



Minute Man National Historical Park

WHO'S WINNING?



EXOTIC VS NATIVE PLANTS

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U.S. Department of the Interior



Minute Man National Historical Park

Presentation Outline

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- Background on Invasive Species
 - Global Environmental Change
 - Ecological / Economic Threats
 - Local Impacts
- Invasive Plant Survey
 - Justification
 - Sampling
- Introduction to Target Species
- Results
- Management
- Future





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Global Environmental Change



- Habitat destruction
- Resource depletion
- Global warming
- Ozone depletion
- Pollution
- Invasive species
- Biodiversity loss



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"Invasive Plant Species" definition and terms:

- Exotic / non-indigenous / alien
- Invasive / aggressive growth
- Xenobiotic





Minute Man National Historical Park Invasive Species Biology

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Weed Attributes:

- Fast growth
- Disturbance tolerant
- Primary successors
- High reproductive rates
 - Dense cover
 - Mature quickly
- Long reproductive periods
- Vegetative and reproductive growth



Minute Man National Historical Park Causes of Invasives

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- Escaped ornamental landscape plants
- Natural dispersion (wind, water, animals)
- Natural growth and range expansion



- Unintentional transport
- Habitats alteration
- Suburban sprawl
- Illegal dumping





Minute Man National Historical Park Environmental and Economic Damage

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- \$100,000,000,000s / years In US

- Loss of habitat
- Loss of biodiversity
- Decrease nutrition
- Competitive dominance
- Lack natural predators
- Weedy attributes
- Resource depletion
- Alter ecosystem's :
 - biomass
 - energy cycle
 - productivity
 - nutrients



Minute Man National Historical Park Recent Land Use

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Building Locations in 1960
Battle Road Unit
Minute Man National Historical Park



Prepared by Minute Man National Historical Park, Resource Management, July 2003

- 1960 Building Location
- ▬ Park Boundary
- - - Battle Road Trail
- - - Tract Line



Minute Man National Historical Park Local Examples of Invasive Effects

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- Monarch and black swallow-wort¹
 - Displaced native milkweed
 - Larvae die on plants
- Cabbage butterfly larvae die after ovipositing on garlic mustard²
 - Chemically defended against native insects
- Decreased hunting area for predators³
- Increased energy need for feeding young⁴
- Altered hydrology, invasives soak up water

1 Haribal and Renwick. 1998

2 Renwick et al. 2001

3 B. Agiuc pers. obs.

4 C. Davis pers. comm.



Minute Man National Historical Park Park Map and History

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- Founded in 1959, to commemorate Revolutionary events of April 19, 1775
- Congressional area is 392 Hectares or 969 Acres
- NPS 2001 mandate to control exotic species



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14 Primary Invasive Species Mapped

Glossy Buckthorn	<i>Rhamnus frangula</i>
Asian Bittersweet	<i>Celastrus orbiculatus</i>
Multiflora Rose	<i>Rosa multiflora</i>
Common Buckthorn	<i>Rhamnus cathartica</i>
Bush Honeysuckle	<i>Lonicera</i> spp.
Norway Maple	<i>Acer platanoides</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
Black Swallow-Wort	<i>Cyanus louiseae</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i>
Phragmites	<i>Phragmites australis</i>
Spotted Knap weed	<i>Centaurea biebersteinii</i>
Garlic Mustard	<i>Allaria petiolata</i>
Tree of Heaven	<i>Ailanthus altissima</i>
Common Tansy	<i>Tanacetum vulgare</i>

Relative Abundance at MIMA

- Extremely Invasive and Ubiquitous
- Highly Invasive, but patchy
- Moderately Invasive, not widely distributed



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100m * 100m Grid Overlay

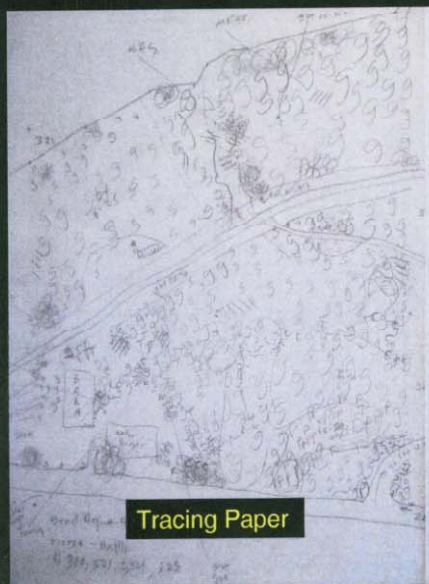
- Uploaded to GPS unit
- 100m * 100m = 1 Hectare = 2.47 Acres
- Grid Survey = 392 Hectares



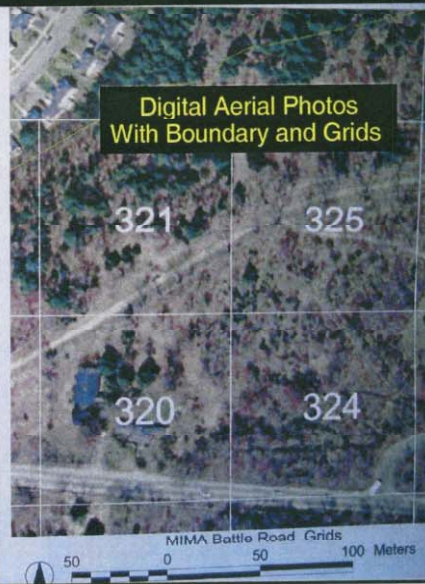


Minute Man National Historical Park Field Mapping

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Tracing Paper



Digital Aerial Photos
With Boundary and Grids

MINA Battle Road Grids

50 0 50 100 Meters



Minute Man National Historical Park Field notes digitized in GIS Arcview

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- Norway Maple
- Glossy Buckthorn
- Common Buckthorn
- Multiflora Rose
- Bush Honeysuckle
- Tansy
- Purple Loosestrife
- Asian Bittersweet

