Invasive Species Management Frequently Asked Questions

- **What is invasive species management?**
    - Invasive species management aims to minimize the impact of nonnative invasive species and uses a range of techniques to achieve this. YLT performs this work on a large scale on the preserves that are significantly impacted by invasive species. This practice helps preserve biodiversity, restore the quality of wildlife habitats, and promote healthy ecosystems.

- **Why is it necessary?**
    - An abundance of invasive species takes up resources and space needed for native plants to grow. This in turn creates food deserts for wildlife from insects to large mammals. Many of these species will eat invasive species but will receive a small fraction of the nutritional value that they would from their native forage. Deer have been shown to avoid eating invasive plants, which leads to the over-foraging of native plants in the same area. Many insects are specialists and are not able to eat or reproduce successfully with the presence of specific native plants in our ecosystem.

- **What are some of the most common invasive species and what is their harm?**
    - Barberry: known to foster higher tick populations, and an increased risk of tick-transmitted diseases is a concern. Some studies show lower populations of important insects, such as spiders in barberry thickets.
    - Honeysuckle: creates dense thickets, crowds out other understory species, creating spaces lacking in needed diversity. It provides very poor bird forage, leading to malnourished migratory birds.
    - Burning bush: creates thickets, decreasing biodiversity and reducing ground cover, leading to increased erosion.

- Bittersweet: can girdle trees and weaken saplings and small trees by overgrowing them.
- Japanese knotweed: releases chemicals toxic to other plants in the soil creating a monoculture. It is incredibly challenging to control manually and has no known biocontrol. This plant causes rapid erosion, especially along streams and rivers.
- Glossy buckthorn: outcompetes native plants for nutrients and light, decreases biodiversity.

  All of these species spread quickly and form dense, homogenous communities in a wide range of conditions, even in areas where there are already healthy populations of native plants present. They diminish the quality of forage and shelter for wildlife, change the soils below them to better accommodate invasive plants, and their root structures do not hold soil in the same way our native plants do, which causes erosion.

- **Who does the work?**
  - Licensed foresters create a long-range forest management plan for the property to guide stewardship of the property and conduct specific practices in the plan, such as invasive species management, habitat restoration, and planting projects. Sometimes contracted or on-staff certified herbicide applicators will conduct treatments as outlined in the forest management plan.

- **Who has YLT consulted with or received guidance from on herbicide use?**
  - YLT has received guidance from our consulting forester, the York County district forester, land trusts throughout the state, and several licensed applicators.

- **What are YLT's methods of invasives species management?**
  - Manual
    - Repeated cuttings
    - Hand pulling
    - Suppression (materials laid on or under the ground to suppress growth)

- Biocontrol
    - Galerucella beetles on Purple Loosestrife
    - Sasajiscymnus Tsugae Beetles for Hemlock Woolly Adelgid
- Chemical [herbicide]
    - Foliar Application: A targeted spray application of a low dose of herbicide to the leaves of invasive species. The concentration of herbicide is typically between 2 and 7 percent.
    - Basal Bark Application: A painted or targeted spray treatment focused on the bark near the base of the plant. The concentration of herbicide is around 20 percent.
    - Cut Stem Application: A treatment painted onto the recently cut stems of invasive species. The concentration of herbicide is around 20 percent.

- **When is it necessary to do chemical treatment instead of manual?**
    - It is necessary to perform chemical treatment when:
        - The infestation has reached a critical mass size that manual removal would not be possible.
        - An invasive species is new to the state, is spreading quickly, and poses a strong risk of spreading throughout the state.
        - The species in question is particularly aggressive, difficult to control, and has strong impacts on conservation values and ecosystem integrity.

- **What chemicals are used and how do they impact natural resources?**
    - Glyphosate
        - Soil: Glyphosate does not have herbicidal properties once it contacts soil. It is not absorbed from the soil by plant roots. Soil microorganisms break down glyphosate and surfactants. The half-life of glyphosate in soil is typically 47 days depending on exposure to the elements (sunlight). Most studies have shown no adverse effects on soil microorganisms, including soil nitrogen cycling processes (USDA-FS 1984).
        - Water: Glyphosate dissolves easily in water, but the potential for leaching into groundwater is low. Glyphosate and surfactants are strongly adsorbed to soil

particles and are not easily released back into water moving through soil. Tests show that the half-life for glyphosate in water ranges from 35 to 63 days.
        - Air: Glyphosate does not evaporate easily and does not pose a risk to air quality.
        - Wildlife: Glyphosate is nontoxic to slightly toxic to birds, and fish, nontoxic to bees. Changes in vegetation, rather than toxicity of triclopyr itself, may affect populations of bees. Glyphosate made for use in and around aquatic features is formulated to be less toxic to fish and other sensitive aquatic organisms.
    - Triclopyr
        - Soil: Triclopyr breaks down relatively quickly in soils. The predominant degradation pathway in soil is microbial degradation. The soil half-life ranges from 8 to 46 days depending on exposure to sunlight. As a systemic herbicide, triclopyr is absorbed through plant leaves and roots.
        - Water: Most triclopyr is soluble in water, meaning it dissolves easily. The predominant degradation pathway for triclopyr in water is photodegradation. The half-life of triclopyr in water with light is around 1 day. Without light, it is stable in water with a half-life of 142 days.
        - Air: Triclopyr has a low vapor pressure, meaning it is not likely to release fumes into the environment.
        - Wildlife: Triclopyr is practically non-toxic to bees, birds and fish. Changes in vegetation, rather than toxicity of triclopyr itself, may affect populations of beetles, butterflies, and spiders.
    - Aminopyralid
        - Soil: Aminopyralid does not absorb readily into soils and is considered to be immobile but breaks down relatively slowly in soils. The predominant degradation pathway in soil is exposure to sunlight. The soil half-life ranges from 70 to 103 days, depending on exposure to sunlight.
        - Water: Most aminopyralid is soluble in water, meaning it dissolves easily. The predominant degradation pathway for triclopyr in water is photodegradation. The half-life of aminopyralid in water with light is around .6 days.
        - Air: Aminopyralid has a low vapor pressure, meaning it is not likely to release fumes into the environment.
        - Wildlife: Aminopyralid has been shown to be practically non-toxic to birds, fish, honeybees, earthworms, and aquatic invertebrates. Aminopyralid is slightly toxic to eastern oyster, algae and aquatic vascular plants.

