species is much more abundant. C) The single iNaturalist Glossy Buckthorn observed in the West Hants Regional Municipality from 2018 to 2023. Imagery created using Google Earth.



## *Invasive Species Observations in the West Hants Regional Municipality*

### **Japanese Knotweed** (*Reynoutria japonica*)

**Description:** Japanese Knotweed is a perennial herbaceous plant that is 1-3 m tall. It is considered one of the world's top invasive plants. It has hollow stems that are purple to green with reddish-brown solid nodes. Its leaves are alternately arranged, 10-17 cm long and 7-10 cm wide, and oval to triangular with a pointed tip and flat base. Small white-green flowers bloom in sprays from late July to August. Japanese Knotweed has an extensive network of underground rhizomes (underground stems) and roots. Underground biomass accounts for two-thirds of its total biomass. The large rhizomes make controlling this species challenging.



**Habitat and Impact:** Japanese Knotweed prefers full sun but can grow in various habitats, including roadsides, utility lines, riparian areas, and wetlands. Japanese Knotweed primarily spreads via rhizomes. Knotweed stems can grow rapidly at 8 cm per day. It quickly forms dense bamboo-like clumps that out-compete native plant species (See Photo 9), reducing plant and invertebrate diversity. Japanese Knotweed can cause significant damage to infrastructure. It can grow through asphalt up to 8 cm thick, and its roots can exacerbate cracks in concrete foundations. Japanese Knotweed also has a less dense root network than native species and, when established on slopes, can contribute to soil erosion.

**Pathways of Spread:** Japanese Knotweed primarily spreads through plant and rhizome fragments. These fragments can be moved by natural means, such as moving water or by humans, through fragments stuck on machinery or in soil. A 1 cm piece of a fragmented rhizome can produce a new plant in favourable damp conditions. It is unknown to what extent seeds contribute to its spread in North America.

**Distribution:** Four observations of Japanese Knotweed were recorded on iNaturalist between 2018-2023 in West Hants (Figure 5). Three of the four observations can be found in the community of Windsor. Six additional observations of Japanese Knotweed were made throughout West Hants, but they are not on the iNaturalist platform. Japanese Knotweed is another abundant invasive plant species in Nova Scotia. It is the province's fifth most recorded invasive plant species, with 1132 observations as of November 2023. There are likely more than nine stands of Japanese Knotweed within WHRM, and complete eradication is unlikely.



**Photo 10.** A newly emerged Japanese Knotweed stem.

**Management:** Reducing further spread and removing newly established Japanese Knotweed plants should be the priority for this species. Preventing the introduction of Japanese Knotweed and removing newly established stands reduces management costs significantly. Due to the plant's rapid growth, newly established plants should be removed as soon as possible. Japanese Knotweed roots can expand up to 50 cm a year in optimal conditions. Newly emerged Japanese Knotweed stems are easily

## ***Invasive Species Observations in the West Hants Regional Municipality***

recognizable and resemble asparagus (See Photo 10). When working near Japanese Knotweed, inspect and clean machinery, gear, and boots from soil and plant fragments before moving to a new site. Fragmented rhizomes stuck on the bottom of boots, or machinery can be spread to a new site if not removed. It is recommended that landscaping or construction projects planned to be completed at a site with Japanese Knotweed should include a management plan that outlines protocols to control Japanese Knotweed spread.

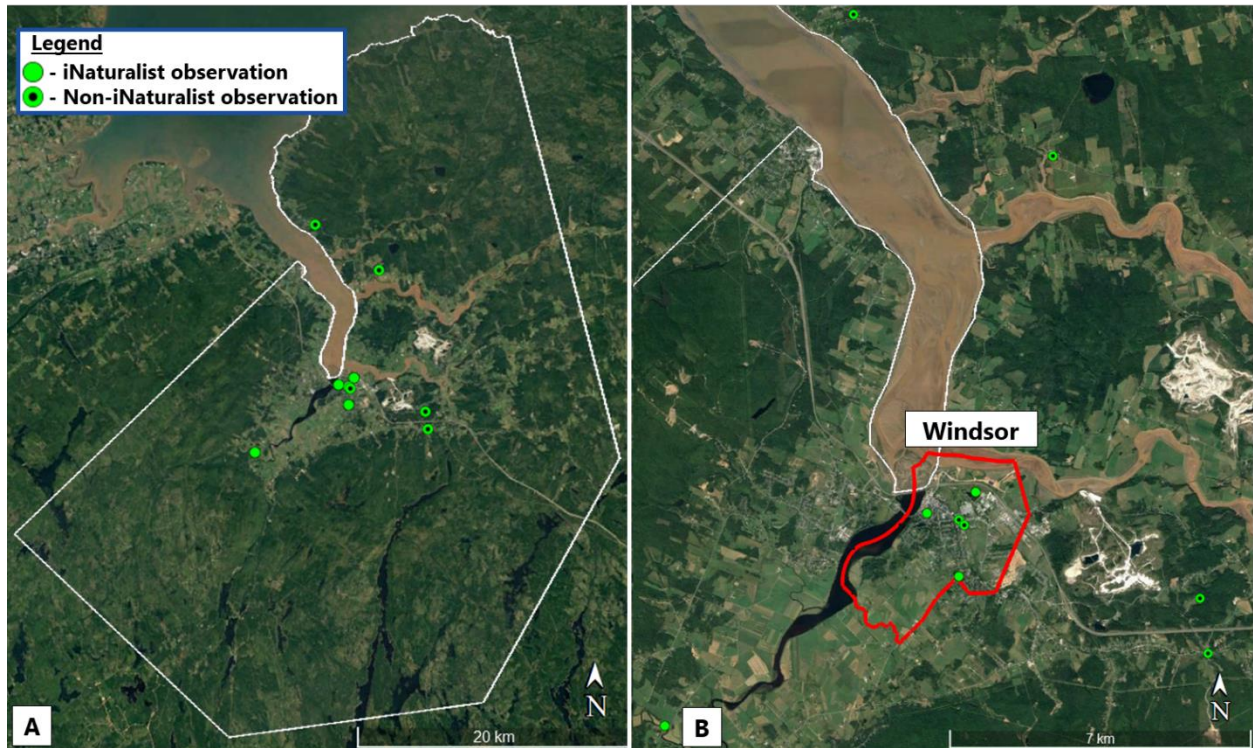
Management of well-established Japanese Knotweed stands can take 5 -10 years of active control to result in eradication. If treatments are not implemented in the years following initial treatments, the disturbance can stimulate aggressive Japanese Knotweed regrowth. Therefore, developing a feasible long-term strategy to manage Japanese Knotweed is essential to ensure success. Due to the high abundance of Japanese Knotweed, determining where to control well-established Japanese Knotweed stands should be prioritized based on natural heritage (eg. Rare species or communities, resources (eg. Forestry or agriculture), or personal (eg. Recreation, aesthetics).