$\Sigma = 8$ species





Minute Man National Historical Park Purple Loosestrife

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1 plant = 2.5 million seeds
Perennial
Woody
Sunny wetlands



Minute Man National Historical Park Glossy Buckthorn

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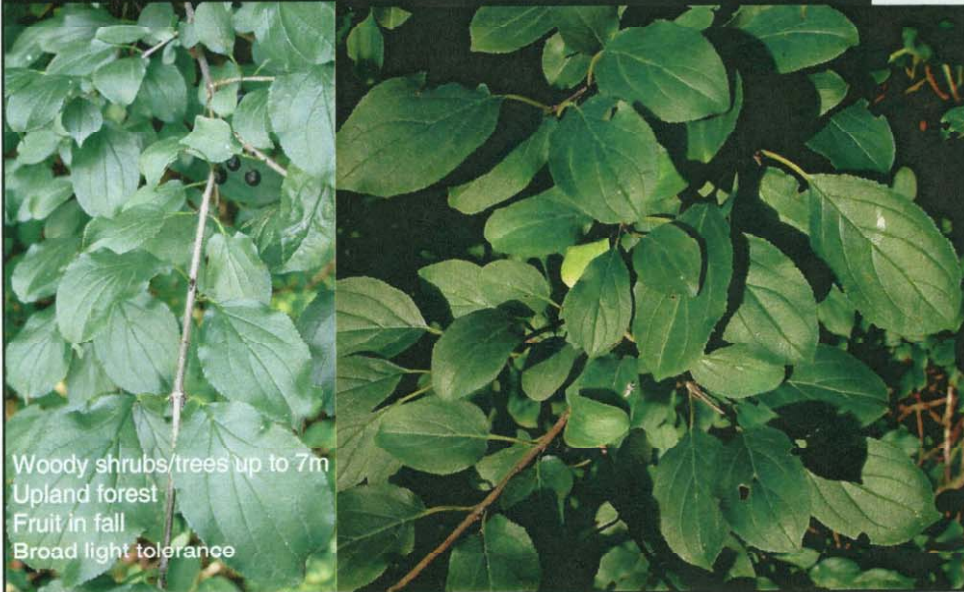


Prolonged seed production : May – Nov.
Dispersion by deer and birds, and water
Wet area (fields and forests)
Tall woody shrub to 6m
Broad light tolerance



Minute Man National Historical Park Common Buckthorn

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Woody shrubs/trees up to 7m
Upland forest
Fruit in fall
Broad light tolerance



Minute Man National Historical Park Japanese Knotweed

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Bamboo-like hollow stalk
Broadleaves
Attract many pollinators
Dense aggregations
Vegetative and seed dispersal



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Tansy



Flat top button flowers
Fern-like dissected leaves
Strongly scented



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Multiflora Rose



Grow as vines and shrubs
Large thorns
Dense, impenetrable thickets
Edges, forests and fields
Dispersed by birds





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Garlic Mustard

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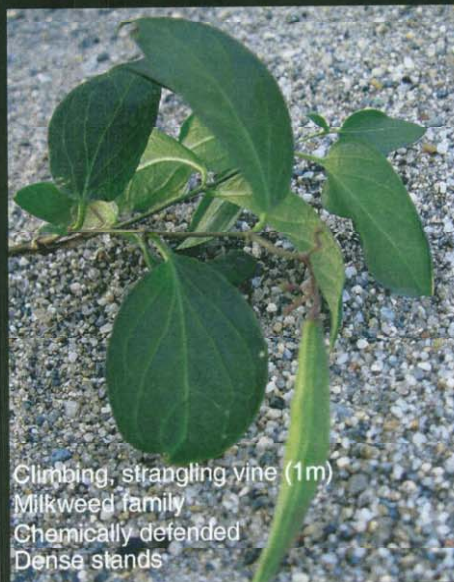
Under-story species (1m)
Biennial, early flowering
Seed disperse on contact
Chemically defended from herbivores



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Black Swallow-Wort

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Climbing, strangling vine (1m)
Milkweed family
Chemically defended
Dense stands

