IMPLEMENTATION OF INVASIVE WEED CONTROL PROGRAMS:
THE PLANNING, TOOLS AND TRICKS TO ACHIEVE SUCCESSFUL OUTCOMES

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Weeds Incorporated

www.weedsinc.com

INTEGRATED PEST MANAGEMENT

- Integrated pest management relies on a combination of common-sense practices using all available control methods to Prevent Unacceptable levels of pest and/or damage.
- Uses effective and environmentally sensitive approach, along with current, comprehensive information on the life cycles of pests and their interaction with the environment to achieve success

WHAT IS AN INVASIVE WEED

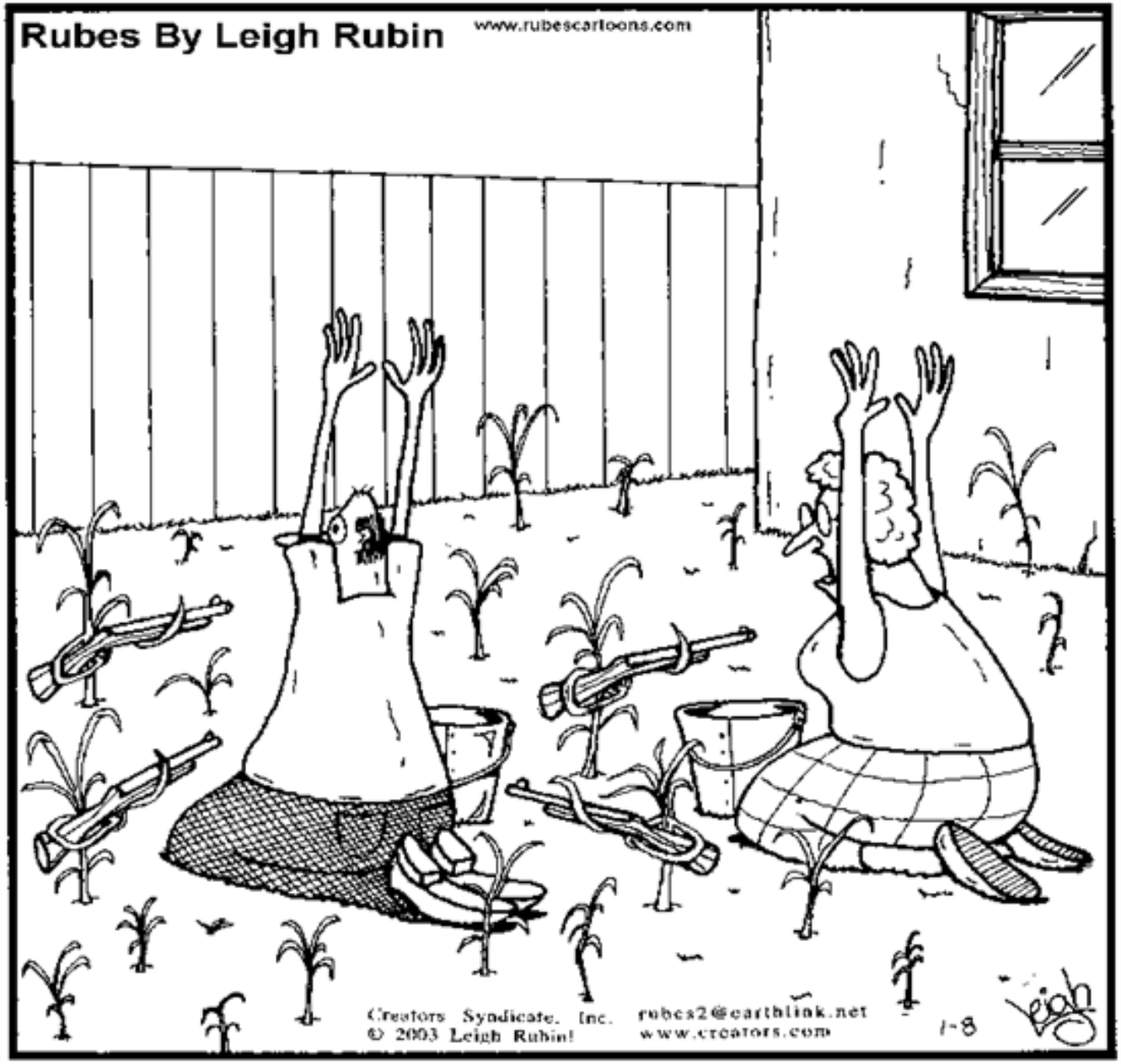
- Invasive species are a non-native species (including seeds, eggs, spores, or other propagules) whose introduction can cause economic or environmental harm, or harm to human health (etc. Giant Hogweed).
  - These include: Wildlife, Plants, Insects, Diseases, etc…

Invasive Weeds

- Non-native species that spread aggressively.
- Outcompete native plants and disrupt ecosystems.
- Spread through seeds, roots, and human activity.
- Example: Japanese Knotweed (*Reynoutria japonica*), Mugwort (*Artemisia vulgaris*).

Noxious Weeds

- Legally designated as harmful by federal or state laws.
- Require control or eradication by law.
- Can threaten agriculture, livestock, and native habitats.
- Example: Canada Thistle (*Cirsium arvense*), Giant Hogweed (*Heracleum mantegazzianum*).



"We never should have waited this long ...
Now the weeds have *completely*
taken over."

Weeds vs. Invasives: What's the Difference?

"Weeds" are essentially plants that are 'out of place' according to human standards. These can be both native and non-native plants and may not necessarily be bad for the environment. Weeds are more of a nuisance to the homeowner, gardener, farmer, or land manager rather than a serious threat. It is human and situational bias that determines what plant is considered "weedy" and where it "belongs". Conversely, "invasive" plants fit the definition above where they are non-native and negatively impact ecosystems, and many of these can be "weedy" as well (I.e., growing where they do not belong).

Common and Prevalent Invasive Plant Species in NJ

Thousands of non-native plants have been introduced to our state, both intentionally (e.g., planting) and by accident (e.g., escaped cultivation, attached to shipping material, seeds/propagules mixed in with other species). However, not all these plants have become invasive or cause harm.

Many non-native plants are well established in New Jersey, some of which are now common and well established (Nonindigenous Plant Species-NJ). A few of these (at least 50) are considered "widespread – invasive" and have altered much of the state's natural landscapes. A greater number are considered "emerging" (few populations but growing) and others have been placed on the "watchlist" (not yet in NJ but found in adjacent states). Range shifts are also occurring for many species due to climate change, pushing southern species northward.

New Jersey does not have an "official" list of invasive plant species, nor does it have legislation mandating the creation of such a list. However, guidance is available on species that can be harmful if planted for landscaping, restoration, or other purposes (See DEP Policy Directive 2004-02; plants Appendix | PD 2004-02). Current information on invasive species is collected and maintained by The New Jersey Invasive Species Strike Team (FoHVOS – NJISST); list is available here: NJISST 2023 – IS Plant List.

Some of the **most familiar and widespread invasive plants** are listed below. Although not an exhaustive list, these species represent those most commonly encountered and with known impacts.

Terrestrial Invasive Species

Japanese Honeysuckle
Lonicera japonica

Japanese Barberry
Berberis thunbergia

Tree of Heaven
Ailanthus altissima

Back to top

mantegazzianum).

- Home
- About NJDA
- One Health
- **Divisions**
  - Agricultural and Natural Resources
  - Animal Health
  - Food and Nutrition
  - Marketing and Development
  - **Plant Industry**
    - About the Division
    - **Programs**
    - Services and Certificates
    - Regulations on Plant Shipment into NJ
    - Features
- E-Licensing/Registration
- Applications and Forms
- Grants, Financial Services
- Publications
- Rule Proposals / Adoptions
- News
- Topics A to Z

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Noxious Weed Seed Regulations

- Bee Inspection
- Beneficial Insect Rearing Lab
- Emerald Ash Borer
- LDD (Gypsy Moth) Suppression
- Jersey Grown
- New Jersey Hemp Program
- Nursery Inspection and Certification
- Pineshoot Beetle
- Plant Laboratory Services
- Plant Pest Survey
- Seed Certifications and Control

The New Jersey Department of Agriculture classifies the following seeds as "prohibited" or "restricted."

PROHIBITED WEED SEED

The following seeds are not allowed in agricultural, flower, tree, shrub or lawn and turf seed:

- Bindweed - *Convolvulus arvensis*
- Hedge bindweed - *Convolvulus sepium*
- Quackgrass - *Agropyron repens*
- Canada thistle - *Cirsium arvense*
- Horse nettle - *Solanum carolinense*

RESTRICTED WEED SEED (in agricultural, vegetable, flower, or shrub seed)

The following seeds may be present in a seed lot, but shall be listed on the label under the heading "Noxious Weed Seed." The name and number per pound must be declared. The terms "free" and " none" shall mean that no noxious weed seed was found in a test conducted using the Association of Seed Analysts (AOSA) established methods.

