



# An Integrated Approach

to invasive plant management and habitat restoration  
for the threatened American hart's-tongue fern

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**New York State Office of Parks,  
Recreation, and Historic Preservation**  
**June 23, 2021**



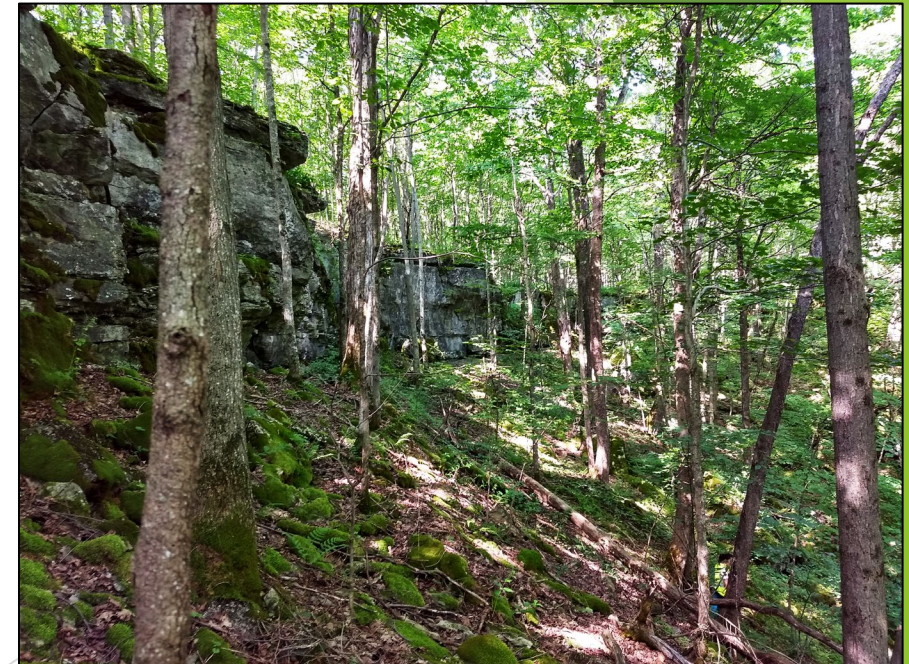
**Parks, Recreation  
and Historic Preservation**

**FORCES**

Friends of Recreation, Conservation  
and Environmental Stewardship

# Why we manage

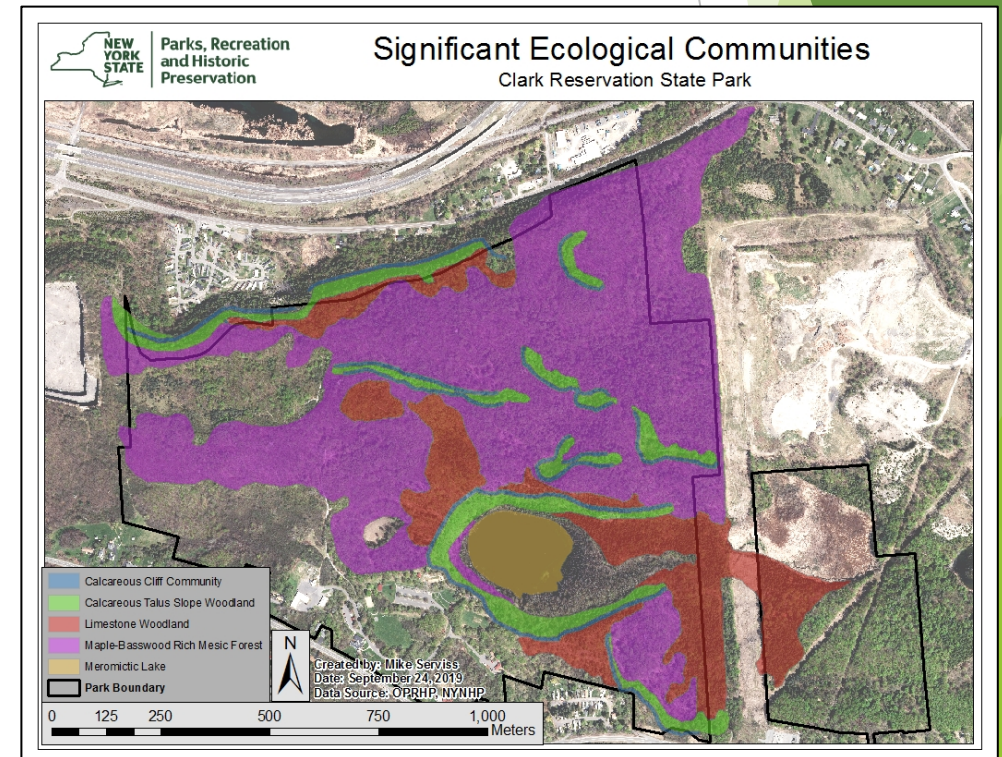
- *Asplenium scolopendrium* var. *americanum*
  - **Imperiled fern species**
    - Federal: Threatened (1989)
    - NY State: Threatened (S1)
  - **Isolated populations**
  - **Unique, rare, significant habitats**