Routinely cutting/mowing can be used to control Japanese Knotweed. This method must be completed monthly for at least five years to deplete the energy stored in rhizomes. Mowing should be completed in the spring after the plants have emerged and continued into the fall until the plants go into dormancy. The machinery used to mow the Japanese Knotweed must be thoroughly cleaned, and all plant material and soil must be removed before leaving the site. Failing to do so will likely cause further spread of Japanese Knotweed. The efficacy of this control method is significantly increased if followed by a systemic herbicide treatment. An herbicide should be applied in late summer to fall after several cuttings have been completed. The plants should be allowed to grow before they are treated with the herbicide. Subsequent treatments will likely be required. The herbicide can be applied using a foliar or wick application. A wick application is more time-consuming but reduces the amount of off-spray.

Hand digging can effectively remove young Japanese Knotweed plants recently established at a site. Care should be applied to remove all the roots. If roots are left, the plant will quickly form new shoots. Due to the large size of the root system, once Japanese Knotweed is well established, hand digging is not an effective means of control. Well-established stands of Japanese Knotweed need to be excavated using large machinery. Soil should be removed at least 2 m deep to remove all the roots. This excavated soil should be buried on-site in a root barrier-lined pit deeper than 5 m. If the soil can not be buried on-site, it should be sent to a soil treatment facility at a landfill.

Tarping the area can also control Japanese Knotweed but should only be used on stands in direct sunlight. A tarp made from a dark material is used to “cook” the roots and block sunlight to reduce growth. Good options for tarps include poly tarps, weed barriers, or pool liners. To prepare a site for tarping, first cut the stems as close to the ground as possible. The tarp should cover the entire infestation and expand at least 1 m beyond the edge of the stand. Secure the tarp using tent pegs or another means to weigh it down. The tarp shouldn’t be secured too tight, and some room for growth should be allowed under the tarp. If it is too tight, Japanese knotweed plants can push through it. The tarp should be placed after the plants have emerged and remain at the site throughout the entire year. More than one year of treatment will be required for control. The site should be routinely monitored for holes or tears in the tarp. If the Japanese Knotweed grows stems out from the tarp, the efficacy of this method is significantly reduced.

## *Invasive Species Observations in the West Hants Regional Municipality*



**Figure 5.** A) Japanese Knotweed observations in the West Hants Regional Municipality from 2018 - 2023. B) Five of the ten observations can be found in the community of Windsor.



## Invasive Species Observations in the West Hants Regional Municipality

### Common Reed

(*Phragmites australis* ssp. *australis*)

**Description:** Common Reed is a perennial wetland grass that can grow up to 5 m in height. In Nova Scotia, the average height is around 2 m. It has a 14 – 40 cm feathery flowering head that is purplish when young and turns to straw colour at maturity. Two subspecies of *Phragmites australis* are present in Nova Scotia, *Phragmites australis* ssp. *australis* and *Phragmites australis* ssp. *americanus*. *Phragmites australis* ssp. *americanus* is the native subspecies and is not considered invasive. These two subspecies are challenging to differentiate. If new populations of Common Reed are observed in the regional municipality, it is recommended that the NSISC be contacted to verify the identification.

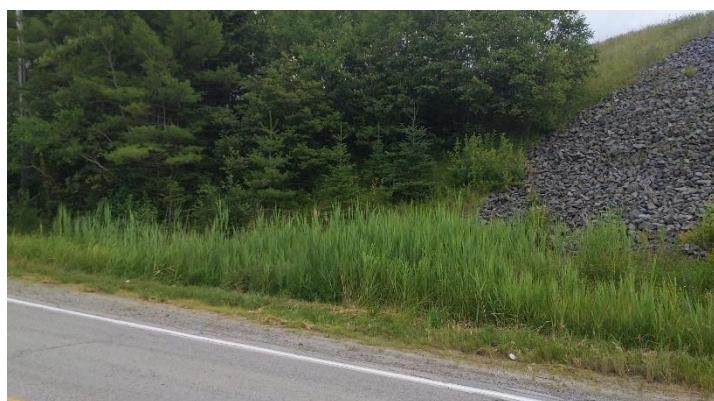


**Photo 9.** Common Reed stand **A** located near the intersection of Hantsport Connector and Trunk 1 in Mount Denson (45.061733, -64.175419).

**Habitat and Impact:** Common Reed thrives in disturbed habitats such as roadsides and ditches. It is salt-tolerant and can invade fresh and brackish water systems such as wetlands, lakeshores, banks, beaches, and wet fields. Common Reed is a significant threat to wetland habitat. It outcompetes native wetland plant species, reduces viable wildlife habitat, and can alter ecosystem function by lowering wetland water levels. It also impacts safety by blocking roadway sightlines and obscuring critical infrastructure such as fire hydrants.

**Pathways of Spread:** This species is primarily spread by its rhizomes (underground horizontal stems) and stolons (horizontal stems/runners). Rhizomes and stolons can get stuck on road maintenance or construction machinery and spread to new areas.

**Distribution:** Four stands of Common Reed have been observed in WHRM (Figure 6). Stands A, B, and D have been verified as the invasive subspecies by the NSISC. Stand A is located near the intersection of Hantsport Connector and Trunk 1 in Mount Denson (See Photo 9). It is growing in the floodplain of the Halfway River. Based on satellite imagery, this area appears to be mowed using a farm tractor. This may have been the source of the introduction. Imagery from Google Street View determined that Stand A has been at this site since at least 2021. Stand B is located along Trunk 1 near the Highway 101 overpass in St. Croix (See Photo 10). This stand is very short, likely due to suboptimal habitat conditions and consistent mowing. It is growing in a slight depression and, based on Google Street View imagery, has been there since 2018. Stand C was observed growing on the North Side of Highway 101, where the highway has been twinned. Several stands were observed growing in an area with high levels of soil disturbance. It likely arrived in contaminated soil or by rhizomes stuck on heavy machinery. This stand was observed by NSISC staff from the twinned highway



**Photo 10.** Common Reed stand **B** located along Trunk 1 near the Highway 101 overpass in St. Croix. (44.962906, -64.017486)

## *Invasive Species Observations in the West Hants Regional Municipality*

and is currently not a record on iNaturalist. Stand D is located along Trunk 14 in Upper Vaughan (See Photo 11). This stand is well established in a ditch between the civic addresses of 718 and 722. It has several stems expanding beyond the ditch. Routine mowing by property owners and road maintenance crews likely keeps it contained to the ditch. Google Street View imagery showed that this stand has existed since at least 2012, making it the oldest known Common Reed stand in WHRM.