- Dodder - *Cuscuta spp.*
- Corn cockle - *Agrostemma githago*
- Wild garlic - *Allium vineale*
- Wild onion - *Allium canadense*
- Cheat - *Bromus secalinus*
- Bermuda grass - *Cynodon dactylon*
- Johnsongrass, perennial sweet Sudangrass, *Sorghum almum,* and hybrids derived therefrom - *Sorghum spp.*, perennial
- Spurred anoda - *Anoda cristata*
- Giant regweed - *Ambrosia trifida*
- Bur cucumber - *Sicoyos angulatus*

RESTRICTED WEED SEED (in lawn and turf seed)

The following seeds may be present in lawngrasses, but when contained in amounts of less than five percent, by weight, of the mixture, they shall be listed on the label under the heading "Noxious Weed Seed" or "Undesirable Grass Seed" and the name and number per pound or ounce must be declared. The total amount of such restricted noxious weed seeds shall not exceed 0.5 percent by weight. This classification shall not apply to grasses or mixtures clearly labeled for pasture, forage, hay, conservation or soil bank reclamation usage.

- Bermudagrass - *Cynodon spp.*
- Annual bluegrass - *Poa annua*
- Rough bluegrass - *Poa trivialis*
- Bentgrass - *Agrostis spp.* (including, but not limited to creeping, colonial, velvet, and redtop)
- Meadow fescue - *Festuca pratensis*
- Tall fescue - *Festuca arundinaceae*
- Orchardgrass - *Dactylis glomerata*
- Timothy - *Phleum pratense*
- Velvetgrass - *Holcus lanatus*

For further information contact Seed Certification and Control, New Jersey Department of Agriculture, Division of Plant Industry, PO Box 330, Trenton, NJ 08625-0330, (609) 292-6590.

PA NOXIOUS WEED LIST

- **Class A Noxious Weed -**
- Is established in Pennsylvania
- Is geographically limited
- Is intended to be eradicated
- **Class B Noxious Weed -**
- Is widely established in Pennsylvania
- Cannot feasibly be eradicated
- **Class C Noxious Weed -**
- Is not known to exist in Pennsylvania
- Poses a potential threat if introduced into Pennsylvania
- Is listed on the Federal Noxious Weed List

Class A Noxious Weeds

•Giant Hogweed - *Heracleum mantegazzianum* (Active Field Program)
•Goatsrue - *Galega officinalis* (Active Field Program)
•Kudzu - *Pueraria lobata*
•Palmer amaranth - *Amaranthus palmeri*
•Waterhemp - *Amaranthus rudis*
•Tall waterhemp - *Amaranthus tuberculatus*
•Animated oat - *Avena sterilis*
•Dodder - *Cuscuta spp.* (Except for native species)
•Hydrilla - *Hydrilla verticillata*
•Broomrape - *Orobanche spp.* (Except for native species)
•Wavyleaf basketgrass - *Oplismenus hirtellus*
•European frogbit - *Hydrocharis morsus-ranae*
•European water chestnut - *Trapa natans*
•Water primrose - *Ludwigia grandiflora ssp. hexapetala*
•Brazilian waterweed - *Egeria densa*
•Yellow floating heart - *Nymphoides peltata*
•Ravenna Grass - *Tripidium ravennae* [Synonym: *Saccharum ravennae*] [Synonym: *Erianthus ravennae*]
•Wild Chervil - *Anthriscus sylvestris*
•Chocolate vine - *Akebia quinata*
•Japanese privet - *Ligustrum japonicum*
•Parrot feather - *Myriophyllum aquaticum*
•Starry Stonewort - *Nitellopsis obtusa*
•*Imperata cylndrica '*Red Baron*'*

Class C Noxious Weeds

•Water soldier - *Stratiotes aloides*

Class B Noxious Weeds

•Bull thistle or Spear thistle - *Cirsium vulgare*
•Canada Thistle - *Cirsium arvense*
•Musk Thistle or Nodding Thistle - *Carduus nutans*
•Johnson Grass - *Sorghum halepense*
•Mile-a-Minute - *Persicaria perfoliata*
•Multiflora Rose - *Rosa multiflora*
•Purple Loosestrife - *Exotic Lythrum species*, including *Lythrum salicaria L.* (commonly known as purple loosestrife), the Lythrum salicaria complex and *Lythrum virgatum L.* (commonly known as European wand loosestrife), their cultivars and any combination thereof.
•Shattercane - *Sorghum bicolor*
•Poison hemlock - *Conium maculatum*
•Tree-of-heaven - *Ailanthus altissima*
•Wild parsnip - *Pastinaca sativa* (except for non-wild cultivated varieties)
•Japanese knotweed - *Reynoutria japonica*
•Giant knotweed - *Reynoutria sachalinensis*
•Bohemian knotweed - *Reynoutria x bohemica*
•Japanese Angelica Tree - *Aralia elata*
•Japanese hops - *Humulus japonicus*
•Oriental bittersweet - *Celastrus orbiculatus*
•Black swallow-wort - *Cynanchum louiseae/Vincetoxicum nigrum*
•Pale Swallow-wort - *Cynanchum rossicum/Vincetoxicum rossicum*
•Mugwort - *Artemisia vulgaris*
•Japanese Barberry - *Berberis thunbergii* (Approved exempted varieties)
•Garlic mustard - *Allaria petiolata*
•Japanese stiltgrass - *Microstegium vimineum*
•Callery pear - *Pyrus calleryana*
•Eurasian watermilfoil - *Myriophyllum spicatum*
•Common buckthorn - *Rhamnus cathartica*
•Glossy buckthorn - *Rhamnus frangula* [Synonym: Frangula alnus] (Rhamnus 'Fine Line'- Approved exempted variety)
•Lesser celandine - *Ficaria verna*
•Burning bush - *Euonymus alatus*
•Chinese privet - *Ligustrum sinense*
•European privet - *Ligustrum vulgare*
•Border privet - *Ligustrum obtusifolium*
•Amur honeysuckle - Lonicera maackii
•Morrow's honeysuckle - Lonicera morrowii
•Bell's honeysuckle - Lonicera x bella
•Tatarian honeysuckle - Lonicera tatarica
•Standish/Fragrant honeysuckle - Lonicera standishii

INVASIVE IPM PROGRAM

1. **Identification & Assessment**
   - Surveys and mapping infested areas.
   - Identify species and assess severity of infestation.
   - Determine ecological impact and prioritize control efforts.
2. **Prevention & Early Detection**
   - Monitor high-risk or new installations areas for new infestations.
   - Implement best management practices to reduce spread and control when population are smaller
   - Educate the public on strategies on preventing spread
3. **Control Methods**
   - **Mechanical:** Hand-pulling, mowing, cutting, tilling.
   - **Chemical:** Targeted herbicide application.
   - **Biological:** Introduce natural predators or pathogens.
   - **Cultural:** Encourage competitive native plant growth.
4. **Installation, Restoration & Long-Term Management**
   - Install Native species to restore ecosystem balance.
   - Monitor treated areas for regrowth.
   - Continue maintenance to prevent reinvasion.
5. **Public Awareness & Policy Support**
   - Work with local agencies and landowners.
   - Promote policies supporting invasive species control.
   - Engage in community outreach and volunteer programs.

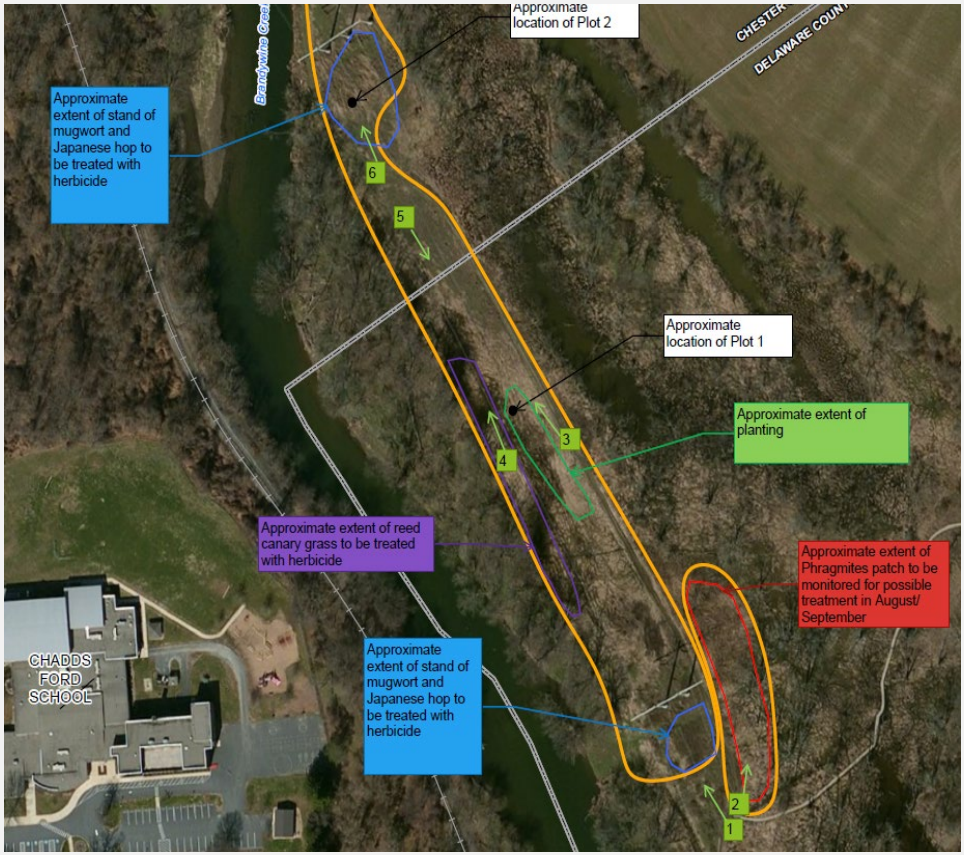
IDENTIFICATION AND ASSESMENT

WHAT IS THE LONG-TERM GOAL FOR THE SITE?