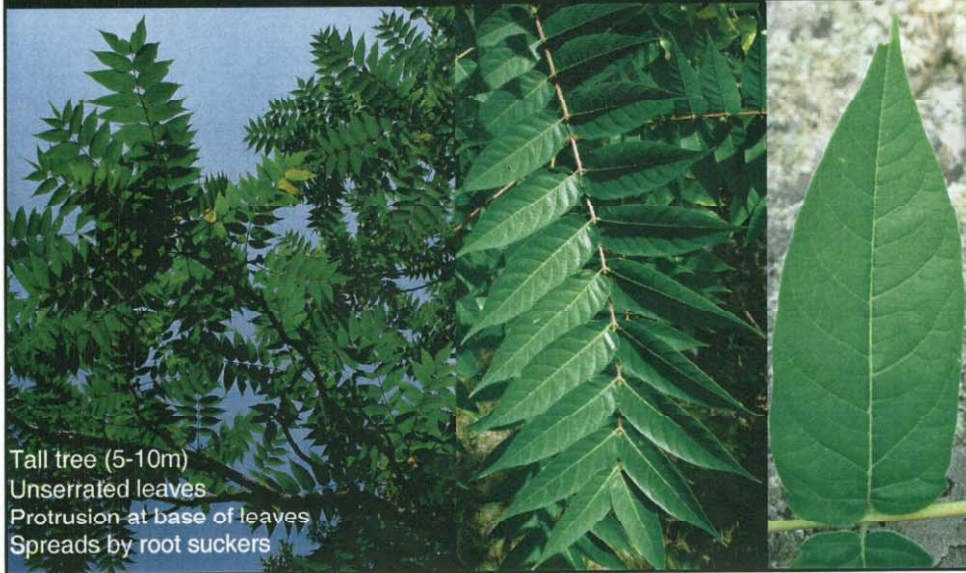




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Tree of Heaven



Tall tree (5-10m)
Unserrated leaves
Protrusion at base of leaves
Spreads by root suckers



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Norway Maple



Large hardwood
Planted along roadways
Dense canopy
Milky white sap
Numerous winged seeds



Minute Man National Historical Park Bush Honeysuckles (5 spp.)

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Perennial shrub
Dispersed by birds
Lonicera species hybridize
Can form dense monotypic stands



Minute Man National Historical Park Asian Bittersweet

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Perennial climbing vine
Berries/seeds spread by birds and humans
Struggles vegetation
Vines reach 30cm in diameter, pull down trees



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Phragmites

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Perennial reed
Dense stands
Alter hydrology and elevation
Deep vegetative root growth