**Management:** Common Reed is challenging to remove once it gets established. Fortunately, Common Reed is not abundant in West Hants Regional Municipality, and the stands are not considerably large, indicating they were recently established (excluding stand D). Efforts to control this species before it spreads further or invades more natural ecosystems are recommended. Currently, all stands are found in areas of high disturbance, minimizing the impacts of management on native species and ecosystems. However, high disturbance means there is a high risk of further spread. Stand A will likely spread along the Halfway River and into more natural areas. If this stand is not removed, continued mowing will likely spread it throughout the area and significantly increase the costs for management. Plant fragments can get stuck on the mower or tire treads, leading to spread. If possible, it is recommended to avoid mowing this stand until it is removed. Stands B and D are located in ditches. Snowplows and other road maintenance activities can fragment rhizomes or stolons, move them along roadways, and introduce the species into new areas. Stand C also has a high risk of spread due to work currently being done around the highway twinning project. Controlling this population is important to ensure it does not spread into the wetland north of the stand.



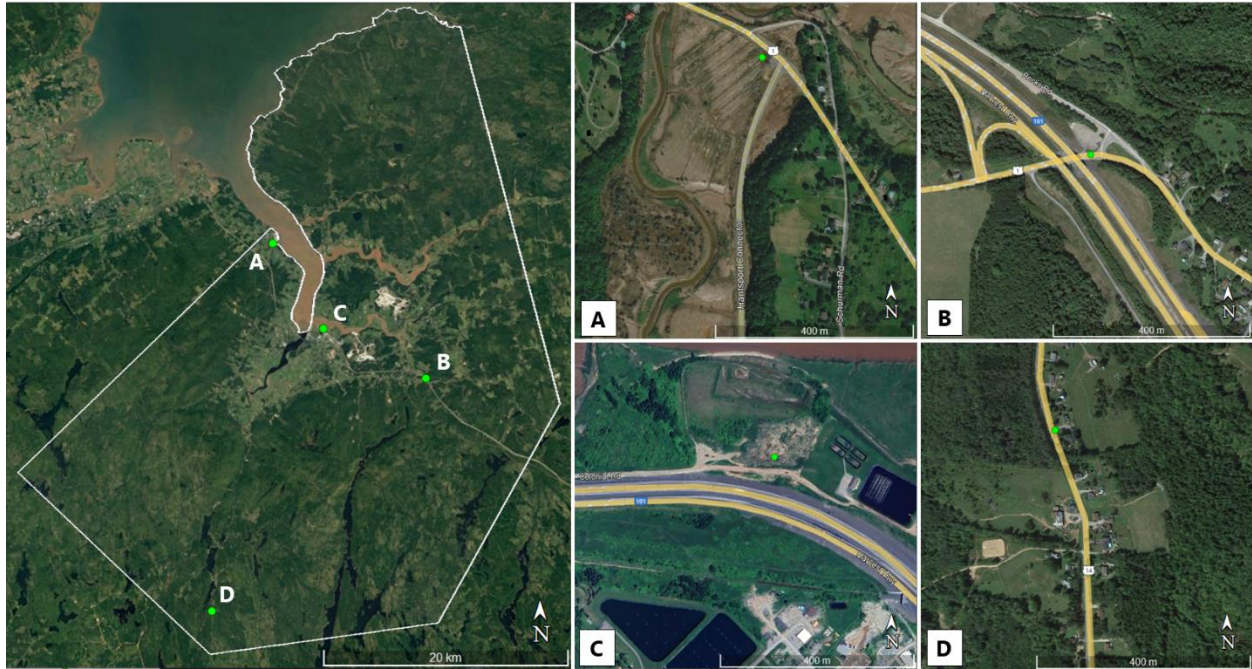
**Photo 11.** Common Reed stand **D** located along Trunk in Upper Vaughan. (44.793436, -64.238961)

Successful removal of Common Reed takes more than one management attempt and requires several years of monitoring. This plant has an extensive below-ground biomass, which allows it to regrow readily after treatments. Herbicide application is an effective way to manage this species and is recommended for dry sites. A foliar spray using glyphosate or Imazapyr herbicide is recommended and should be applied in late summer or early fall. Herbicide can be applied after mowing the site to reduce the off-spray.

Selective cutting can also be done to control smaller stands. Push a sharpened spade at a 45° < angle near the base of the plant to cut stems below the soil surface. This method works best in soft soil. Removed stems should not be left at the site. Stems should be burned or sent to a municipal compost facility that reaches high enough temperatures to kill living plant tissue. Multiple cutting/spading treatments may be required throughout the growing season as new shoots emerge. It is effective after several years of repeated treatments. Digging out Common Reed is considered a low-efficacy method as it is costly, stimulates regrowth, and the extensive below-ground biomass makes it difficult to remove all plant material. Large machinery, such as a backhoe, is necessary to dig out Common Reed successfully. This, however, will result in significant disturbance. This method may be plausible for these stands due to their locations in ditches or other already disturbed sites. Machinery such as mowers used to manage Common Reed must be cleaned after leaving the site. Otherwise, it will lead to spread.



## *Invasive Species Observations in the West Hants Regional Municipality*



**Figure 6.** Common Reed observations in the West Hants Regional Municipality from 2018 – 2023. Imagery created using Google Earth.



### **Mid-Priority and Low-Priority Invasive Plant Species**

There are some notable observations of species in the mid and low-priority categories. Low-priority species such as Colt's-foot (32 observations), Dame's Rocket (18 observations), and Black Medic (13 observations) are some of the most common invasive species in the area. These are weedy species that can out-compete native plant species for resources and space. In contrast to the high-priority species, their impact is less severe. The focus for controlling these species should be reducing spread. These species are spread by contaminated fill and seeds stuck on gear, equipment, or clothing. Cleaning machinery, gear, and boots between sites can help reduce the spread of these and other invasive species.