# Why we manage

- **Maintain biodiversity**
  - “Botanist’s paradise”
  - Fern diversity: 27 species
- **Restore degraded habitats**
- **Protect significant natural community types**
  - Limestone woodlands
  - Calcareous talus/cliff





# Who we are

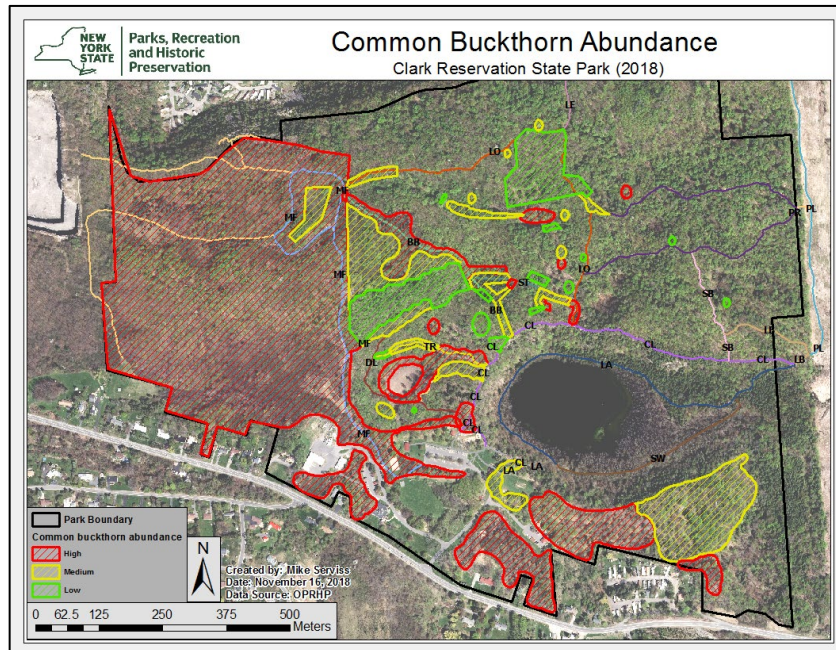
- **NYS Parks staff**
  - Invasive Species Techs
- **FORCES stewards**
  - Recent graduates
  - Federal Work Study
  - College Interns
  - Volunteers
- **Community-based stewardship**
  - Various local organizations / students