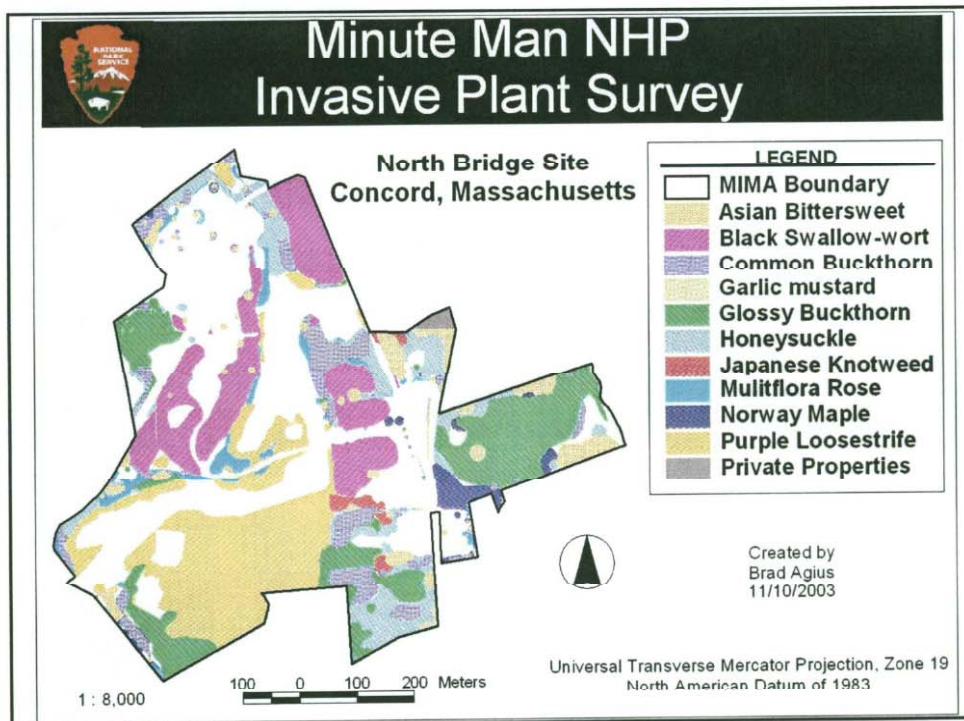
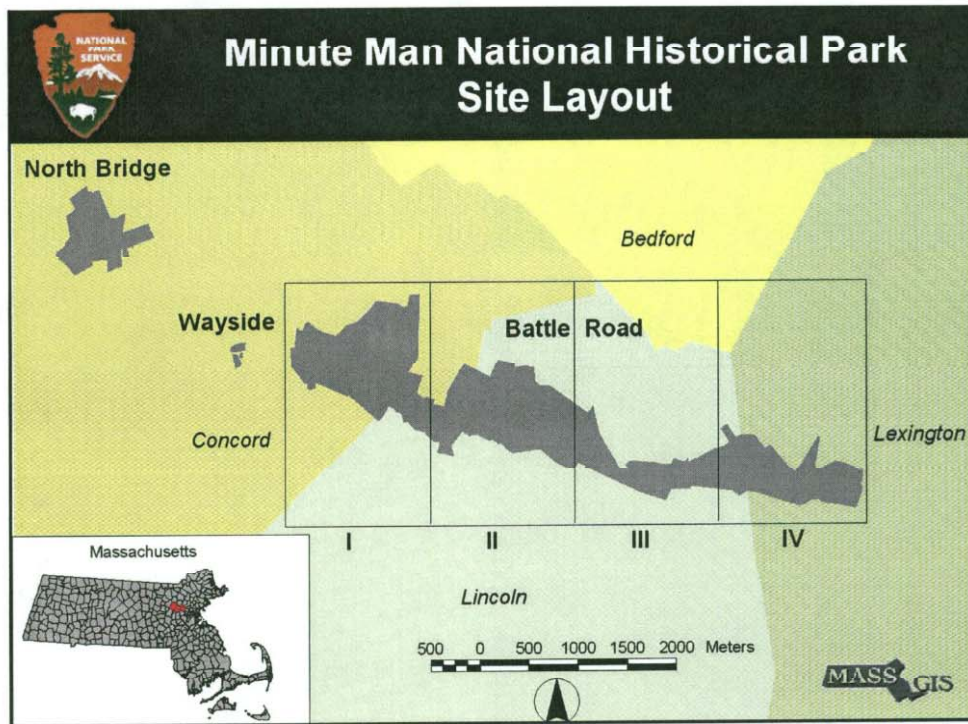
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