Several invasive tree and shrub species commonly used for landscaping, such as Black Locust, Sycamore Maple, Japanese Barberry, European Ash, Scots Pine, Rugosa Rose, English Oak, Manitoba Maple, and White Poplar, have been recorded in WHRM. These species should be avoided in landscaping, and native or non-invasive species should be used instead. Please see the NSISC Grow Me Instead guidebook for a list of alternative species. Black Locust appears especially problematic in the area, with evident spread through sapling growth. For example, large Black Locust trees were found at the Hantsport Memorial Community Centre, and several young saplings were found in the wooded area near the south portion of the park. Black locust trees form dense stands that outcompete native vegetation for space and sunlight. These stands have lower plant diversity in contrast to native communities and can cause a shift in the species composition. Black Locust trees are nitrogen fixers and can invade nutrient-poor ecosystems, increasing soil nutrient levels. The increase in nutrients promotes the growth of weedy species that can out-compete the non-competitive native plant species adapted for low-nutrient soils.

### **General Comments on Invasive Plant Species Management**

- **Site-specific management plans** should be outlined for invasive species removal. Surveys should be completed to identify the locations of the targeted invasive plant species. Identifying satellite population locations is a critical component of this. Satellite populations are smaller areas of invasive species separate from the larger source population. These are usually more recently established and contribute to further spread in the area. Removing satellite populations is recommended as the first step when managing invasive plant species. This can help prevent further spread and limit the infestation to a single area.
- Developing a **multi-year management plan** to control invasive plant species is necessary for the project's success. Invasive plants will require more than one year to achieve effective control. Failing to plan for follow-up management can promote the growth of the invasive species and worsen the situation.
- **Information signs** explaining the importance of removing invasive species should be installed for areas where large-scale invasive species removal is being conducted. Informing the public of the work can help reduce negative opinions about removing plants from natural or semi-natural areas.
- When managing invasive species, **cutting or removing plants before they can fruit and produce seeds** is optimal. This can help prevent further spread in the location.

## ***Invasive Species Observations in the West Hants Regional Municipality***

- **Disposal methods** are an essential part of the management plan. Failing to dispose of invasive plants properly can lead to increased spread and negate the efforts spent to remove the species. Invasive species should never be backyard composted or disposed into plant waste piles. Plant material should be sent to a municipal compost facility that reaches temperatures high enough to kill plant material. If the plants that are being removed contain seeds or fruit, these should be placed in black garbage bags and solarized for at least two weeks. The bags should be double-bagged and disposed of in a municipal landfill. When possible, it is recommended not to remove plants that are in seed to decrease the chances of spread.
- **Clean gear and clothing** whenever working near invasive plant species. Before leaving a recreational site, soil and plants stuck in boot treads should be removed. Utilizing a stationary or mobile boot brush can quickly and effectively do this with little hassle. This can help reduce invasive species' spread and future management costs. When cleaning machinery used to mow invasive plant species, attention should be directed to tire treads and the mowing deck. All plant material should be brushed off the machinery before it is to be used at another site. Failing to do so can lead to the spread of invasive plant species and increase management costs.
- **Follow-up monitoring** is always required after invasive species have been removed. This is also necessary if a small population has just been established. Invasive species are difficult to remove, and ensuring the control method was successful by checking the site after its removal is essential.
- **A remediation plan** should be a part of an invasive species management plan. After control measures have been completed, the site should be planted with native plant species. Bare and exposed soil are favourable conditions for future invasive species invasions. Planting native species after removing invasive species can give native species an advantage and reduce the chances of another invasive plant colonizing the area.

### **Invasive Insect Observations**

#### **Hemlock Woolly Adelgid (*Adelges tsugae*)**

Of the six invasive insect species recorded on iNaturalist, Hemlock Woolly Adelgid (HWA) is the most significant concern (Table 2). In August 2023, the Canadian Food Inspection Agency (CFIA) confirmed HWA in the West Hants Regional Municipality. As of November 2023, only one observation has been made, and it is in the St. Croix community. This invasive insect is a significant threat to Eastern Hemlock trees and can kill Hemlocks in 4 to 20 years. HWA is host-specific and will not target other trees. Options exist to protect Hemlock trees from HWA. This includes pesticides applied as basal bark sprays or injections of pesticides that have been used to protect Hemlock trees for several years. It is recommended to contact the local CFIA office to determine the best strategy for managing this invasive species in the area.



*Hemlock branch.*

Observations of HWA should be directly reported to CFIA or the Nova Scotia Invasive Species Council (NSISC). HWA can be identified by waxy “wool” like sacs at the base of Hemlock needles (see photo 12). Hemlocks are large trees, and sometimes HWA infestations are only located in the upper crown, making them difficult to detect. An easy way to look for HWA is to pick up fallen Hemlock branches and check the tips of the branches for the presence of HWA. Wind and animals such as birds and squirrels can spread HWA. However, humans also play an important role in the spread of HWA. These tiny insects can cling to clothing and gear and be unintentionally moved to another site. When working in areas with Hemlocks, cleaning gear before and after is recommended to reduce the spread of HWA in the area. A lint roller is a quick and easy way to clean clothing and gear.

#### **Box Tree Moth (*Cydalima perspectalis*)**

Box Tree Moth (BTM) is another important invasive insect observed in the area. This species is a pest of Boxwood shrubs (*Buxus* spp.) that causes significant defoliation and dieback. Boxwood shrubs are not native to Nova Scotia but are a common landscaping shrub and economically important in the nursery trade. BTM has not been documented on iNaturalist in the area and is a newly observed invasive species in the Maritimes. The species was first observed in the Maritimes in June 2023. It was discovered at several plant retailers. Later in August, a population was found on private property in Windsor. This population is not believed to be connected to the known plant retailers, indicating BTM has been established in the area. Currently, the best method to combat this species is raising awareness to limit its spread. Potential sightings of BTM should be reported to CFIA or the NSISC.