- Restoration or beautification?
    - Grant? Public or Private Bid?
        - Time Constraints for project?
- Is the location an Industrial location, Commercial Business, Public Park, School, Playground, Nature area
    - Is the location open for public use?
        - How heavy is the foot traffic?
- Terrestrial vs Aquatic?
    - Wetlands, Ponds/Lakes, Stream/Creek/River?

Inspection of PECO ROW

- Purple loosestrife (Lythrum salicaria) specific: present throughout project area but observed as sparse individual seedlings totaling ~1% cover of project area; most plants observed exhibited evidence of moderate browsing on leaves by biological control agents (beetles); beetles were observed on several plants – **beetles from prior years are still being impactful**
- Common reed (Phragmites australis): some growth was observed in the previously treated area along the eastern border, but appeared less vigorous and were present as sparse fronds; recommend monitoring area to identify extent and technique (foliar spray or direct wipe) for follow-up treatment to be conducted in late summer to early fall
- Mugwort (Artemisia vulgaris): large patch of mugwort observed in northern-most and southern-most portions of project area near each tower, sparse patches also observed along access road; recommend foliar spot treatment as encountered June-July prior to seed production
- Reed canary grass: although the central portion of the project area remains dominated by native species such as goldenrods (Solidago spp.), woolgrass (Scirpus cyperinus), New York ironweed (Veronia noveboracensis), and swamp rose mallow (Hibiscus moscheutos), a large swath of reed canary grass (Phalaris arundinacea) exists along the western border in the central portion of the project area; recommend foliar treatment during the later portion of the growing season to maximize translocation to the rhizome Yellow rocket (Barbarea vulgaris): present as sparse individual plants with a few dense patches in the central portion of the project area; yellow rocket plants were removed by hand during this visit, recommend continued manual removal as encountered and monitoring for the need for a change in control strategy
- Japanese hop (Humulus japonicus): observed in several patches near the northern-most tower; recommend foliar application June-July prior to seed production
- Poison hemlock (Conium maculatum): several individual plants were observed throughout; recommend spot treating as encountered



Seward Hill Preserve
Ecological Restoration Plan

October 2021

Prepared by Michael Van Clef, Ph.D.

Ecological ES Solutions

The Preserve features expansive meadow habitat with native grasses and patches of native wildflowers.

MECHANICAL AND PHYSICAL CONTROL

- Forestry Mowing
- Chainsaw
- Mowing to reduce weeds
- Combo with Chemical Control
  - Hack and Squit
  - Stump Treatments

CULTURAL CONTROL

- Careful Site Selection
- SITE PREPERATION!
- Sanitation Tools and equipment- Prevent Spread
- Water Management
- Fertilization

BIOLOGICAL CONTROL

Natural Enemies and Predators:

Ladybug Beetles
Lacewings
Praying Mantis
BTI (Bacillus thuringiensis israelensis)

Released Insects

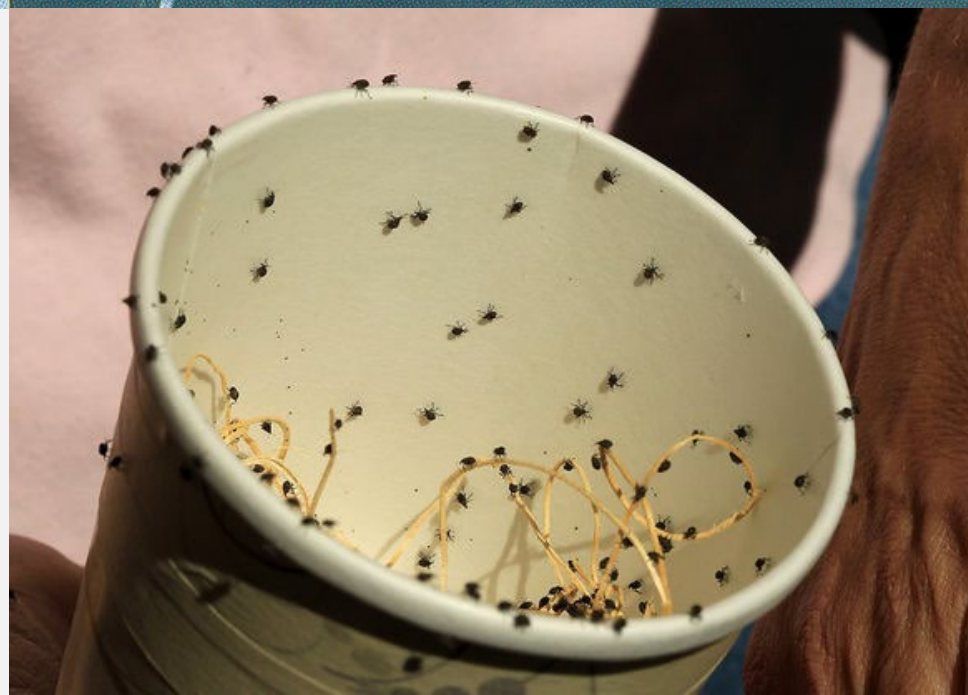
Rhinocominus latipes (Mile-A-Minute Weevil)
Purple Loosestrife Insects
Hylobius Transversovittatus (Loosestrife root weevil)
Nanophyes Marmoratus (Loosestrife Seed Weevil)
Galerucella Calmariensis (Black-Margined Loosestrife Beetle)
Galerucella Pusilla (Golden Loosestrife Beetle)
Canada Thistle
Various others

CHEMICAL CONTROL

- Use in combination with other approaches
- Use the safest pesticides
- Use proper formulations

Mile-A-Minute Weevil Larva

Mile-A-Minute Weevil



Hylobius Transversovittatus (Loosestrife root weevil)

Nanophyes Marmoratus (Loosestrife Seed Weevil)

Galerucella Calmariensis (Black-Margined Loosestrife Beetle)

Galerucella Pusilla (Golden Loosestrife Beetle)


Galerucella calmariensis
(Purple loosestrife defoliating beetle)
DO NOT OPEN UNTIL READY TO RELEASE!
Empty entire container in one place.

Yearly Release of Galerucella calmariensis (Loosestrife defoliating beetles)

Weed Control based on Inspection report

Weeds Controlled- Phragmites, Reed Canary Grass- Thistle/s

Integrated Weed Control Insect Price List (406-299-9850)

(Due to limited supplies, no discounts are offered this year)

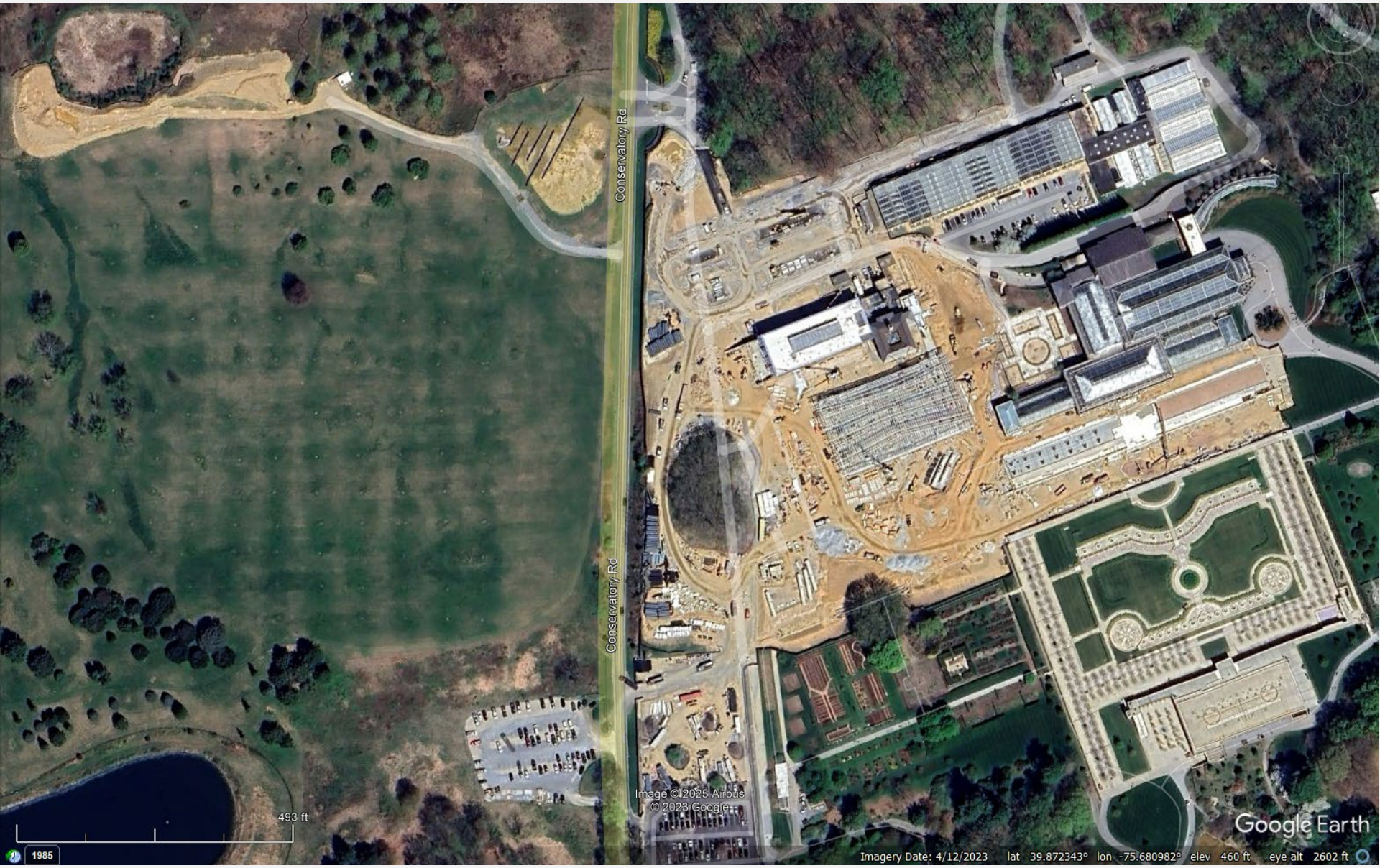
Easy to collect and move around--call for free tips and advice!