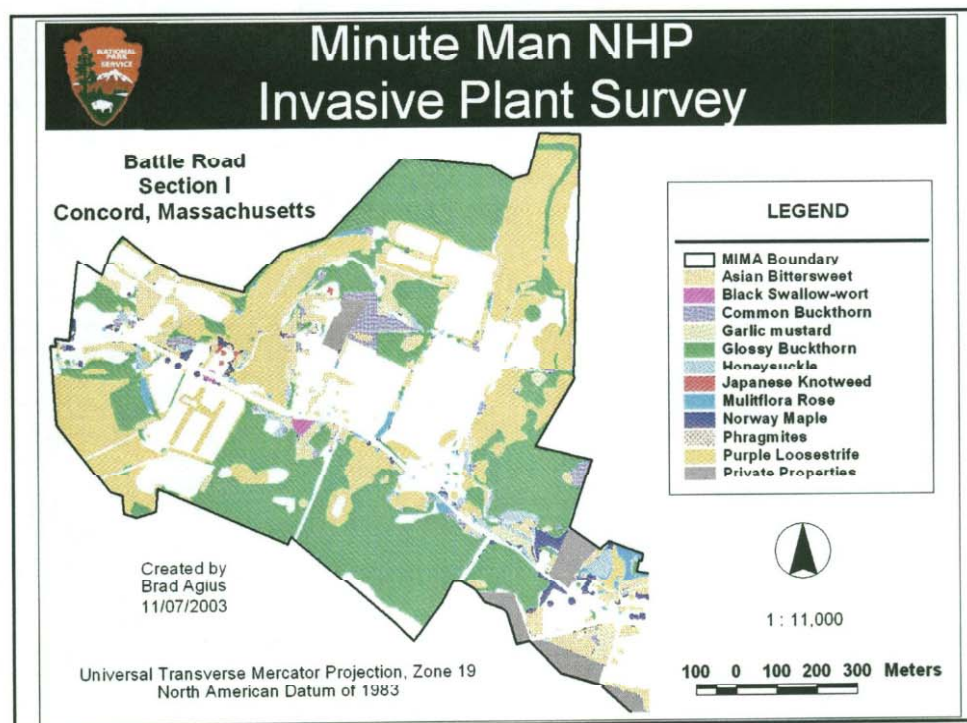
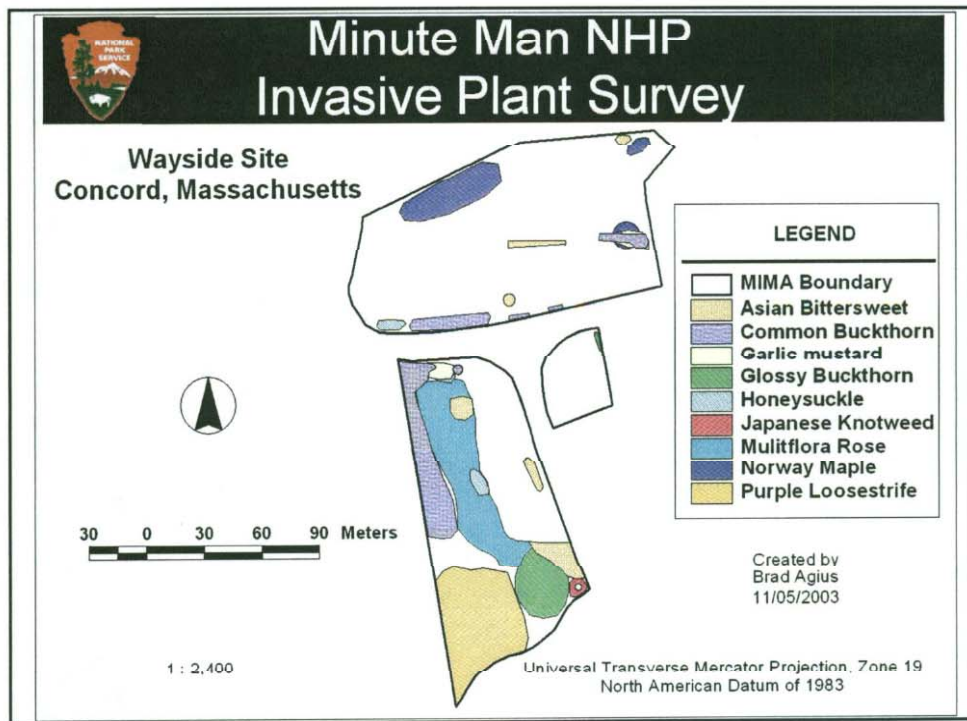
Spotted Knapweed