# Our Approach

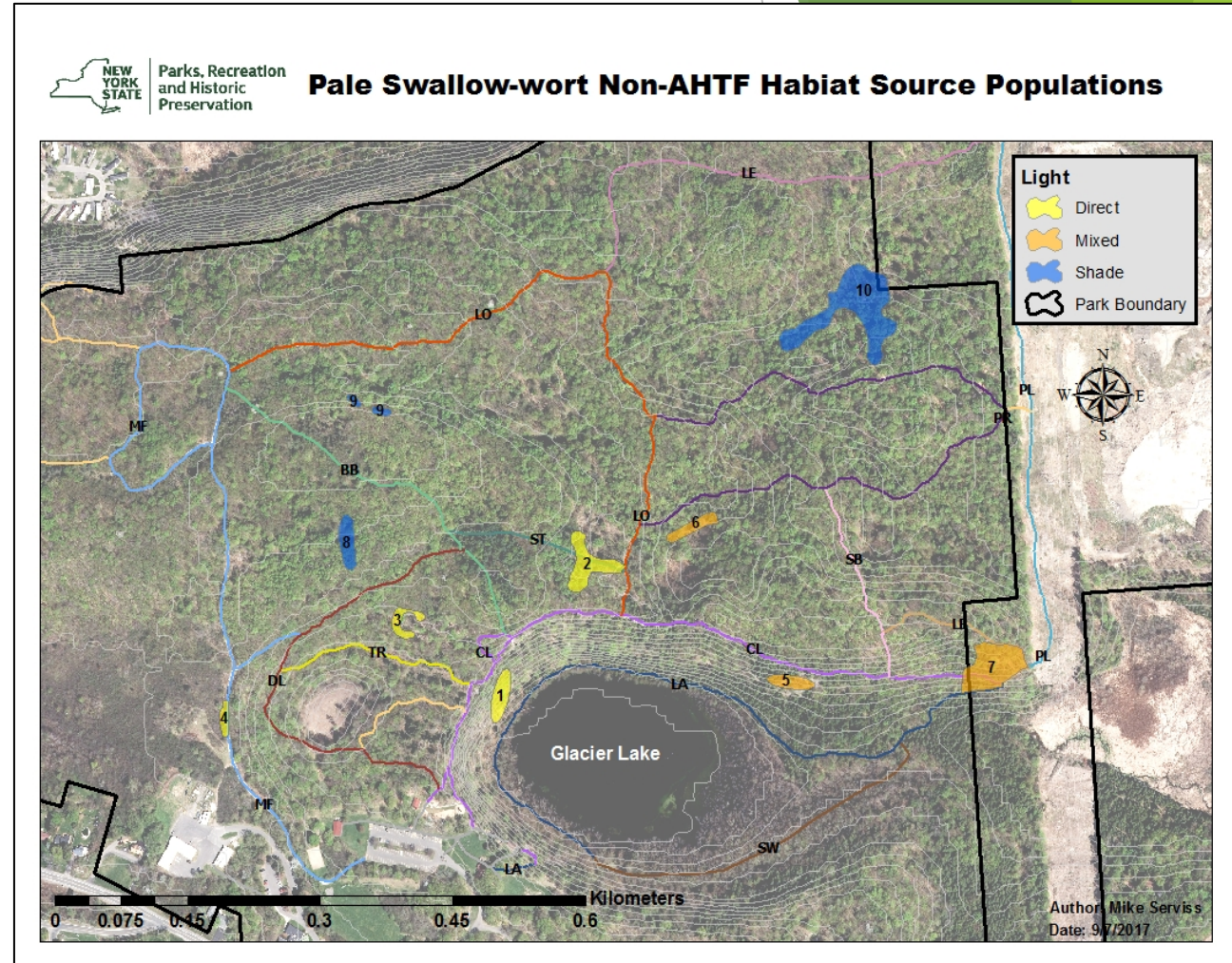
- **Understand scope of the invasion**
  - What species are present?
  - Where are they located?
  - How abundant are they?





# Our Approach

- Determine priority management sites
  - Proximity to RTE species populations
  - Proximity to critical/significant habitats
  - Seasonal timing
  - Site characteristics





# Integrated Management

- **Manual removal (EDRR)**
  - Monitor and follow-up as needed
- **Manual/mechanical control**
  - Repeated cutting (annual or bi-annual)
- **Limited herbicide application**
  - Follow-up annually as needed
  - In accordance with OPRHP Pesticide Reduction Policy





