NYS Parks Natural Resource Stewardship and Environmental Interpretation Initiative

Searching for a Mechanical BMP for Large-scale Management of Pale Swallow-wort (*Cynanchum rossicum*)

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PROJECT BACKGROUND

Robert G. Wehle State Park

- 1,067 acre park established in 2004
- Located in Henderson, NY on the eastern shore of Lake Ontario
- Infested with pale swallow-wort (*Cynanchum rossicum*)
- Surrounded by pale swallow-wort infested properties on all sides
- History of attempted pale swallow-wort management since the 1960's

Cynanchum rossicum - Pale Swallow-wort

- Non-native viney member of the milkweed family
- Wind dispersion of up to 2,000 seeds/m^2
- Long-lived perennial
- Allelopathic - Roots contain antofine
  - antifungal and antibacterial activity
  - reduced seedling root growth in nearby native species
- Dense root crown with many root nodes capable of sprouting new plants

Control must target the root system!

Control Rationale

- Eliminate or reduce pesticides as per NYS Parks Pesticide Reduction Policy

- Is large-scale, non-chemical treatment of swallow-wort is feasible?
  - ➔ Can swallow-wort root crowns be removed on a large scale?
  - ➔ What techniques can be used to reclaim soils?
  - ➔ Can mechanically treated sites be restored?

New York State Office of Parks, Recreation and Historic Preservation

POLICY ON PESTICIDE REDUCTION IN STATE PARKS AND HISTORIC SITES

Purpose

As part of the agency's sustainability initiative and our commitment to protecting the health of agency staff, the public, and ecological resources, OPRHP will promote environmentally sensitive pest management by minimizing the use of pesticides in New York State Parks and Historic Sites. Our goal is to eliminate pesticide uses wherever possible. In special instances where pesticide use is required, we will limit our use to least toxic alternatives.

This policy is effective immediately.

Dated: April 22, 2009

Carol Ash
Commissioner
Digitally Replaced

Methodology

No Restoration: B, C	Annual Rye: C, B + Native Seeds
Annual Rye: B + Native Seeds: C	Annual Rye: B, C

1/4 acre test plots

- Utilize Bobcat tractors to mechanize root crown removal in fields and forests (main habitats)
  - Separate root crowns from soil
  - Test effectiveness of several different Bobcat™ Attachments (Tiller, Conditioner, Grapple, Rake)
- Test different potential restoration strategies
- Test high heat treatment (weed torch) effect on swallow-wort emergence and restoration treatments as potential soil reclamation strategy
  - 1m burn plots (B) vs. 1m control plots(C)
- Treat removed soil
  - On-site composting with windrows and black plastic

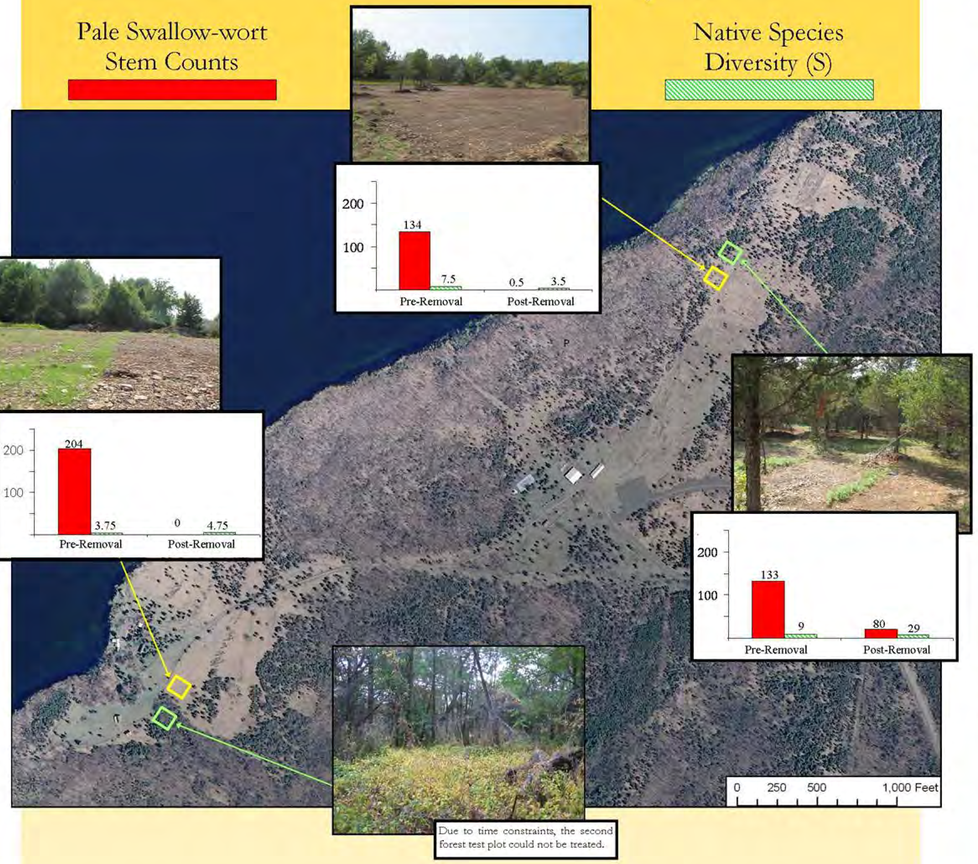
Rototiller | Soil Conditioner | Root Grapple | Power Rake