Weeds / Insects	Quantity	Price	Type of Damage	Availability
Canada thistle				
Urophora cardui	105	$125.00	Stem gall fly	June-July
Ceutorhynchus litura	105	$175.00	Stem and crown mining weevil	Aug-Oct
Leafy Spurge				
Aphthona mix (multi- species)	1200+	$175.00	Root mining beetles	June-July/Aug
Oberea erythrocephala	105	$175.00	Stem mining and girdling beetle	June-July/Aug
Spurgia esulae	50 galls	$100.00	Gall forming midge	June-Aug
Knapweeds				
Larinus minutus/obtusus	105	$100.00	Seed head weevil	June-Sep
Cyphocleonus achates	105	$150.00	Root boring weevil	July-Sep
Poison Hemlock				
Agonopterix alstroemeriana	150+	$150.00	Defoliating moth	June-July
Dalmatian and Yellow Toadflax				
Mecinus janthiniformus/janthinus	105	$125.00	Stem boring weevil	May/early June
Saint Johnswort				
Chrysolina quadrigemina	105	$125.00	Foliage feeding beetle	June-Sep
Aplocera plagiata	105	$200.00	Leaf eating moth	June-Sep
Common Mullein				
Gymnetron tetrum	105	$150.00	Seed eating weevil	June-July
Purple Loosestrife				
Galerucella calmariensis	105	$150.00	Defoliating beetle	May/early June

- We fill our orders on a first-ordered first-served basis and typically have overwhelming demand (especially for those insects with limited availability), so it is advisable to order as soon as possible.
- All insects are available only during specific time periods, depending on the life cycle of each species.
- When you order, you will be given an estimated timeframe for the delivery of each insect. We will work within your time constraints as much as possible, but be prepared to receive the insects when we call—insects cannot be shipped outside their window of availability.
- ALL ORDERS MUST BE SHIPPED BY OVERNIGHT DELIVERY. We do not ship without confirmation—all shipments are coordinated with you (or the recipient) prior to shipping so that you know they are coming.
- We will work closely with you to make the release process as efficient as possible. We will provide any consulting advice that you may require regarding the release, establishment, monitoring, and redistribution of these biocontrols as a service included with the purchase of the insects.
- All insects must be shipped overnight--those charges are in addition to the price of the insects. BE AWARE THAT OVERNIGHT RATES ARE QUITE HIGH. At your request, we will provide shipping quotes for your location.
- All insects are packaged in breathable, escape-proof containers in well-insulated packaging. Packages are kept cool with frozen cold packs. We do not charge for our packaging.

IDENTIFICATION AND ASSESMENT

- Identification of Invasives will help determine course of action.
  - Timeline for eradication
    - How many Applications?
    - How many years for follow up monitoring and apps?
- Other Factors to be aware of
  - Adjacent properties
  - Prevailing Winds
  - Water Flow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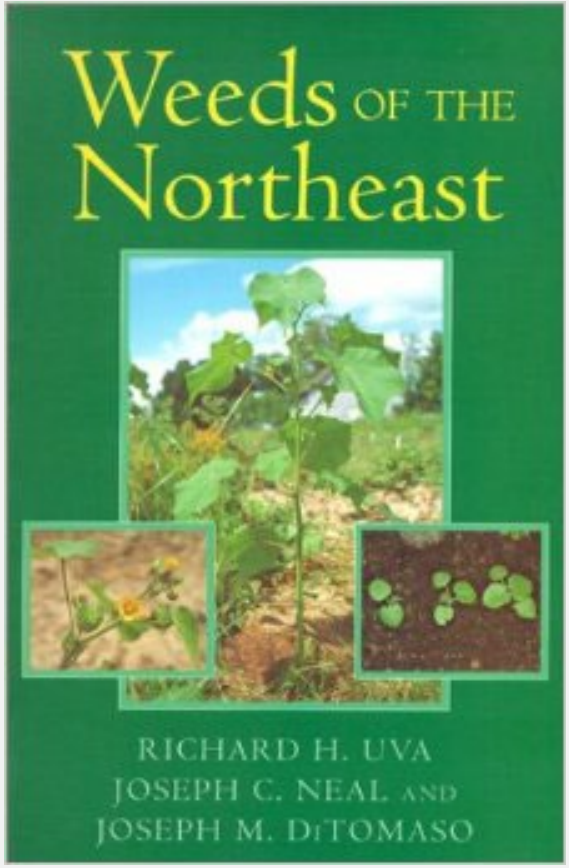
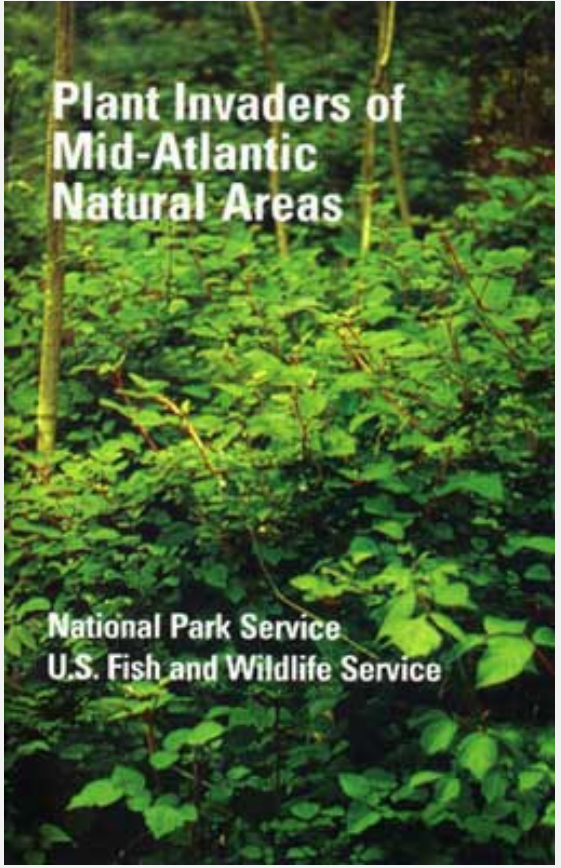
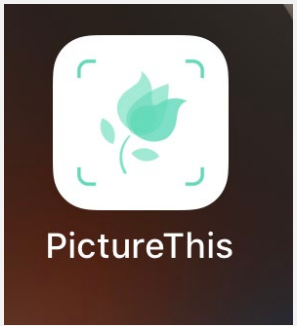




Apps for plant ID:

- PictureThis
- Seek



Sources for Identification of "Invasive" and "Noxious" weeds:

www.Invasive.org
https://www.invasivespeciesinfo.gov/plants/main.shtml
http://www.usna.usda.gov/Gardens/invasives.html

EQUIPMENT OPTIONS

- Herbicide Spray Equipment
- Truck Sprayers
  - Flatbed
  - Pickup
- All Terrain
  - ATV
  - Track
- Boat
- Backpack
  - Solo
  - Birchmeier
- Helicopter

MECHANICAL AND PHYSICAL CONTROL

- Forestry Mower
- Flail Mowers
- Brush Hog
- Chain Saws
- Loppers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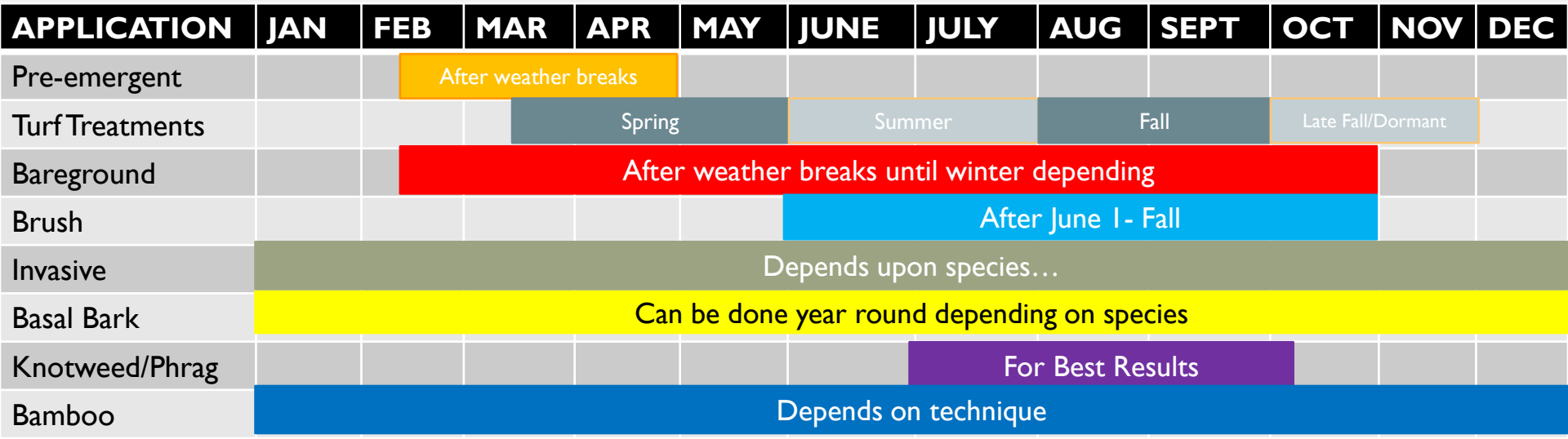
DECISIONS ON TIMING?