# Integrated Management

- **Results**

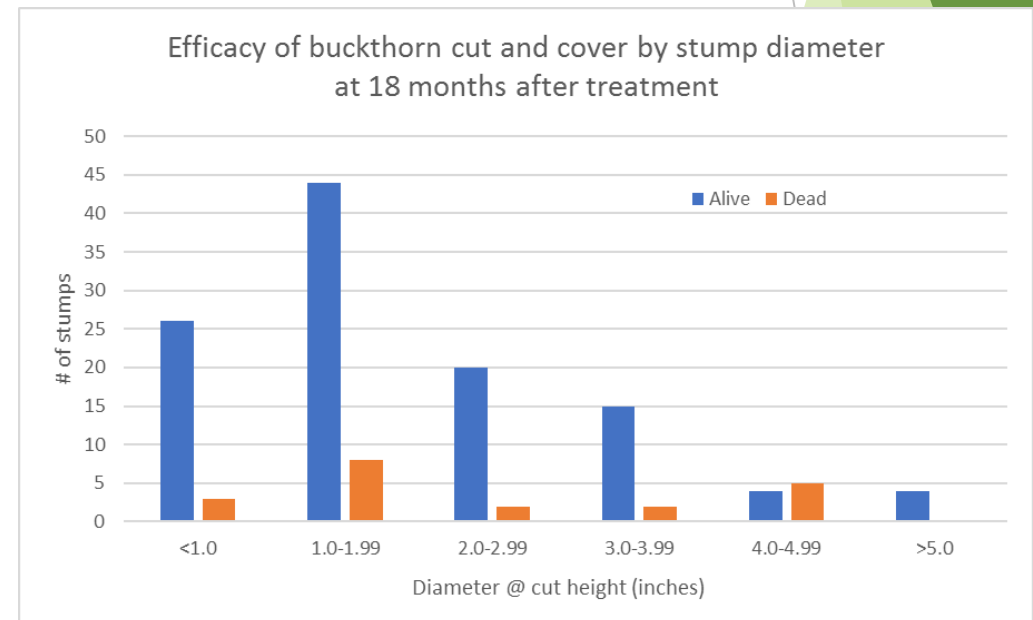
- 300,000+ invasive plants removed (2014-2020)
- Herbaceous invasives virtually eradicated from AHTF habitats
- Smaller PSW populations removed without chemical treatment
- Conservation of RTE species and significant natural communities
- Plans to restore some sites with native seed and transplants via Plant Materials Program





# Buckthorn Management

- Cut and cover method for *Rhamnus cathartica*
  - Cost effective
    - Supplies ~ \$0.40/stump
    - Reusable materials
  - Limited success after 18 months
    - ~15% kill ratio





# Restoration

- **Plant Materials Program @ Sonnenberg Gardens**
  - AHTF Propagation/Reintroduction
    - Building on work by Dr. Danny Fernando @ ESF
  - 3 populations augmented
  - 2 new populations created
    - Most recently- 200 ferns transplanted at Three Falls Woods on June 16, 2021