- **What is the difference between pesticides and herbicides?**

- Pesticide is a broad term that refers to substances used to manage, mitigate, or eliminate pests, which can include unwanted plants, animals, or fungi. Herbicides are a specific type of pesticide designed for use on plants. In conservation, the application of herbicides differs from agricultural practices; they are used more sparingly in conservation, applied in a highly targeted way, and typically only used when manual removal methods are not feasible. When possible, we choose herbicides that only impact specific kinds of plants to mitigate the risk of harm to other kinds of nearby plants.

- **Where are herbicide treatments done in relation to water sources?**
  - The forester conducting the treatment is observing required setbacks from streams and wetlands and not treating in or around aquatic habitat, even where allowed. We are using a wetland-approved herbicide to treat in upland areas out of an abundance of caution. Our aim is to mitigate impacts to aquatic vegetation, wildlife, and waterways.

- **What is the risk of herbicide use for humans?**
  - Herbicides can impact humans in various ways. The most effective method to reduce risk is to limit exposure by avoiding treated areas until they are deemed safe and refraining from touching wet, recently sprayed plants. The effects of herbicides on humans can be categorized into two groups: acute (single, short-term exposure) and chronic (multiple exposures over an extended period). Acute effects may include nausea, skin or eye irritation, and respiratory distress. Generally, herbicides exhibit low acute toxicity in humans due to the significant differences between plant and human physiology. Chronic effects, on the other hand, are more extensive and can include cancer, neurological issues, and reproductive problems. The treatments conducted on conservation land are of very low risk, due to the low volume and concentration of herbicides involved and the careful, targeted application methods used. By the time the preserve is re-opened to visitors after treatment, it will be safe to walk our trails and interact with plants and natural features as usual.

- **What is the risk of herbicide use for pets?**
    - Herbicides can be irritating to pets if they come in contact with wet fur, noses, or eyes. They can also lead to gastrointestinal distress if ingested in high concentrations. Always keep your pet on a leash and on the trail. Most herbicide contact with dogs comes from lawn treatments applied improperly. If you suspect your pet has rolled in or ingested herbicide, contact your veterinarian.

- **How do herbicide treatments impact pollinators?**
    - The herbicides YLT uses have been described as "practically non-toxic to bees" and other similar insects. YLT does not use any insecticides or neonicotinoids. Some studies on Glyphosate have shown impacts on navigation, memory and energy in bees, but research on this topic is conflicting. It is well established that impacts to bees, butterflies and other pollinators from herbicide treatment are often from herbicides being used over a very large area or in a non-targeted way- resulting in herbicide drift and contact with native plants. When the herbicide is used in a way that causes significant habitat or forage loss for pollinators, this does significant harm to local populations of pollinators.

- **Do you manage different pieces of your land in different ways?**
    - Yes. We have two basic management types which can be applied to our land:
        - Active management
            - Properties that have experienced significant, unnatural human disturbance and require more management to keep the property in good condition or improve ecological function are considered actively managed. Active management is carefully planned with support from a variety of seasoned resource protection specialists and agencies and is highly specific to each property. Activities conducted on an actively managed property could include anything from forestry work and invasive species removal to trail building and maintenance, to wetlands restoration, and habitat enrichment, etc.
        - Passive management

        - Properties that are healthy overall and require little or no intervention to stay healthy are passively managed. The vast majority of YLT land is passively managed. This is a more hands-off approach that limits use of the property to foraging, plant and wildlife research, and other very low impact use and management of the property. Significant human use and disturbance would be detrimental to these properties.

- **Why don't you just leave your preserves alone?**
    - We must constantly address invasive plants and pests and mitigate other threats and changes to our preserves. We aim to steward healthy, diverse forests that can support an abundance of native plants and animals and are resilient in the face of climate change. Humans have so altered our ecosystems over history that many open spaces have already been significantly impacted by human disturbance in ways that leave them vulnerable to infestation by invasive species and numerous other threats. Although invasive plants are natural in the context of their native environments, invasive plants have been rapidly and unnaturally introduced to our area from very far away. Our ecosystems cannot adapt rapidly enough to avoid threats and losses to local plant and wildlife populations, resulting in negative impacts on the ecosystem as a whole.

Resources:

https://www.maine.gov/dacf/php/horticulture/invasiveplants.shtml

https://www.invasivespeciesinfo.gov/us/maine

https://extension.unh.edu/sites/default/files/migrated_unmanaged_files/Resource000988_Rep1720.pdf

https://www.merckvetmanual.com/special-pet-topics/poisoning/herbicide-poisoning

http://npic.orst.edu/factsheets/triclopyrgen.html#env

https://hhs.iowa.gov/epi-manual-guide-surveillance-investigation-and-reporting/environmental-disease/pesticide-poisoning#:~:text=The%20symptoms%20of%20chronic%20toxicity,a%20disease%20such%20as%20cancer.

https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-005100_10-Aug-05.pdf