- Restoration Project
  - Meadow Planting- Spring or Fall Installation
  - Tree Planting/Forrest Restoration
- Are there any conditions to consider?
  - Weather conditions including droughts or temperatures
- What is the growth cycle of the species needing eradication?
  - Annual/Bi-Annuals/Perennial
    - Is there a time or section of life cycle that makes them more vulnerable to herbicide applications
    - Is the plant evergreen?
- What is surrounding the areas where you will be making an application?
  - Natural area with natives?
  - How to prevent off target damage?
    - Timing, spray techniques, formulations

CALENDAR OF APPLICATIONS



Common Invasive Weeds & Life Cycles (New Jersey)

Species	Life Cycle
Japanese Knotweed (*Reynoutria japonica*)	Perennial
Mugwort (*Artemisia vulgaris*)	Perennial
Kudzu (*Pueraria montana*)	Perennial
Garlic Mustard (*Alliaria petiolata*)	Biennial
Purple Loosestrife (*Lythrum salicaria*)	Perennial
Canada Thistle (*Cirsium arvense*)	Perennial
Giant Hogweed (*Heracleum mantegazzianum*)	Biennial/Perennial
Mile-a-Minute Weed (*Persicaria perfoliata*)	Annual
Japanese Stiltgrass (*Microstegium vimineum*)	Annual
Lesser Celandine (*Ficaria verna*)	Perennial
Autumn Olive (*Elaeagnus umbellata*)	Perennial
Tree of Heaven (*Ailanthus altissima*)	Perennial
Multiflora Rose (*Rosa multiflora*)	Perennial
Norway Maple (*Acer platanoides*)	Perennial
Common Reed (*Phragmites australis*)	Perennial
Japanese Honeysuckle (*Lonicera japonica*)	Perennial
Oriental Bittersweet (*Celastrus orbiculatus*)	Perennial
Wineberry (*Rubus phoenicolasius*)	Perennial
Porcelain Berry (*Ampelopsis brevipedunculata*)	Perennial
Burning Bush (*Euonymus alatus*)	Perennial
Black Swallow-wort (*Vincetoxicum nigrum*)	Perennial
Pale Swallow-wort (*Vincetoxicum rossicum*)	Perennial
Japanese Barberry (*Berberis thunbergii*)	Perennial
European Privet (*Ligustrum vulgare*)	Perennial
Chinese Silvergrass (*Miscanthus sinensis*)	Perennial

CHOOSE PROPER PRODUCT AND READ THE LABEL

- Questions to ask before starting:
  - What kind of product do I need?
    - PRE or POST EMERGENT!
    - SELECTIVE or NON-SELECTIVE?
    - CONTACT or SYSTEMATIC
  - Does the product I plan to use list control the undesired species?
  - Can I use the product in the location?
    - Terrestrial vs. Aquatic?
  - What are the restrictions or other precautions.
    - What kinds of equipment access is needed?
  - Sprayer Cleanout Needed?
    - Switching or combination formulation
  - What PPE do you need?

Invasive Weed	Best Herbicide(s) for Control
Japanese Knotweed (*Reynoutria japonica*)	Glyphosate, Imazapyr
Mile-a-Minute Weed (*Persicaria perfoliata*)	Pendimethalin, Glyphosate, Triclopyr
Japanese Stiltgrass (*Microstegium vimineum*)	Pendimethalin, Imazapic, Glyphosate, Grass Specific
Lesser Celandine (*Ficaria verna*)	Glyphosate, Triclopyr,
Ailanthus (Tree of Heaven) (*Ailanthus altissima*)	Triclopyr, Imazapyr
Phragmites (*Phragmites australis*)	Glyphosate, Imazapyr (foliar spray)
Callery Pear (*Pyrus calleryana*)	Glyphosate, Triclopyr
Bradford Pear (*Pyrus calleryana* 'Bradford')	Glyphosate, Triclopyr
Canada Thistle (*Cirsium arvense*)	Clopyralid, Aminopyralid, 2,4-D, Triclopyr
Bull Thistle (*Cirsium vulgare*)	Clopyralid, Aminopyralid, 2,4-D
Mugwort (*Artemisia vulgaris*)	Glyphosate, Clopyralid
Multiflora Rose (*Rosa multiflora*)	Triclopyr, Glyphosate, Metsulfuron-methyl
Purple Loosestrife (*Lythrum salicaria*)	Glyphosate, Triclopyr (foliar spray)
Garlic Mustard (*Alliaria petiolata*)	Glyphosate, Triclopyr (before seed production)
Autumn Olive (*Elaeagnus umbellata*)	Triclopyr, Glyphosate (cut-stump or foliar treatment)
Kudzu (*Pueraria montana*)	Triclopyr, Picloram, Metsulfuron-methyl, Clopyralid


MADE IN U.S.A

LESSER CELANDINE

- Apply Glyphosate (Aquaneat, Accord, Etc) from Mid Feb.- Early April with temperatures above 50 degrees and prior to 50% of plants being in bloom
- Broadleaf Turf 3/4-way that include: Need Herbicides that translocate
  - MCPA
  - Mecoprop-p
  - Triclopyr
  - Dicamba

Best Practices for Herbicide Application:

✓ **Apply early** (late winter–early spring) beforeflowers bloom
✓ **Apply Systematic Herbicdes-** translocations to bulb
✓ **Use a surfactant** for better absorption on waxy leaves
✓ **Do not mow after application** – allow herbicide to translocate to roots
✓ **Monitor and retreat** as needed, since celandine spreads through tubers