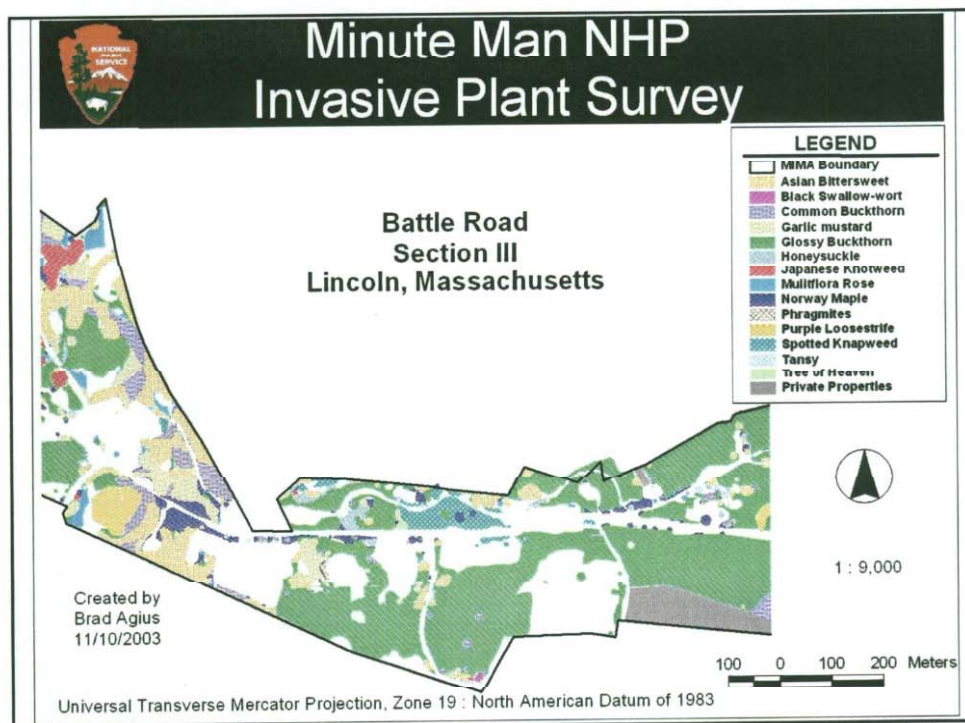
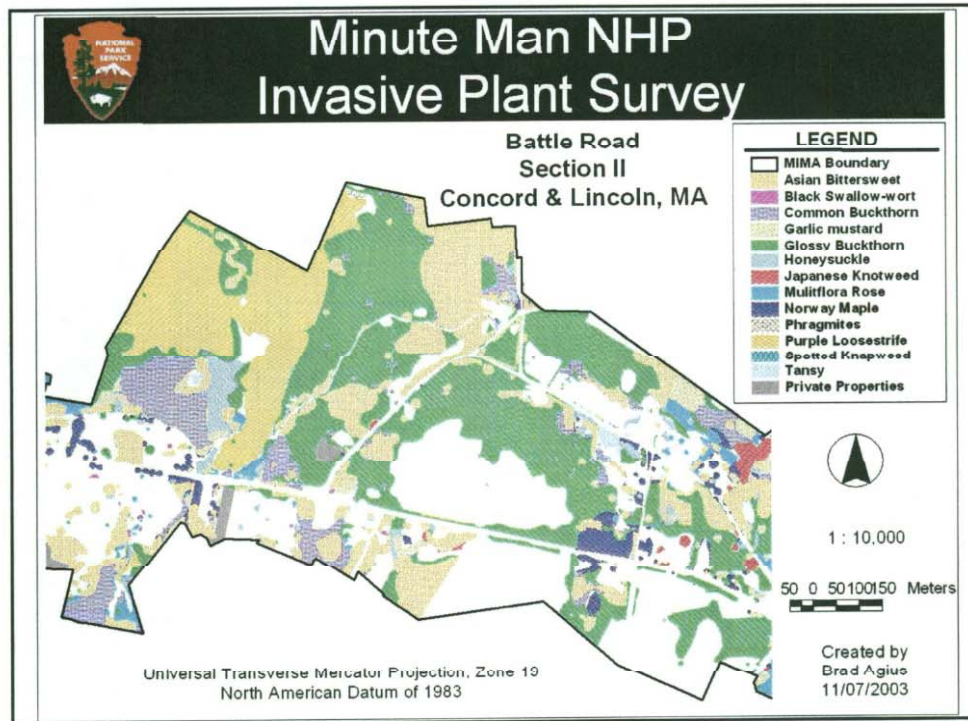
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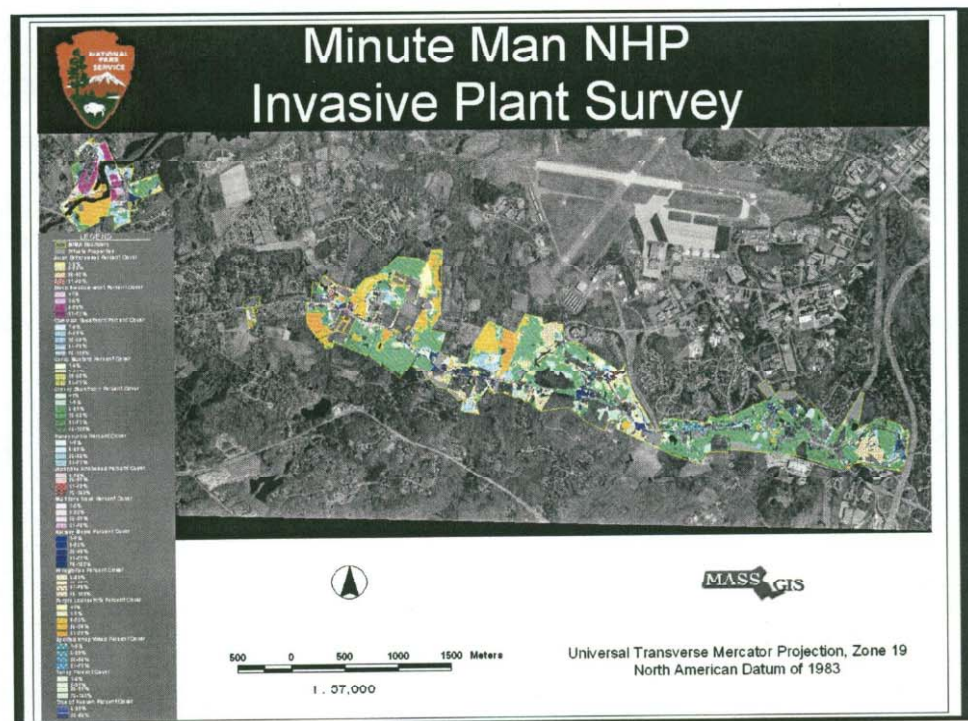
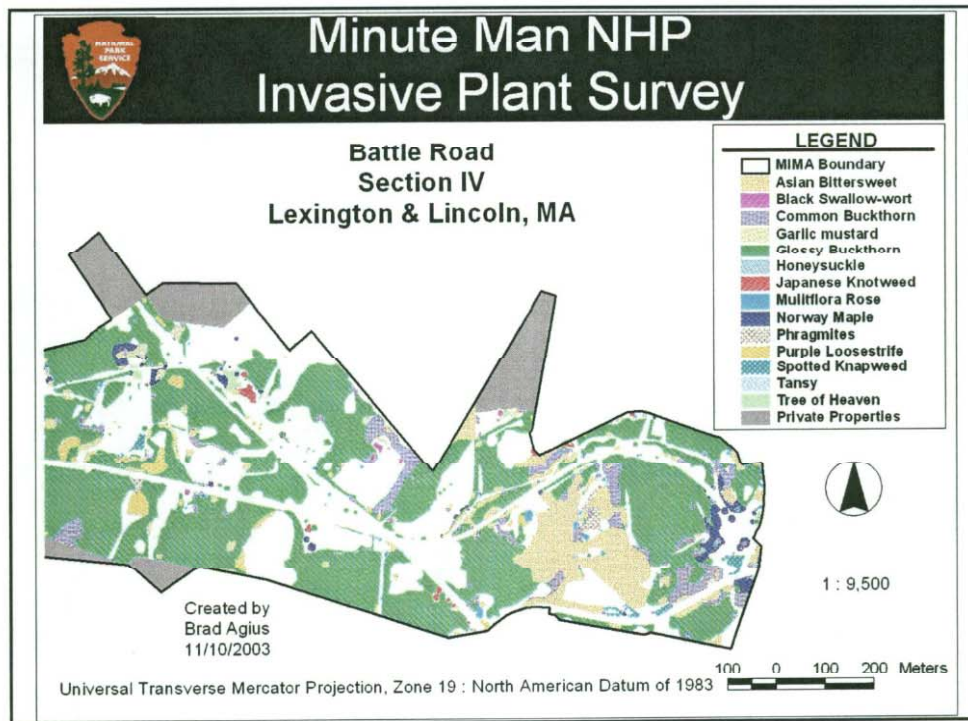