**Photo 13.** Box Tree Moth larvae and adult.



## Invasive Species Observations in the West Hants Regional Municipality

**Table 2.** Invasive insect species recorded on iNaturalist in the West Hants Regional Municipality from 2018 - 2023.

| West Hants Regional Municipality iNaturalist Invasive Insect Data 2018-2023 |                                  |                        |
|-----------------------------------------------------------------------------|----------------------------------|------------------------|
| Common name                                                                 | Scientific name                  | Number of Observations |
| Beech leaf-mining weevil                                                    | <i>Orchestes fagi</i>            | 2                      |
| Colorado Potato Beetle                                                      | <i>Leptinotarsa decemlineata</i> | 2                      |
| Japanese Beetle                                                             | <i>Popillia japonica</i>         | 2                      |
| Hemlock Woolly Adelgid                                                      | <i>Adelges tsugae</i>            | 1                      |
| Introduced Pine Sawfly                                                      | <i>Diprion similis</i>           | 1                      |
| Spongy Moth                                                                 | <i>Lymantria dispar</i>          | 1                      |

## Invasive Crustaceans and Fish Observations

European Green Crab was the most documented invasive species on iNaturalist in WHRM (Table 3). This species is a shore crab that, as an adult, has five prominent spines on either side of its eyes and three bumps between its eyes. They are voracious consumers of plants and animals, especially soft-shell clams, oysters, quahogs, and mussels. They uproot and destroy Eelgrass beds, an important habitat-forming species for native fish, invertebrates, and waterfowl. Predation and habitat destruction by European Green Crabs negatively impact biodiversity and harm local shellfish fisheries. A cluster of observations can be found in WHRM at Summerville Beach and Hobarts Beach. This species can be found all along the Bay of Fundy coast.

Smallmouth Bass was the most abundant fish species in the area, with eight observations. They are efficient predators of many smaller fish, mammals and amphibians. They also create competitive pressures for native fish species. Observations were found in Panuke Lake, Mockingee Lake, Falls Lake, Black River Lake, and the Avon River. This invasive fish is established in other water bodies in WHRM. Only one observation of Chain Pickerel was documented on iNaturalist in the West Hants Regional Municipality. Chain Pickerel are voracious predators and will consume fish, insects, aquatic invertebrates, rodents, and even snakes. This single observation was outside of the West Hants Regional Municipality. However, it was found in the Kennetcook River, which flows into the West Hants Regional Municipality.

**Table 3.** Invasive fish and crustacean species recorded on iNaturalist in the West Hants Regional Municipality from 2018 - 2023.

| West Hants Regional Municipality iNaturalist Invasive Fish and Crustaceans Data 2018-2023 |                             |                        |
|-------------------------------------------------------------------------------------------|-----------------------------|------------------------|
| Common name                                                                               | Scientific name             | Number of Observations |
| European Green Crab                                                                       | <i>Carcinus maenas</i>      | 36                     |
| Smallmouth Bass                                                                           | <i>Micropterus dolomieu</i> | 8                      |
| Chain Pickerel                                                                            | <i>Esox niger</i>           | 1                      |

## ***Invasive Species Observations in the West Hants Regional Municipality***

### **Invasive Bird Observations**

European Starling was the only invasive bird species observed in the West Hants Regional Municipality. This invasive species is widespread in Nova Scotia and is the province's second most recorded invasive species on the iNaturalist platform. This species competes with native birds for resources. Observations of European Starlings can be found throughout WHRM but were primarily found in more urban environments.

**Table 4.** Invasive bird species recorded on iNaturalist in the West Hants Regional Municipality from 2018 - 2023.

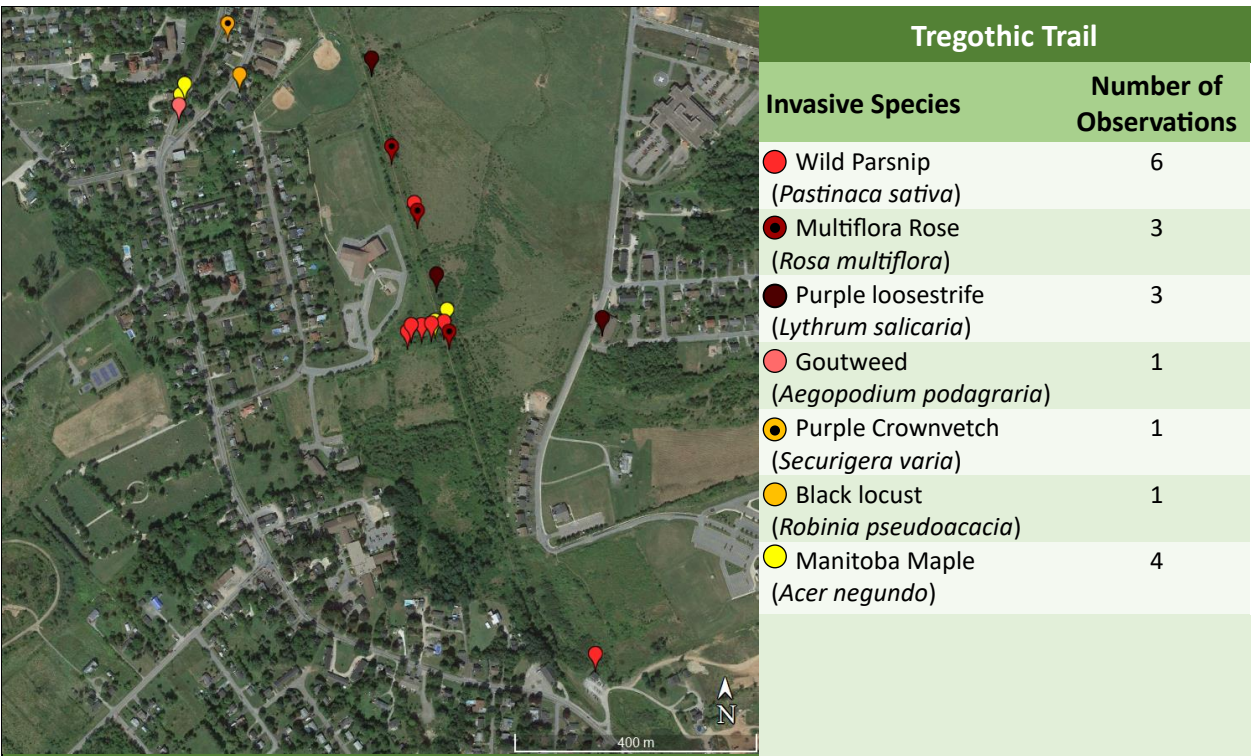
| <b>West Hants Regional Municipality iNaturalist Invasive Bird Data 2018-2023</b> |                         |                               |
|----------------------------------------------------------------------------------|-------------------------|-------------------------------|
| <b>Common name</b>                                                               | <b>Scientific name</b>  | <b>Number of Observations</b> |
| European Starling                                                                | <i>Sturnus vulgaris</i> | 12                            |

### **Clusters of iNaturalist Invasive Species Observations**

Most of the observations within WHRM were located near Windsor and the adjacent communities (Figure 1). Humans play a significant role in the spread of invasive species. Therefore, the more human activity, the greater the chances for invasive species introduction. Several other clusters can be found throughout the municipality and area associated with parks and hiking trail systems. Similarly, the higher amount of human activity is likely the cause of these clusters. In addition, hikers and other nature enthusiasts are more likely to document organisms as they enjoy nature rather than when they go about their daily activities. Notable clusters of invasive species observations recorded on iNaturalist can be found at Tregothic Trail in Windsor (Figure 7), Irishman's Road Recreation Site in Newport Station (Figure 8), Cheverie Salt Marsh Trail in Cheverie (Figure 9), Falmouth Boat Launch in Falmouth (Figure 10), and Smileys Provincial Park and Campground in McKay Section (Figure 11). Some other clusters include Summerville Beach/Hobarts Beach in Summerville, New Rail Trail in Union Corner, and Meadow Pond in Gypsum Mines. These are likely not the only clusters of invasive species in West Hants Regional Municipality. The iNaturalist observations give a limited view of the invasive species present.