HOA-Woods Edge and Basin

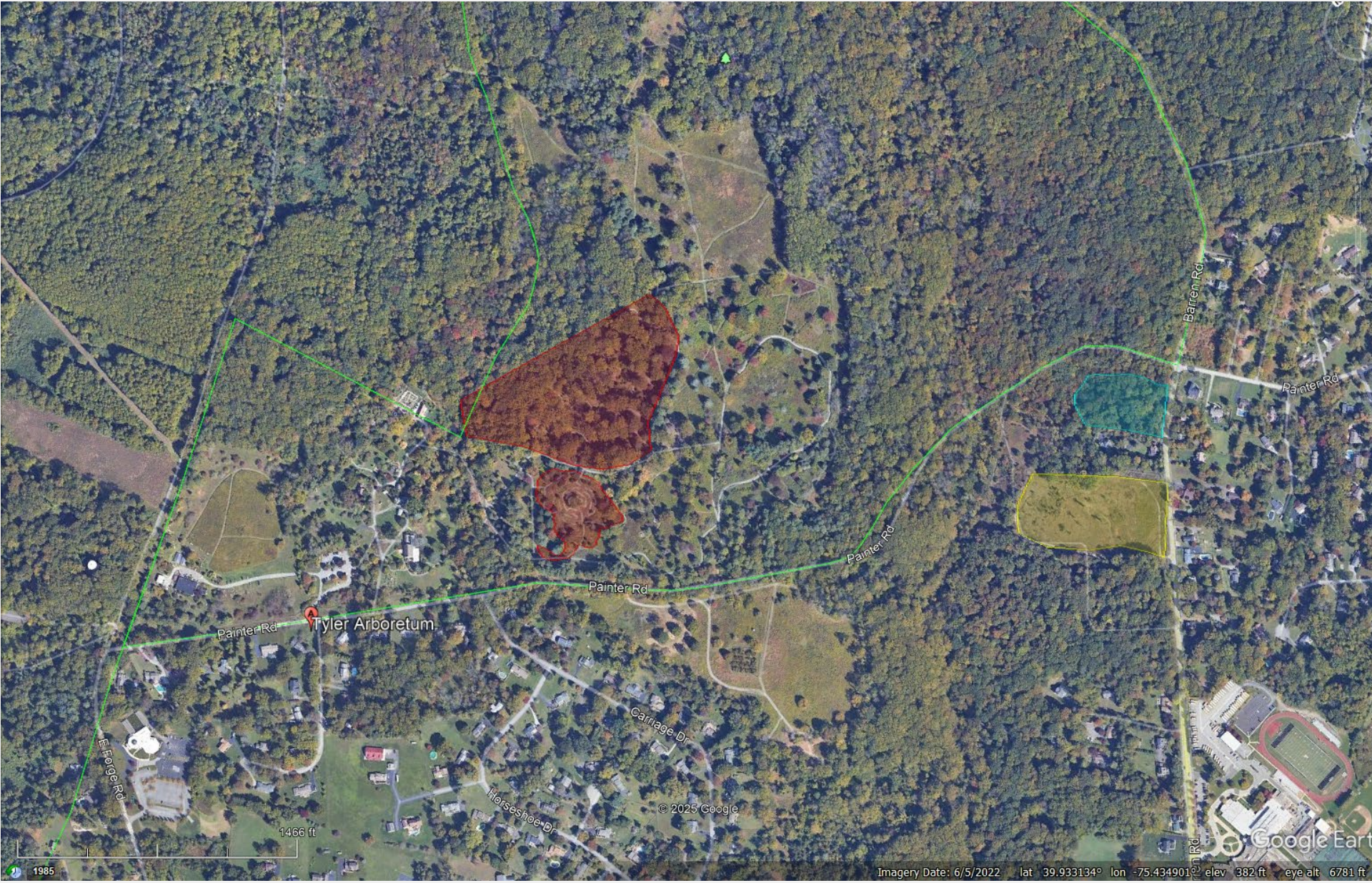
- Japanese Stiltgrass

JAPANESE STILTGRASS

- Apply pre-emergent such as Prodiamine and/or Pendimethalin, Isoxaben
  - Pendulum Aquacap at 2.4-4.8 qts./per acre to prevent it from germinating with higher rate providing season long control depending on site.
- **Post emergent:**
  - Glyphosate- Non-Selective
  - Imazapic (which works pre and post) with ¼% solution of non-ionic surfactant
  - Aminocyclopyrachlor
  - Grass Specifics: Clethodim, Sethoxydim, Fluazifop-P-butyl
    - For Turf- Pylex (Topremezone) also controls it at 1-1.5 fl oz/ per acre with .5-1% solution of MSO or Crop Oil Concentrate

Best Practices for Herbicide Application:

- ✓ **Apply pre-emergent in early spring** before seeds sprout.
- ✓ **Use post-emergent before stiltgrass flowers (August-September).**
- ✓ **Avoid mowing after flowering**, as it spreads seeds.
- ✓ **Combine with manual removal and native plant restoration.**



Tyler Arboretum- Media, PA

- Rhodadendiran Garden, Pathways, Flower Maze (Daffodils), Pink Hill Serpentine Barren
- Mile-A-Minute, Stiltgrass, Mugwort, Knotweed, Multiflora Rose

MULTIFLORA ROSE

Foliar Spray (For dense infestations, summer-fall)

- **Triclopyr**– Selective, effective on woody plants
- **Glyphosate**– Non-selective, kills all vegetation
- **Metsulfuron-methyl**– Broadleaf-specific, minimal impact on grasses
- **Aminopyralid**– Long-lasting, controls regrowth

Best Time: Apply **during active growth (mid-summer to early fall)**

Tips: Use a **surfactant** for better herbicide absorption on waxy leaves

Best Practices for Effective Control

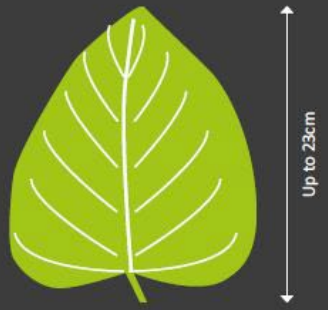
✓ **Apply herbicides in late summer to fall** for better translocation to roots
✓ **Use selective herbicides** (like triclopyr) to protect surrounding vegetation
✓ **Monitor for regrowth** – multiflora rose resprouts aggressively
✓ **Combine herbicide treatments with mechanical removal** for best long-term control

WHAT IS JAPANESE KNOTWEED?

GIANT KNOTWEED

PLANT GROWTH: Up to 4- 5m in height

LEAF: The leaf is broadly oblong-heart shaped at the base and feels quite delicate with a furry lower side.



BOHEMIAN KNOTWEED

PLANT GROWTH: 2.5 to 4m in height

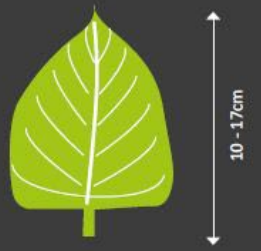
LEAF: Typically a heart shaped leaf with a slightly lobed base. Can have a textured surface and sometimes.

KNOTWEED VARIATIONS

DWARF JAPANESE KNOTWEED

GROWTH: The plant grows up to 1 - 1.8m in height

LEAF: A dwarf form of Japanese knotweed. Leaves have crinkled edges, a leathery texture, reddish veins and are often curled into a concave form.



JAPANESE KNOTWEED

PLANT GROWTH: 3 to 3.5m in height

LEAF: Shovel shaped leaf flattened at the base, feels quite tough to the touch with a smooth lower side.

HIMALAYAN KNOTWEED

PLANT GROWTH: 2 - 3m in height

LEAF: Longer narrow leaf tapering to a long point. Frilled edges and pink-red central midrib. Higher density of leaf veins.

JAPANESE KNOTWEED

- **Glyphosate 1%-2% solution**

  Applications:

  - Best if 2x application 1-month apart
  - Applied in late summer to early fall when the plant is actively transporting nutrients to its roots.
  - Can be sprayed on the foliage or applied as a stem injection for targeted control.

- **Imazapyr ½% solution**

  Applications:

  - 1x application
  - Applied to foliage or as a cut-stump treatment.

  Note- Highly persistent in soil, so use with caution near desirable plants.

Best Practices for Herbicide Use:

•**Cut and Treat:** Cut stems in May/June to allow for smaller plants to apply herbicide to.

•**Stem Injection:** Directly inject herbicide into hollow stems to reduce non-target damage. TIME CONSUMING

•**Repeated Applications:** One-time treatment is rarely effective; multiple applications over multiple years are necessary. Monitoring: 3 years after applications

•**Follow Local Regulations:** Some herbicides have restrictions near water sources or protected areas.

PHRAGMITES

- **Glyphosate 1%-2% solution**
  Applications:
  - Best if 2x application 1-month apart
  - Applied in late summer to early fall (August-October) During plume set, when the plant is actively transporting nutrients to its roots,
  - Can be sprayed on the foliage or applied as a stem injection for targeted control.
- **Imazapyr 3/4% solution**
  Applications:
  - 1x application - Spray to wet during July – October
  - Applied to foliage or as a cut-stump treatment.

  Note- Highly persistent in soil, so use with caution near desirable plants.

Best Practices for Herbicide Use:

•**Handwicking Stem:** Directly wipe herbicide into stems/leaves to reduce non-target damage. TIME CONSUMING

•**Repeated Applications:** One-time treatment is rarely effective; multiple applications over multiple years are necessary. Monitoring: 3 years after applications

•**Follow Local Regulations:** Some herbicides have restrictions near water sources or protected areas.

Brandywine Museum and Conservancy
PECO-ROW

MILE-A-MINUTE

- Apply pre-emergent such as Prodiamine and/or Pendimethalin, Imazapic (Plateau) during late February, early March.
- Post-Emergent- if area permits use selective broadleaf herbicide application such as Triclopyr or 2,4-D
- *Note*- Waxy leaf surface requires extra sticker agent for post emergent

Best Practices for Herbicide Application:

✓ Apply Pre-emergent to prevent sprouting
✓ Post emergent- Apply **before flowering and seed production** to prevent spread
✓ Use a **surfactant** to improve herbicide absorption on waxy leaves
✓ Spot-treat infestations to minimize damage to non-target plants