Biennial thistle
Grows in well drained soils
Affinity for disturbed areas
Serious infestation in western states





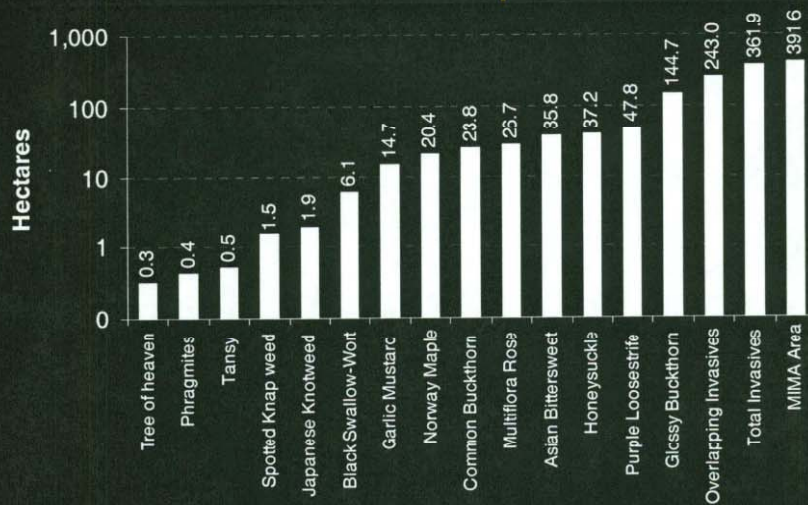






Minute Man National Historical Park Total Area / Species

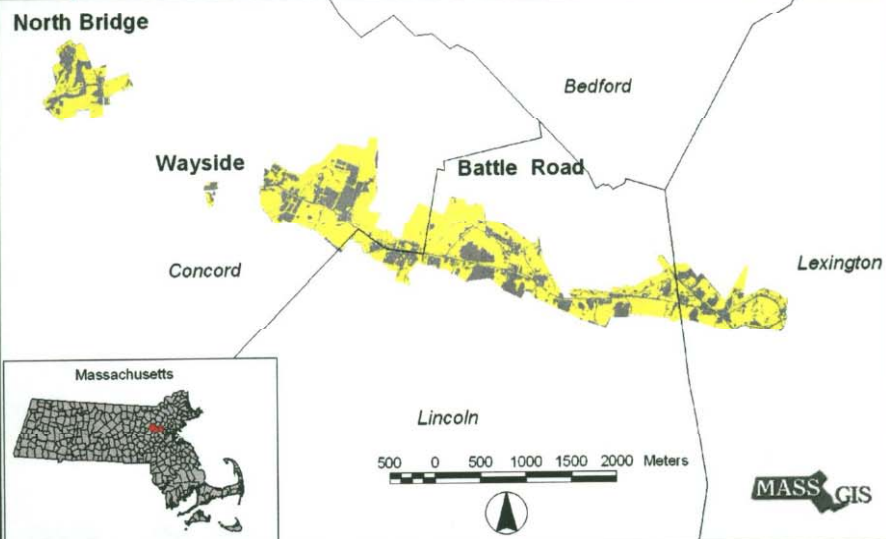
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- Glossy buckthorn = 36.9 % of total of total park area
- Without overlap top 14 invasive plants = 95.3% of total park area
- Aerial overlapping 14 invasive species = 63.9 % of total park area



Minute Man National Historical Park Total Invasive Species Cover



- Up to 6 of the 14 primary invasives within a 1m² vertical column



Minute Man National Historical Park Example of Vertical Invasion

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- Norway Maple
- Glossy Buckthorn
- Common Buckthorn
- Asian Bittersweet
- Bush Honeysuckle
- Garlic Mustard



Minute Man National Historical Park Secondary Invasive Plants

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- An additional 37 species recorded in survey, and not exhaustive



Minute Man National Historical Park Eradication and Restoration

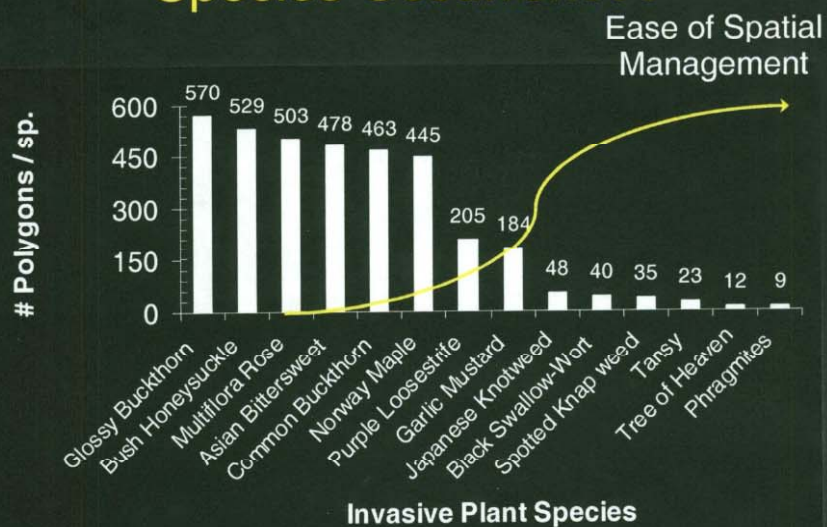
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- Identify problem species
- Systematic survey
- Baseline data (monitoring and control)
- Treatment
- Native recruitment vs planting
- Limitations
- Patrol Native Areas
- Funding for Eradication and Restoration
- Education
- Community involvement: within and outside the park



Minute Man National Historical Park Species Occurrences

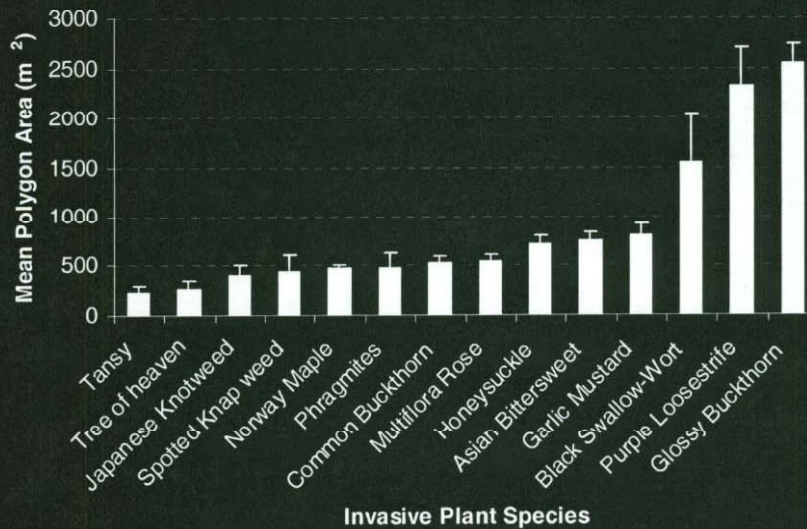
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Minute Man National Historical Park Mean Polygon Area

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Minute Man National Historical Park Six Species to Control First

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1. Tree of Heaven
2. Tansy
3. Black Swallow-wort (Battle Road)
4. Spotted Knapweed
5. Japanese Knotweed
6. Phragmites (wetland regulations)