**Tregothic Trail**

Seven invasive species were identified on iNaturalist near and along the Tregothic Trail (Figure 7). Wild Parsnip and Multiflora Rose are the two most problematic species at the site. Managing the Wild Parsnip in the area is recommended due to its human health concerns. This species can be found throughout the area, growing along Payzant Dr. and in the field West of Avon View High School. Dense stands of Multiflora Rose can be found in the area growing along the trail system and the field edges. Other invasive species that were not recorded on iNaturalist but were observed growing along the trail include Black Knapweed, Colts Foot, English Oak, and Norway Maple. A stand of Japanese knotweed was also observed growing in the backyards of a private home on Trunk 1. This observation can be seen in Figure 5.

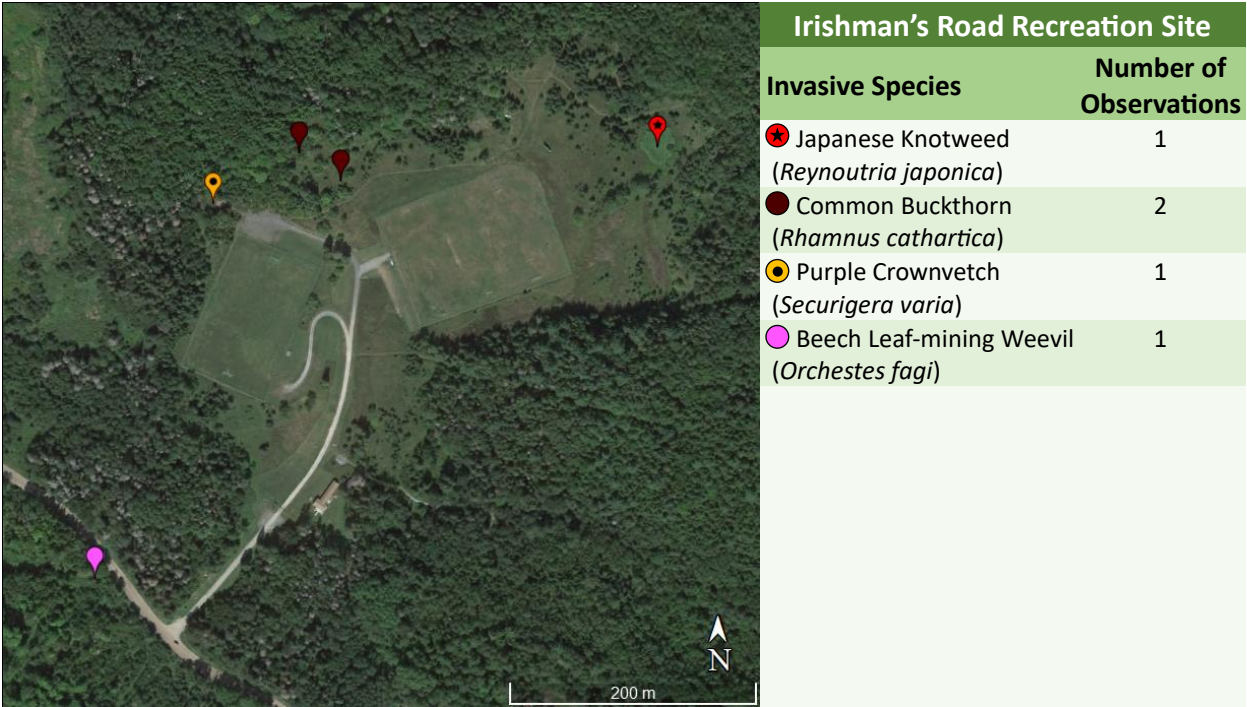


**Figure 7.** Tregothic Trail iNaturalist invasive species observations. The pin colour indicates plant priority levels as outlined in Table 1. Reds are high-priority species, orange are mid-priority species, and yellow are low-priority species.



**Irishman’s Road Recreation Site**

Three invasive species were identified on iNaturalist near the Irishman’s Road Recreation Site (Figure 8). In addition, a large stand of Japanese Knotweed was observed during the invasive species guided hike in the fall of 2023. Based on satellite imagery observed from Google Earth, this Japanese Knotweed patch has been at the site since 2010. There is evidence that the stand was present in 2004, but due to the lower quality of the imagery, it cannot be determined with confidence. This stand is considerably large, and its proximity to the trail system represents a pathway for further expansion in the area. It has the potential to spread throughout the west side of the Irishman’s Road Recreation Site, resulting in a dense patch of Japanese Knotweed, undermining the remediation efforts that transformed the previous landfill into the recreation site it currently is. In addition to these species listed, Burdock (*Arctium minus*), Colts Foot, Black Knapweed, and Multiflora Rose were observed at the site. The Multiflora Rose was observed in front of the garbage bin near the gated entrance of the park. This appeared to be a young plant that should be removed as soon as possible.