RESULTS

Pre and Post Treatment Plant Surveys

Pale Swallow-wort Stem Counts

Native Species Diversity (S)

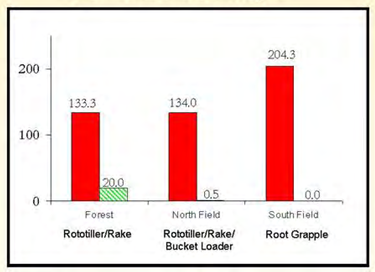


Due to time constraints, the second forest test plot could not be treated.

Pale Swallow-wort Stem Counts

Pre-Treatment Vs. Post-Treatment

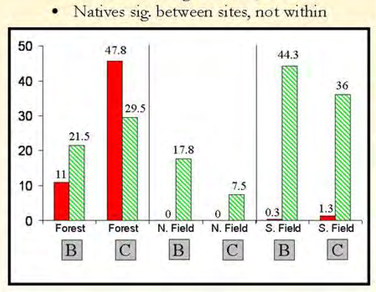
- >99% reduction in field plots
- 85% reduction in forest plot



Burn Plot Stem Counts

Pale Swallow-Wort Vs. Native Species

- Swallow-wort sig. in forest, not field
- Natives sig. between sites, not within



SPECIAL THANKS

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DISCUSSION

Removal

The Bobcat™ tractors and attachments were able to break up the soil, facilitating the removal of pale swallow-wort plant material in different ways.

Rototiller: Spinning Tines
- Broke up the soil completely
- Mixed soil and root material, making it difficult to find and remove
- Required the extra step of sifting the soil - by hand or with the power rake

Soil Conditioner: Rotating Spiked Drum/Barrel
- Peeled up the whole root zone, often leaving a solid mat of roots
- Good job of separating the roots from the soil
- Root mats were very difficult to move
- Operation was very slow, and the equipment took a lot of punishment

Root Grapple: Tined Claw
- Able to get underneath the entire root zone, picking up all roots and soil
- Material was then able to be transported in one step
- Impossible to separate roots from soil
- Left nearly topsoil free site

Power Rake: Spiked Conveyor Belt Collector
- Intended to separate rocks from loosened soil
- Plant material tended to get stuck to the conveyor spikes, bypassing collector, often being deposited back on the surface
- Good first step for complete removal with follow-up

Disposal of Swallow-wort Plant Material

Every mechanical method utilized was faster than similar manual techniques at this scale, but the separation of uninfested soil from pale swallow-wort root material was not successful.

Solution: Composting?
- Natural decomposition under high temperatures to destroy pathogens and weed seeds.

- Windrows
  - + Traditional farm composting
  - – Long piles of soil to turnover
- Black Plastic
  - + Less composting time
  - – Difficult to maintain

Solution: Desorption?
- The use of an external heat source to destroy contaminants (roots and seeds) in soil
  - + Much faster return of soil back to the system
  - – Requires a lot of energy
  - – Very expensive on a large scale
  - – Soil becomes sterile

CONCLUSION

Mechanical methods can be used to decrease pale swallow-wort density, in both fields and forests, at least initially. The presence of tree roots in the forest plot limited the ability to remove pale swallow-wort roots, most likely leading to the higher totals during monitoring. However, none of the tested techniques could remove pale swallow-wort without major soil disturbance and actual removal of large quantities of soil. Following treatment, the field test plots had a greatly reduced soil profile depth as compared to the pre-treatment condition. It is yet to be determined what impact this will have on long-term pale swallow-wort density or the nature of ecological restoration without the addition of either treated soils from the site (i.e. composting or desorption) or the addition of uninfested soils from off site. However, it is possible that the extremely shallow nature of the soils in the field test plots will spur the development of alvar pavement barrens, a globally rare ecosystem based on limestone plains with very thin or no soil, which are found nearby at the park and in the surrounding area. This potential conversion from typical old field habitat to a globally rare habitat may be a very positive unintended consequence of these techniques. However, the data presented here represent only one season of follow-up monitoring. Additional monitoring of these test plots will help determine the long-term feasibility and applicability of these techniques.

FOR MORE INFORMATION CONTACT:

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