Chester Borough, NJ

Meadow installation and invasive weed control

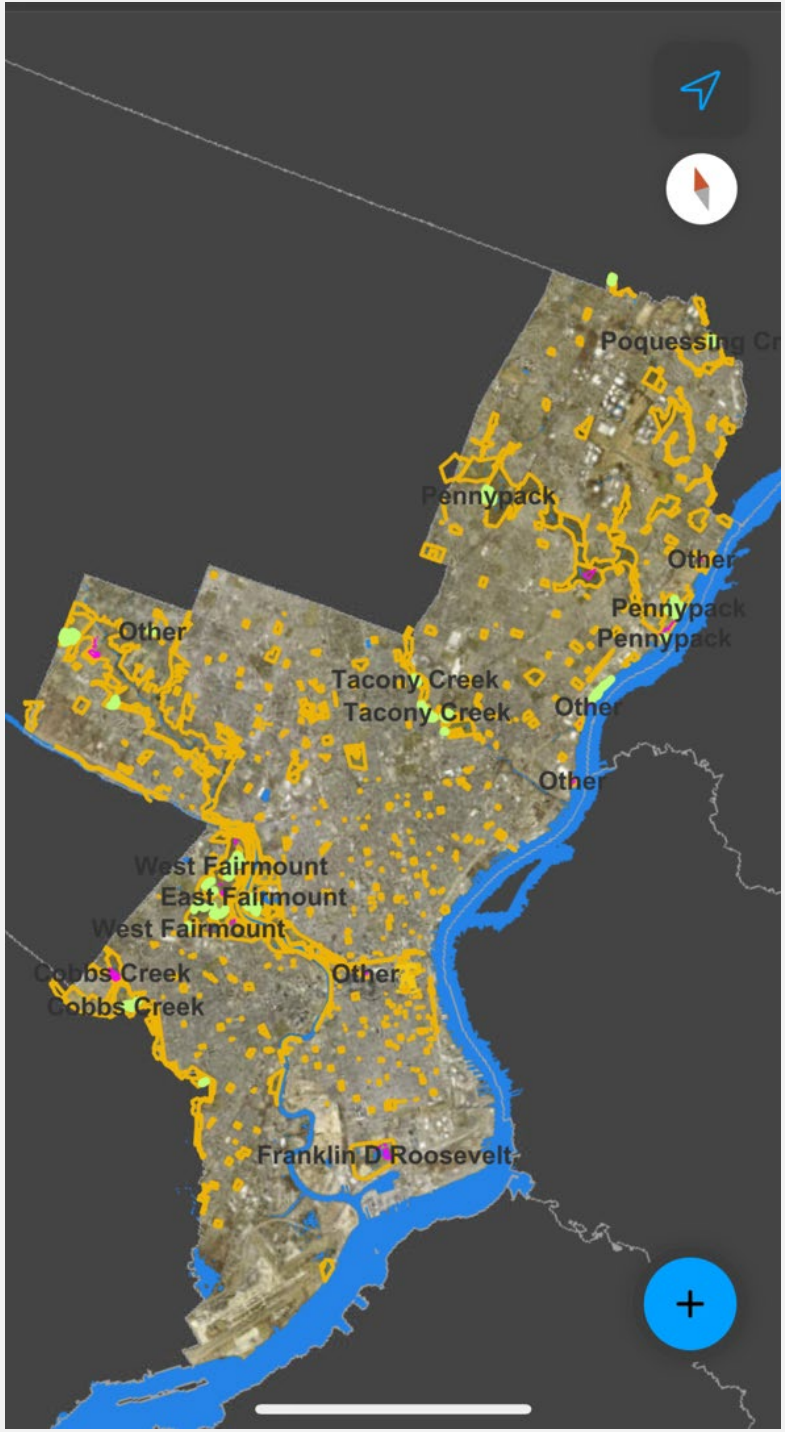
INSTALLATION OF MEADOW WITH HEAVY PRESSURE

Heavy Invasive Pressure

- Mugwort, Autumn Olive, Barberry, Wild Brambles, Multiflora Rose, Cedar Trees, Thistle

Meadow Installation process

- Year 1
  - 2 Strong Applications to control broadleaf invasives
    - Combination of brush and broadleaf herbicides
      - Don't kill grasses, which act as ground cover
- Year 2
  - 2 Applications to then eliminate all vegetation including grasses
  - Dormant Seeding for germination in following year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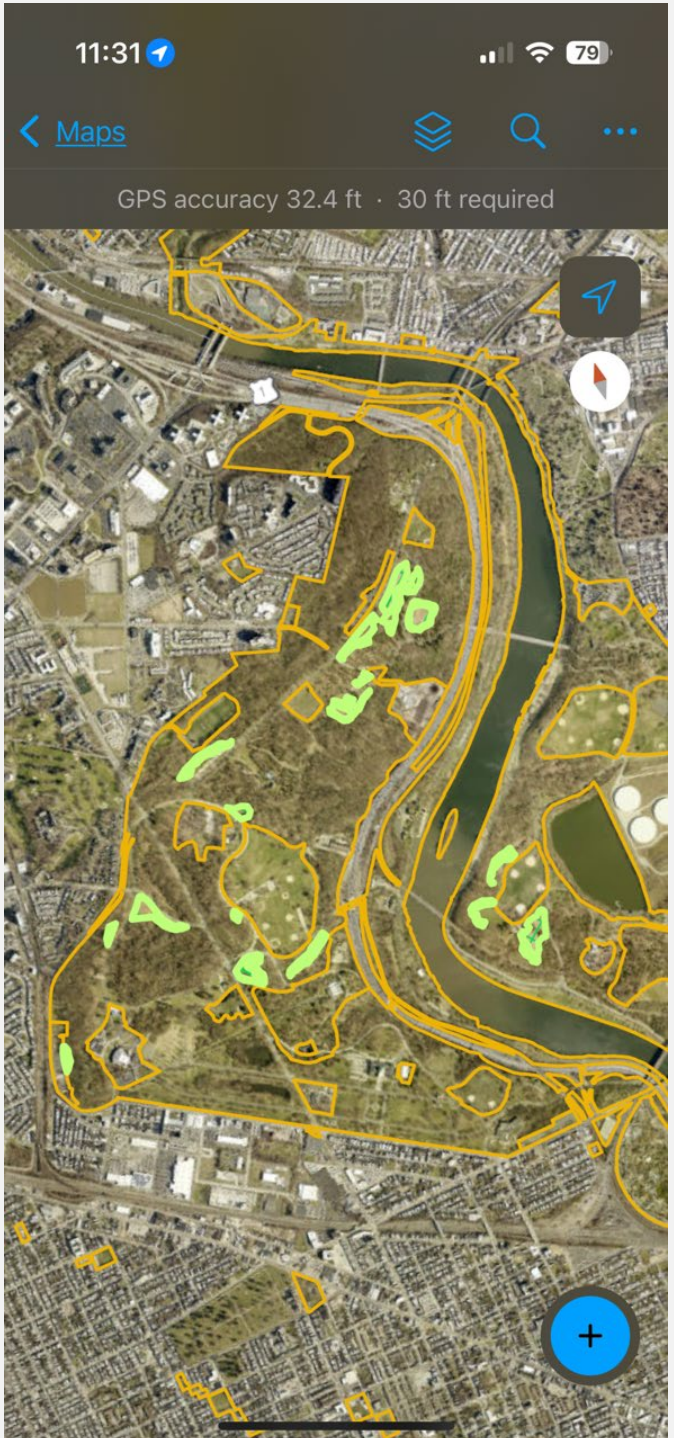
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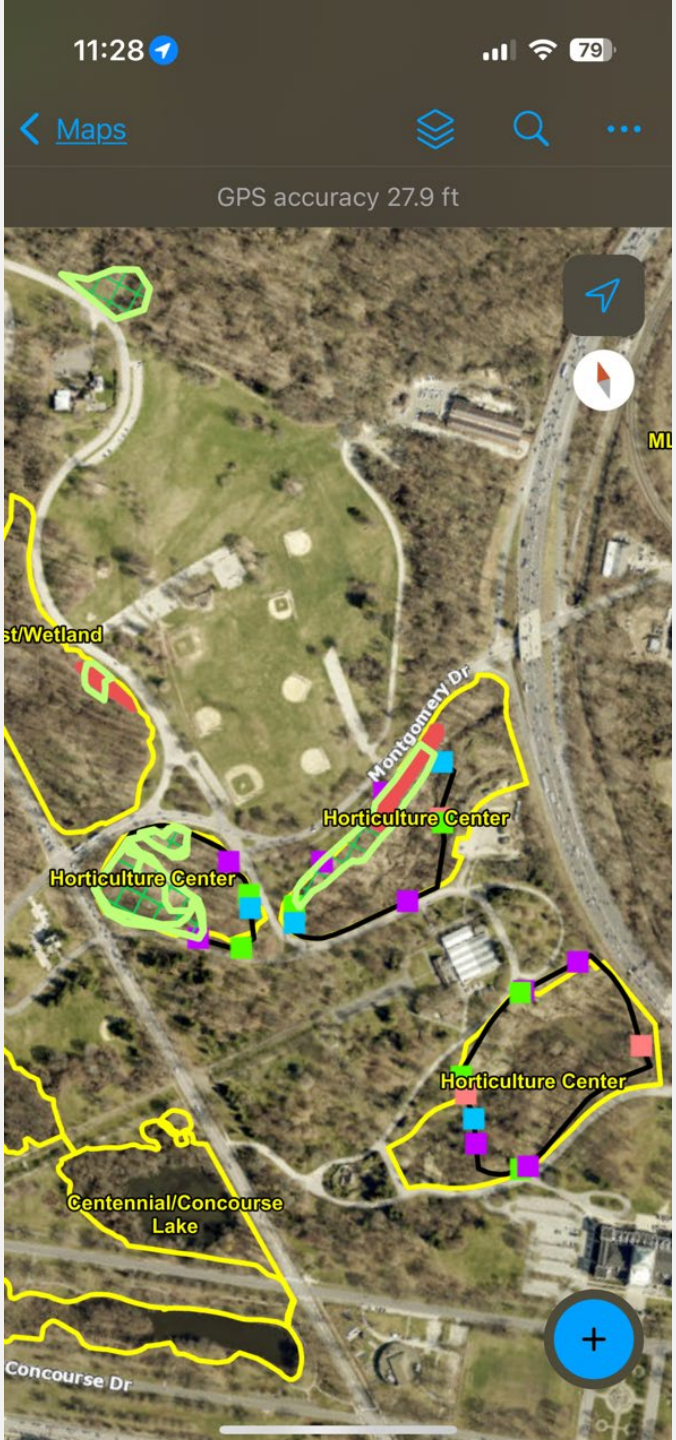
Maps
GPS accuracy 32.4 ft · 30 ft required



City of Philadelphia- Horticulture Center
Reforestation project – started 2018
Project timeline

- Started with Manual Clearing
- Multiple Brush Control Apps
- Seeding
- Follow up invasive weed control
  - Pre-emergent
  - Summer foliar
- Tree Plantings
  - Phased in sections