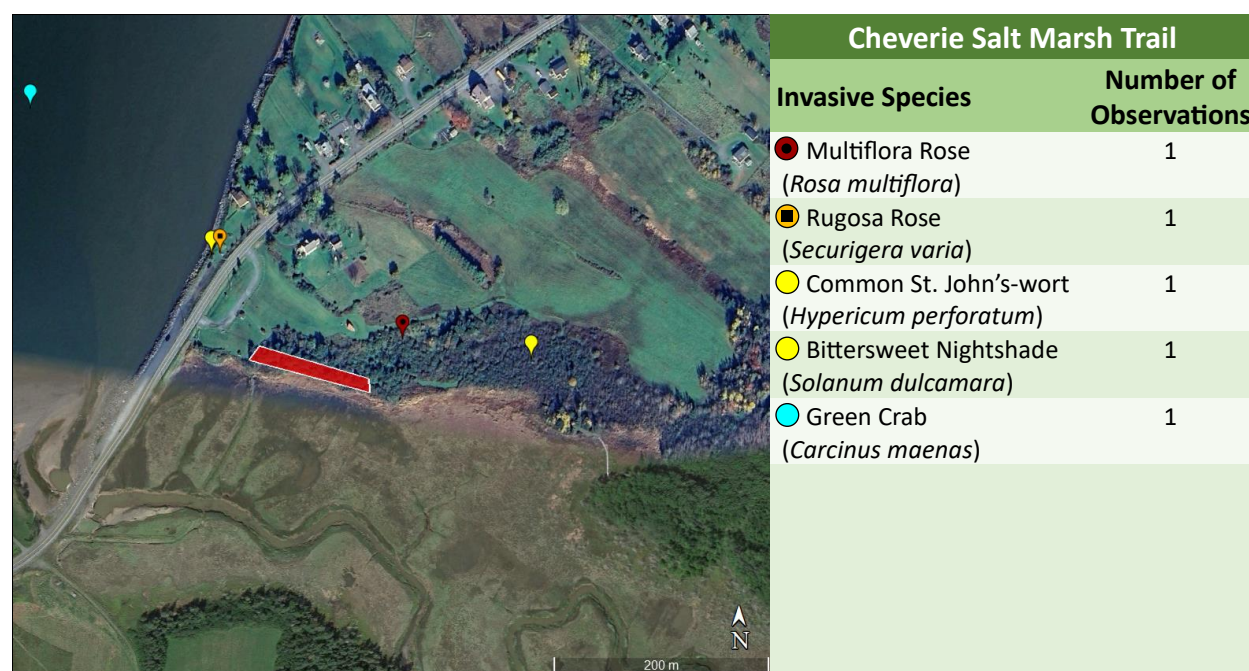


**Figure 8.** Irishman’s Road Recreation Site iNaturalist invasive species observations. The pin colour indicates the priority level. Reds are high-priority species, orange are mid-priority species, and yellow are low-priority species. The star indicates a Japanese knotweed observation that is not recorded in iNaturalist.

## Invasive Species Observations in the West Hants Regional Municipality

### Cheverie Salt Marsh Trail

Five invasive species were identified on iNaturalist near and along the Cheverie salt Marsh trail (Figure 9). The most problematic invasive species present at this site was Multiflora Rose. This species was found growing along the trail, as indicated by the red polygon in Figure 9. It is likely in other locations in the area that have not been documented to iNaturalist. Rugosa Rose was also observed in the area. This salt-tolerant invasive species dominates coastal communities such as rocky headlands and coastal dunes. It is desired as an ornamental species and can be found throughout Nova Scotia in gardens and established in natural habitats. This species is typically listed as a high-priority species by the NSISC. Due to the low number of observations and the desire to limit the number of high-priority species to ten, this species was categorized as mid-priority. This species can be controlled by using similar methods outlined for Multiflora Rose.

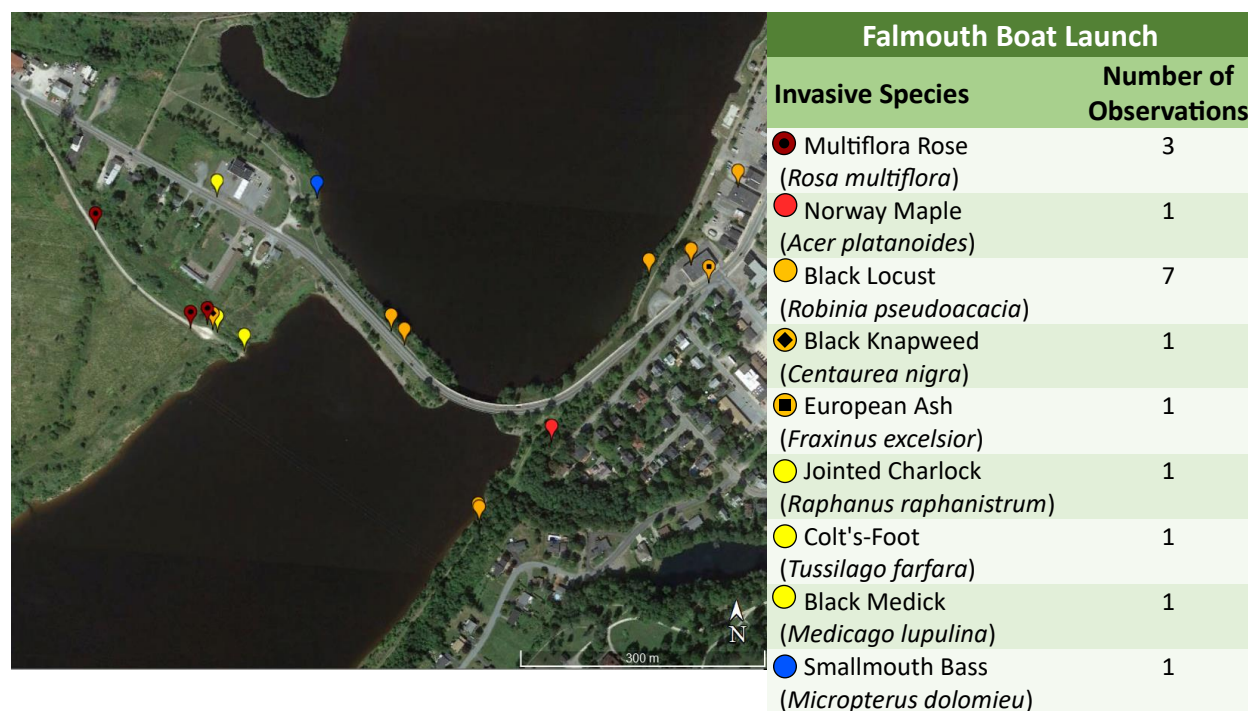


**Figure 9.** Cheverie Salt Marsh Trail iNaturalist invasive species observations. The pin colour indicates plant priority levels as outlined in Table 1. Reds are high-priority species, orange are mid-priority species, and yellow are low-priority species.

## Invasive Species Observations in the West Hants Regional Municipality

### Falmouth Boat Launch

Nine invasive species were identified on iNaturalist near the Falmouth Boat Launch (Figure 10). Multiflora Rose and Black Locust are considered the two most problematic species in the area. Multiflora Rose was observed growing in several patches along the road to the boat launch. It can also be found growing along both sides of Trunk 1 here. Black Locust was highlighted due to the notable spread here in the area. There are likely more saplings growing in the area.