* Based on small area and high density



Minute Man National Historical Park In Summary

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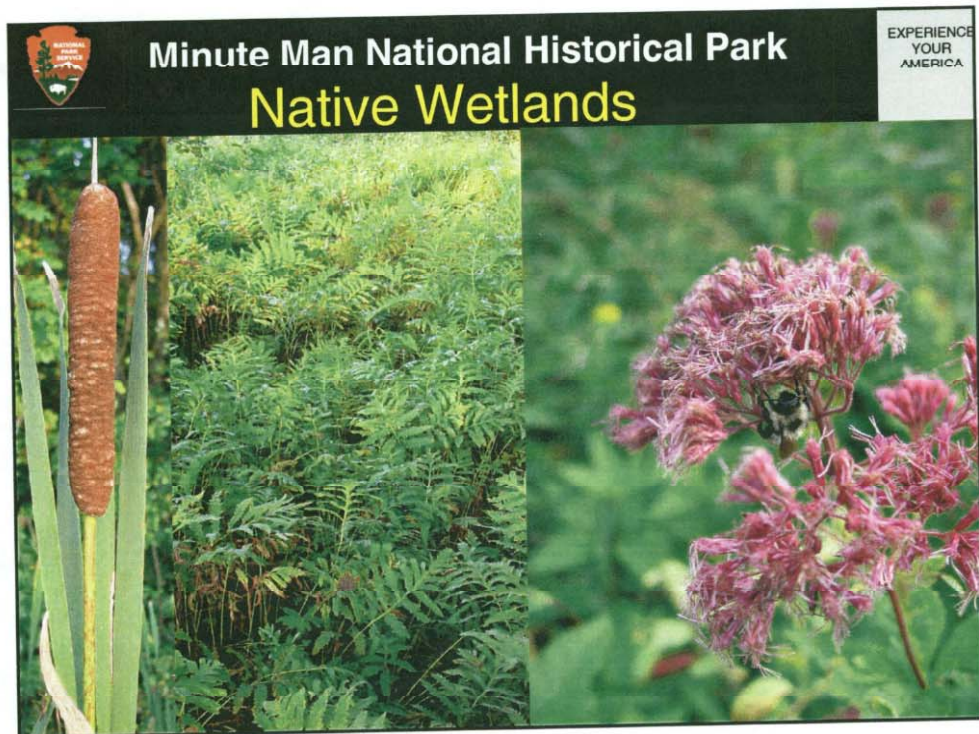
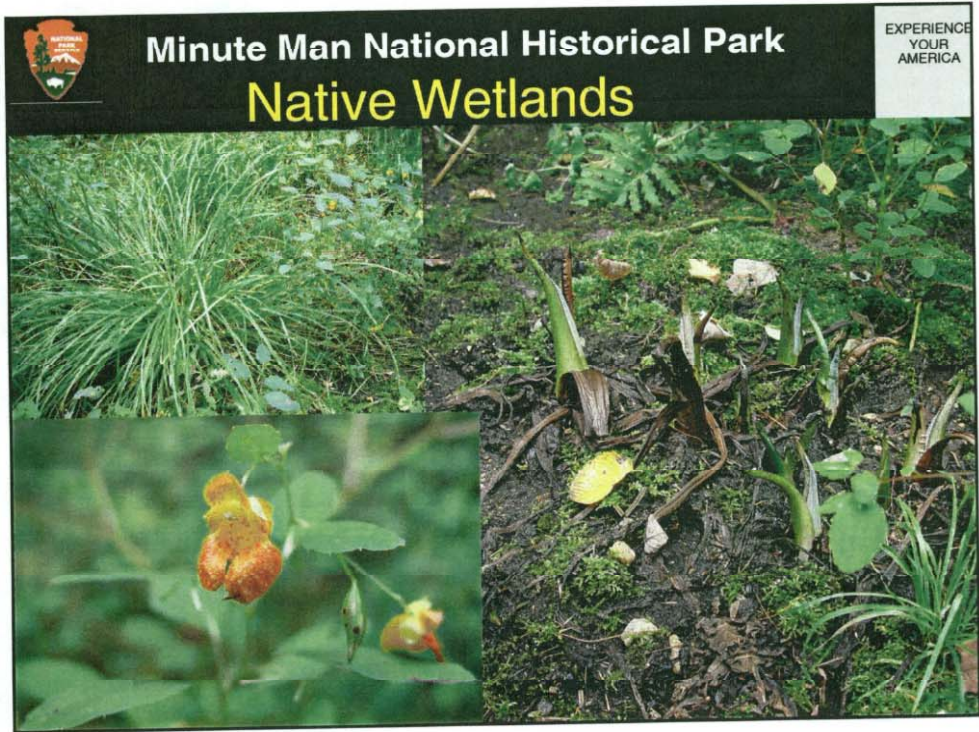
- Minute Man NHP infested 64+% by 14 invasive plant species
- 51 exotic plant species surveyed
- Every vegetated habitat is invaded
- Minute Man NHP can now apply for congressional funding to eradicate invasive plant species - ESMT
- Many unique and threatened plants, animals, and habitats in the park that would greatly benefit eradication of invasive and native species restoration



Minute Man National Historical Park Native Forests

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Acknowledgments

Chris Davis

Greg Shriver

Melissa Saalfeld

Siobhan MacManus

Amanda Shearin



MASS GIS

Photo Credits

www.tncweeds.ucdavis.edu – Japanese Barberry
www.gov.on.ca/OMAFRA - Spotted Knapweed
www.ipcm.wisc.edu - Spotted Knapweed
<http://midwest.fws.gov> – Garlic Mustard
www.1000pictures.com – Red Tail Hawk
<http://photojournal.jpl.nasa.gov> – Earth
www.theglobalroad.com – Butterfly
www.junglewalk.com – Robin