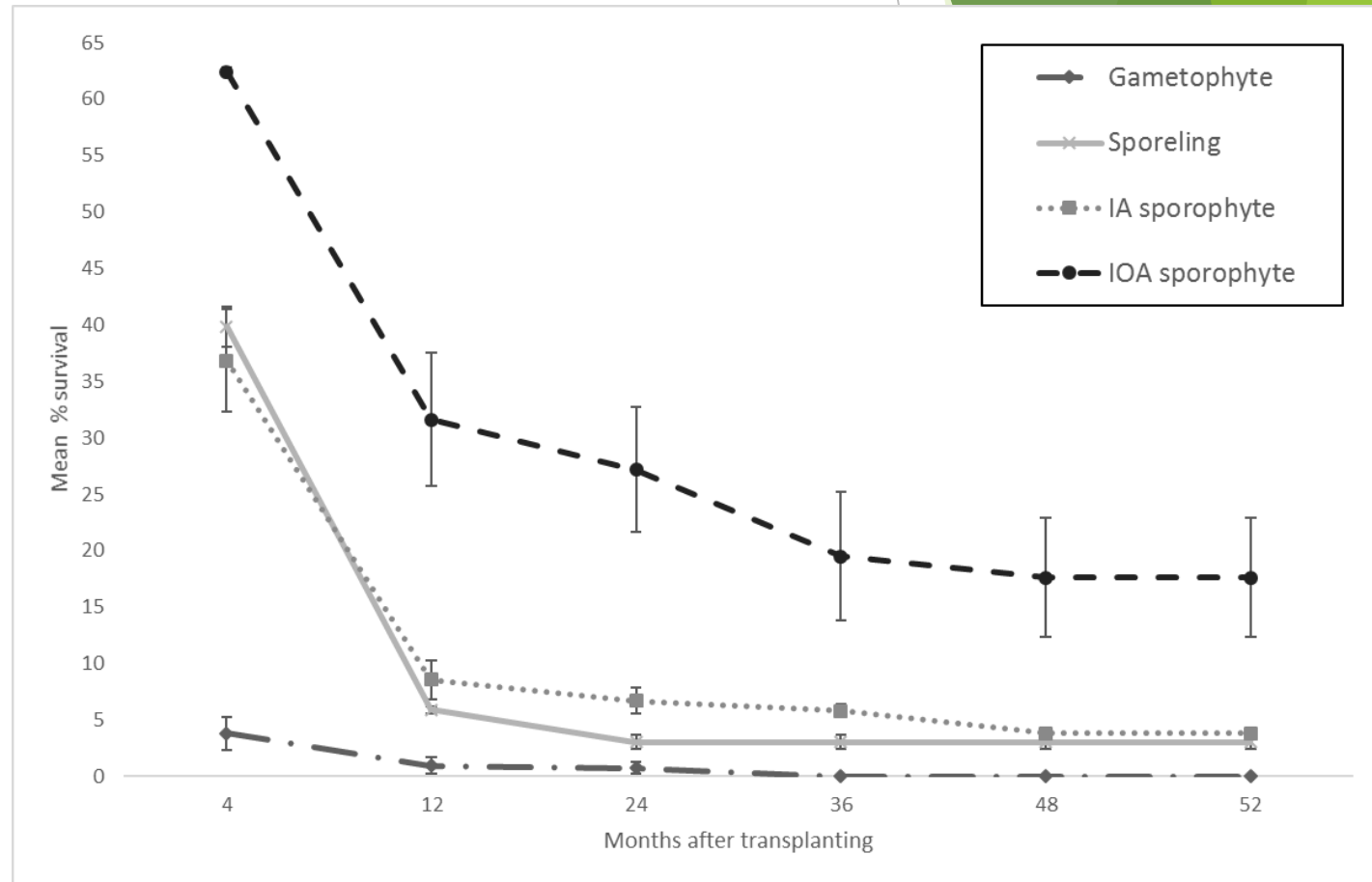




# Restoration

- **Reintroduction**

- 4 transplant types
- 3 original sites (2015)
- Significantly higher survival of “hardened off” ferns ( $\alpha = 0.05$ )
- Initial decrease in # and size of fronds, but trending toward recovery and growth after 2 years (data not presented)
- Survival stabilized after 3 years





# Restoration

- **Key findings**

- Acclimatization is critical to successful reintroduction
  - 2-4 year process from spore to transplant
  - Growth chamber > greenhouse > semi-outdoor environment
  - “Hardened off” ferns 93% more likely to survive longer than 1 year ( $P < 0.001$ ) compared to non-hardened off
  - “Hardened off” ferns reach maturity more quickly – increased potential for recruitment
- Transplants with better vigor (**not size**) 3-15 times more likely to survive longer than 1 year ( $P < 0.005$ )







# Restoration

- **Proposed Federal delisting from ESA**
  - Species Status Assessment / 5 Year Review
  - Delisting proposed due to **recovery**
  - Reasons for delisting
    - Stability of most populations over time
    - Discovery of additional populations
    - Ongoing invasives management (especially in NY)
    - Success of propagation/reintroduction
  - Post-delisting Monitoring Plan



# Conservation Partners

- US Fish and Wildlife Service
- Great Lakes Restoration Initiative
- SUNY ESF- Fernando Lab
- NY Natural Heritage Program
- NYS Department of Environmental Conservation
- Plant Materials Program



New York  
Natural Heritage  
Program



Department of  
Environmental  
Conservation

Questions?