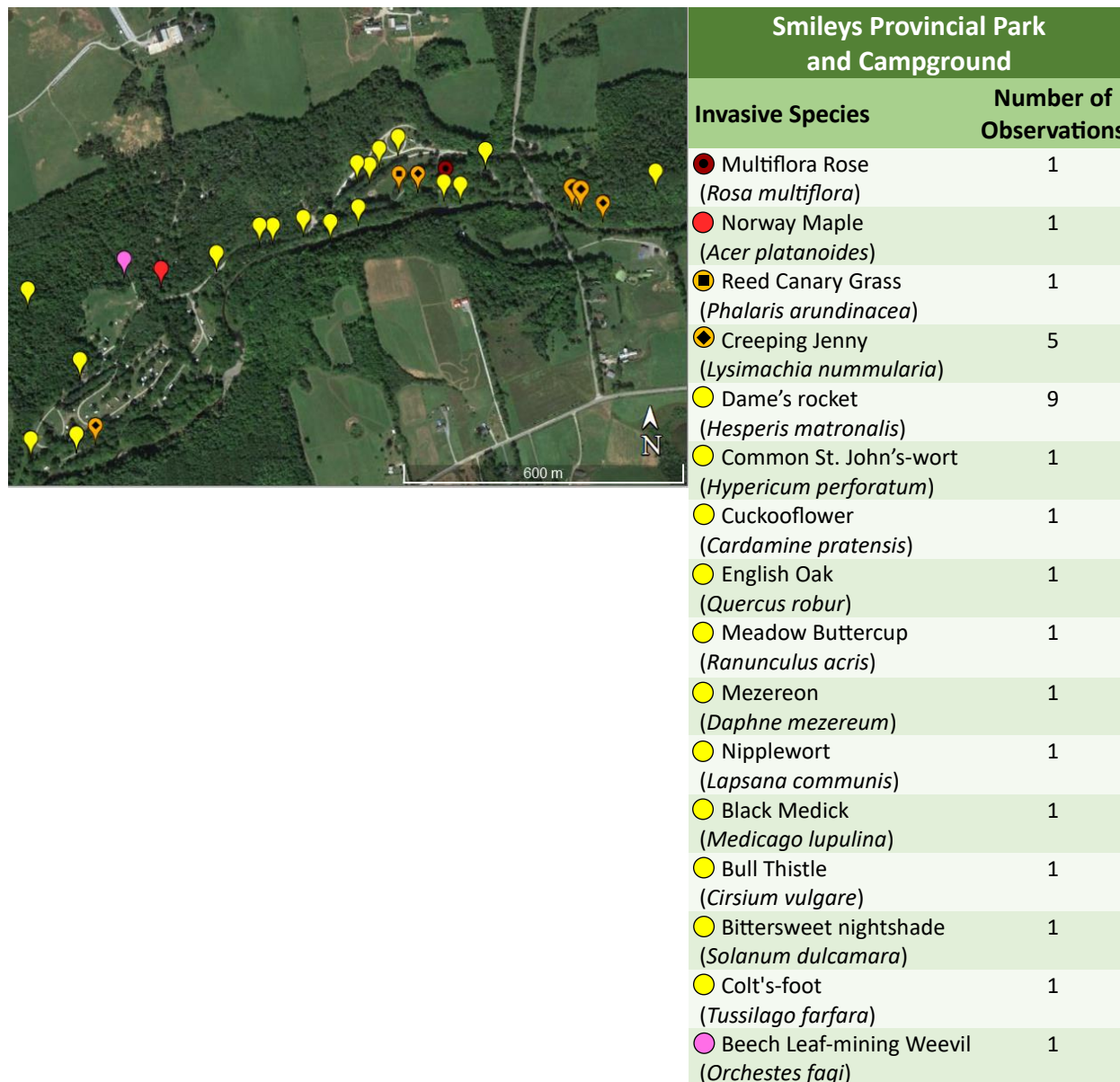
**Figure 10.** iNaturalist invasive species observations at the Falmouth Boat Launch. The pin colour indicates plant priority levels as outlined in Table 1. Reds are high-priority species, orange are mid-priority species, and yellow are low-priority species.



## Invasive Species Observations in the West Hants Regional Municipality

### Smileys Provincial Park and Playground

Sixteen invasive species were identified on iNaturalist near Smileys Provincial Park and Playground (Figure 11). This cluster of invasive species is the most species-rich area in West Hants Regional Municipality. Eleven of the fifteen invasive plant species at this site are low-priority. One observation of Multiflora Rose was observed at the site. It is unknown how many other patches of Multiflora Rose are present. Based on the iNaturalist observations, Creeping Jenny, also known as Creeping Yellow Loosestrife, appears to be a problematic species at this site. This garden escape prefers moist soils such as ditches and along the banks of streams, rivers, and ponds. It can be found growing at several locations near the small river flowing through the site.



**Figure 11.** Smileys Provincial Park & Campground iNaturalist invasive species observations. The pin colour indicates plant priority levels as outlined in Table 1. Reds are high-priority species, orange are mid-priority species, and yellow are low-priority species.

### **Conclusion**

There were 59 different invasive species reported to iNaturalist in WHRM from 2018-2023. Multiflora Rose was identified as one of the most problematic invasive species in the area. Due to its high abundance in WHRM, eradication is unlikely. Management of this species should be focused on preventing further spread and controlling site-specific populations with high social or ecological value. Wild Parsnip was also identified as a problematic invasive species in WHRM. A dense population of this plant was found in the Tregothic Trail area. It is recommended that action be taken to remove this plant as soon as possible due to its threat to human health. In August 2023, Hemlock Woolly Adelgid was found in the municipality. It is recommended that WHRM work with the local Canadian Food Inspection Agency to develop a strategy to combat this species. Other notable invasive species documented in the area include Japanese Knotweed, Glossy Buckthorn, and Common Reed.

The most cost-effective method to manage invasive species is responding to introductions as soon as possible and preventing their establishment. Delays in controlling invasive species can increase costs substantially. Monitoring for invasive species is a vital component of invasive species management and allows for early detection. Training park staff on identifying priority species when they first establish on municipal property and how to control these species will aid in timely responses. In addition, it is important to prevent unintentional introduction by cleaning gear, boots, and machinery between sites. Creating more public awareness of the impact of invasive species and how to prevent their spread is also an essential component of managing invasive species. Citizen reporting through iNaturalist can help identify issues and provide valuable data on invasive species spread.

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