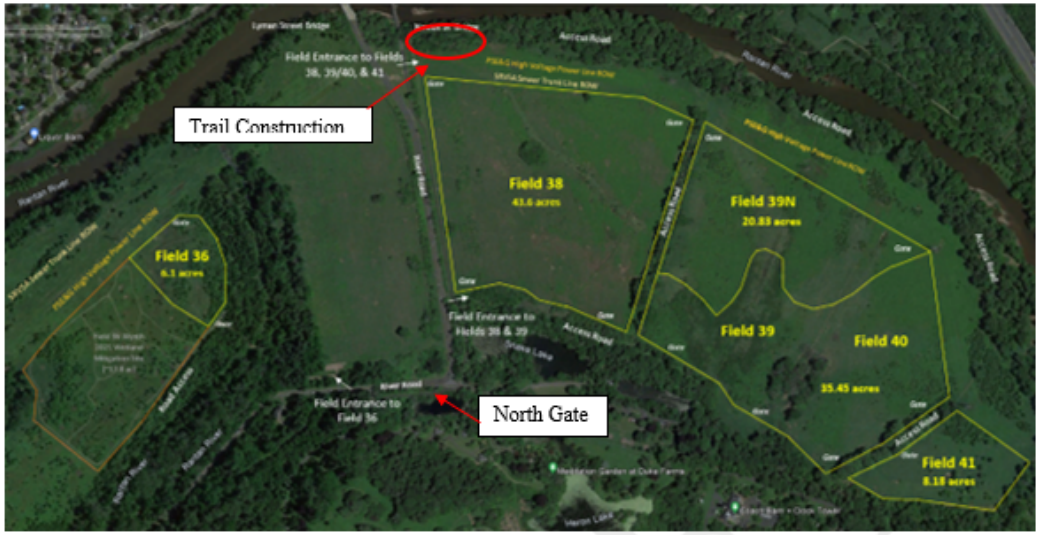


Figure 2: Location of the Project fields at Duke Farms. A full-size version of this map is provided in **Attachment B**.

These field designations are essential because in this SOW breakdown, activities will be conducted within particular fields in a particular order, commencing with vernal pool and surface water retention berm construction, followed by planting work that will be implemented over two successive years in three separate planting mobilizations. The fields have already been cleared of invasive trees and have undergone two years of treatment to commence the control of invasive herbaceous vegetation.

The SOW to be performed by a qualified and licensed landscaping contractor (Contractor) includes these field-specific activities:

Phase 2A: February/March/April/May 2025:

- Field 39/40: Earthwork to create three surface water retention berms and four vernal pools
- Field 38: Earthwork to create two surface water retention berms
- Field 41: Earthwork to create two vernal pools and a surface water retention berm
- Field 36: Earthwork to create two vernal pools
- Mowing and native seeding of all fields.
- Field 38: Tree/shrub planting (43.6 acres)
- May Invasives Species Treatment (herbicide)

Phase 2B: October/November 2025:

- Field 36: Tree/shrub planting (6.1 acres)
- Field 41: Tree/shrub planting (8.18 acres)
- Field 39N: Tree/shrub planting (20.83 acres)
- Fall Invasives Species Treatment (herbicide)

PEAR TREES (BRADFORD)

- **Triclopyr**
  Application Method:
  - **Basal Bark Treatment**: Mix with an oil carrier and apply to the lower 12–18 inches of the trunk.
  - **Cut Stump Treatment**: Apply immediately to freshly cut stumps to prevent regrowth.
  - **Foliar Spray**: Effective for seedlings or small saplings.
- **Glyphosate**
  Application Method:
  - **Cut Stump Treatment**: Apply concentrated glyphosate to freshly cut stumps.
  - **Foliar Spray**: Use on young trees and resprouts.
- **Imazapyr**
  Application Method:
  - **Basal Bark and Cut Stump Treatment**: Very effective but has long soil persistence—avoid use near desirable plants.
- **Aminopyralid + Metsulfuron-methyl**
  Application Method:
  - **Foliar Spray**: Works well for seedlings and saplings, but should be used with care around non-target plants.

Best Practices for Herbicide Use:

- **Apply in Late Summer to Fall:** Herbicides are most effective when trees are storing energy in their roots.
- **Use Cut-Stump or Basal Bark Treatments:** These methods minimize impact on surrounding vegetation.
- **Monitor for Resprouting:** Multiple treatments may be necessary to completely eradicate Callery pear.

THISTLE

- **Clopyralid**

  Best For: Canada thistle, bull thistle

  Application Method:

  - Foliar spray during the rosette or early bolting stage.
  - Highly selective, so it won't harm most grasses.

- **Aminopyralid**

  Best For: All types of thistles, including musk thistle

  Application Method:

  - Foliar application in spring (rosette stage) or fall (before frost).
  - Residual control prevents regrowth.
  - Do not use near sensitive crops like vegetables or legumes.

- **Triclopy**

  Best For: Aquatic Situations

  Application Method:

  - Apply in spring or fall as a foliar spray.
  - Often mixed with 2,4-D

Best Practices for Herbicide Use:

•**Apply at the Right Growth Stage:** Herbicides are most effective at the rosette stage.
•**Use a Surfactant:** Helps herbicides stick to thistle leaves.
•**Monitor and Reapply:** Some thistles (like Canada thistle) have deep root systems and may require multiple treatments.
•**Combine with Mowing:** Mow before seed production and apply herbicide to regrowth.

MUGWORT

Foliar Spray (Best for Active Growth, Late Spring–Fall)

- **Glyphosate**– **Non-selective**, kills all vegetation
- **Triclopyr**– **Selective**, targets broadleaf weeds, safe for grasses
- **Clopyralid- Selective**, effective on broadleaf perennials
- **Metsulfuron-methyl**– **Long-lasting**, broadleaf-specific control

Best Time: Apply when mugwort is actively growing (**late spring to early fall**)

Tips: Use a **surfactant** for better herbicide absorption

Best Practices for Effective Control

✓ **Apply herbicides in late summer to fall** for better translocation to roots
✓ **Use selective herbicides** (like triclopyr or clopyralid) to protect surrounding vegetation
✓ **Avoid mowing before herbicide application**, as it can reduce effectiveness
✓ **Monitor and retreat** – mugwort has strong rhizomes and may resprout

REED CANARY

Foliar Spray (Best for Active Growth, Late Summer–Fall)

- **Glyphosate– Non-selective**, kills all vegetation
  - **Best Time:** Late summer to early fall (August–September), when the plant is moving resources to the roots.
- **Grass Specifics- Clethodim**
  - **Note**: Less commonly used for reed canary grass but may have use in some restoration contexts where preserving forbs is a priority.
- **Imazapic- Plateau-** Can be a pre and post emergent
- **Multiple treatments**: One application is rarely enough. Expect to treat 2–3 times a year or annually for several years.

- **Tips:** Use a **surfactant** for better herbicide absorption

CANE BAMBOO-CONTROL SCHEDULES- CUT AND TREAT

YEAR 1

- Fall/Winter-Preferred but can be done almost year round
  - Cut Stalks
    - Leaving a few inches above the bottom Node
  - Haul away Stalks
    - 3- Options
      - Chip
      - Stack
      - Remove
  - Fill Stalks and let it sit
    - Using Backpack sprayer
      - Concentrated solution of Herbicide
        - Mostly Glyphosate, Imazapyr if possible
        - N-Fertilizer to help with absorbtion

CONTROL SCHEDULES- CUT AND TREAT

YEAR 2

- LET IT GROW!!!
  - Whatever grows back needs to continue for the entire growing season
- Complete the same round of treatment

YEAR 3

- If Treatment was needed LET IT GROW, otherwise you are free to finish rehabbing the area


EXPECTATION

- If done right should control 95-99% in year 1 and remainder in 2nd year
- Suggest waiting until the 3rd year to be sure
  - Cheaper to wait to plant then to buy all new plants

FOLIAR SPRAYING

- If stalks are too narrow or solid then foliar spraying is completed

YEAR 1

- Fall/Winter
- 2% Solution Glyphosate is sprayed to wet on all stalks and leaves
- 2nd complete application is done 3-4 weeks later
  - Does not matter if it looks like it is dying or dead, spray it again
- 3rd Optional application but highly suggested
- Let stand over winter

YEAR 2

- If need/want, cut to ground but do not disturb the roots
- LET IT GROW!!!
- Complete the same set of 2 applications in the Fall

YEAR 3

- If Treatment was needed LET IT GROW, otherwise you are free to finish rehabbing the area

Best Practices for Invasive Weeds Control Programs

Choose the Right Herbicide

- Systemic herbicides (e.g., glyphosate, triclopyr) for perennials
- Selective herbicides (e.g., 2,4-D, clopyralid) to protect desirable plants
- Pre-emergent herbicides (e.g., prodiamine, pendimethalin) to prevent seed growth

Apply at the Right Time

- Target actively growing plants for best absorption
- Late summer to fall is ideal for perennials
- Avoid application before rain to prevent runoff

Use Proper Techniques

- Spot treat rather than broad spraying to reduce waste
- Apply directly to leaves or cut stems
- Add surfactants for better absorption on waxy leaves

Follow Safety Guidelines

- Wear protective gear (gloves, mask, long sleeves)
- Keep herbicides away from water sources
- Store and mix according to label instructions

Monitor & Follow Up

- Check for regrowth and retreat as needed
- Combine with mechanical or cultural control for long-term success
- Rotate herbicides to prevent resistance

THERE IS NO SILVER BULLET! Different Locations/Different Species/Different Times

SOURCES OF INFORMATION

- Information
  - US Department of Ag. National Invasive Species information Center www.invasivespeciesinfo.gov/aquatics/hydrilla.shtml
  - Invasive Plant Atlas http://www.invasive.org/weedus/index.html
  - The National Wildlife Federation https://www.nwf.org
- Pictures
  - Google Images (various sources)
  - Weeds Inc.

THANK YOU!

QUESTIONS?