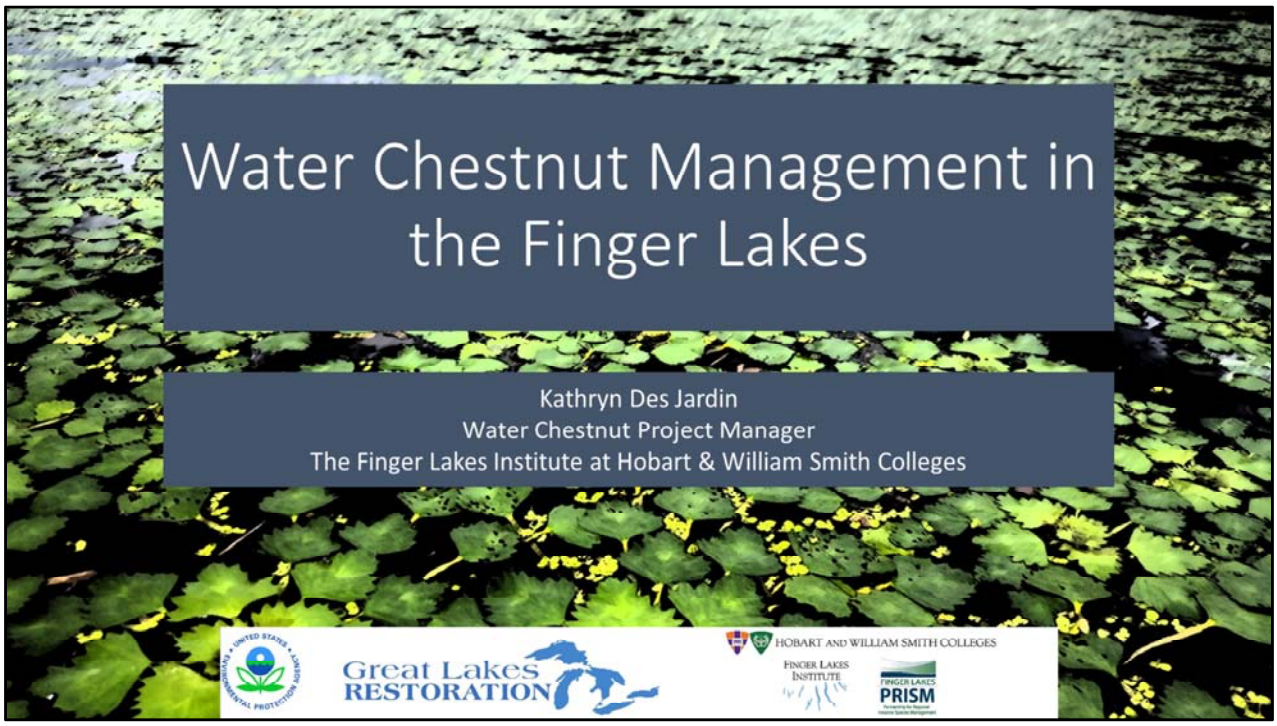
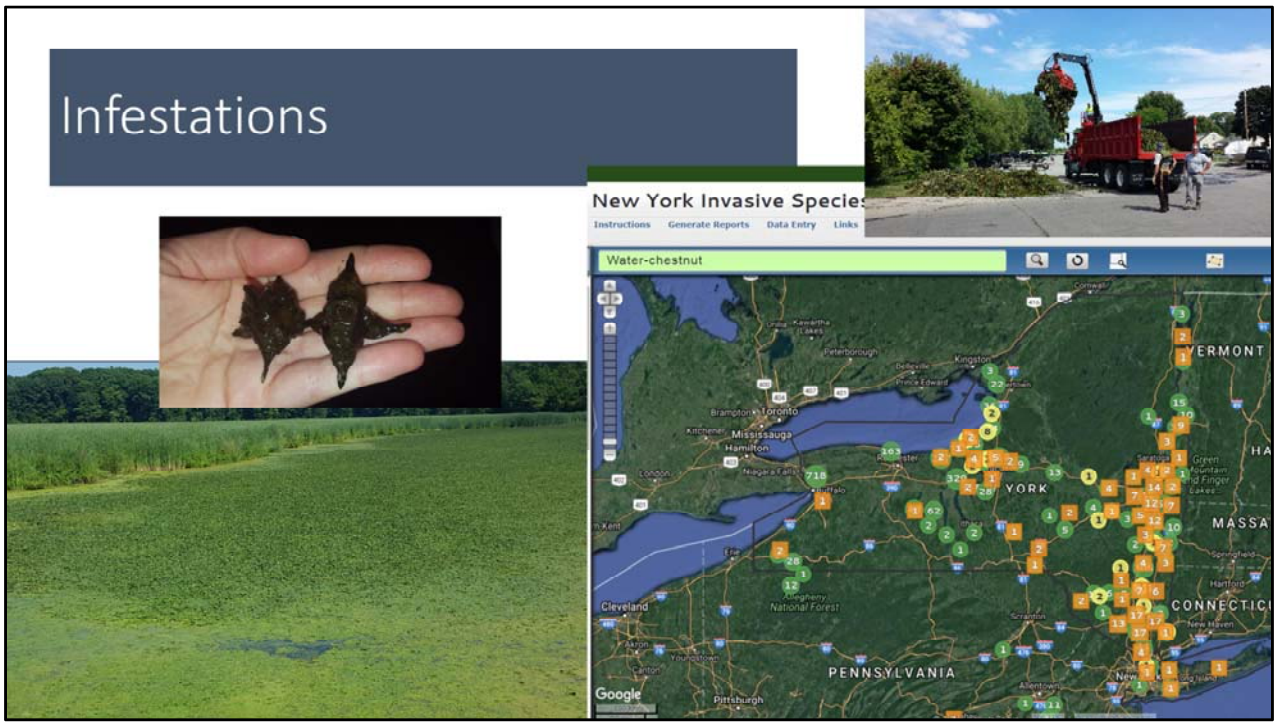

Water Chestnut Management in the Finger Lakes
Kathryn Des Jardin
Water Chestnut Project Manager
The Finger Lakes Institute at Hobart & William Smith Colleges
Great Lakes RESTORATION
HOBART AND WILLIAM SMITH COLLEGES
FINGER LAKES INSTITUTE
FINGER LAKES PRISM

Title Slide

Water chestnut is a floating-leaved aquatic annual
Established late 1800's in Mass.
4-spined seeds, 3-4 stems grow from each seed, up to 5 rosettes of floating triangular leaves from each stem
Feathery adventitious roots



Whys is water chestnut bad?
Dense floating mats reduce light, photosynthesis in the water column, [DO], affect water chesmistry
Impact habitat structure, affect invertebrate and fish communities
Compete and displace native macrophytes
Impede boating, fishing, swimming
Sharp seeds
Affect property value
Costly to manage once established

Project Overview

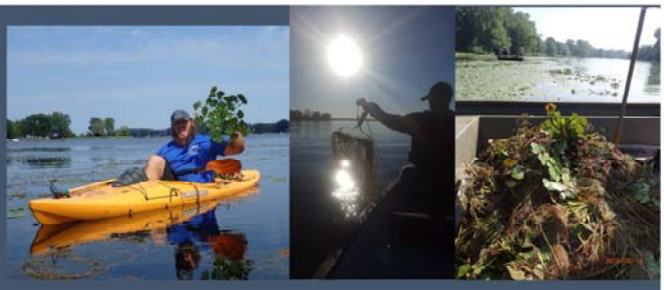
Project Description- focus on management

Project Overview

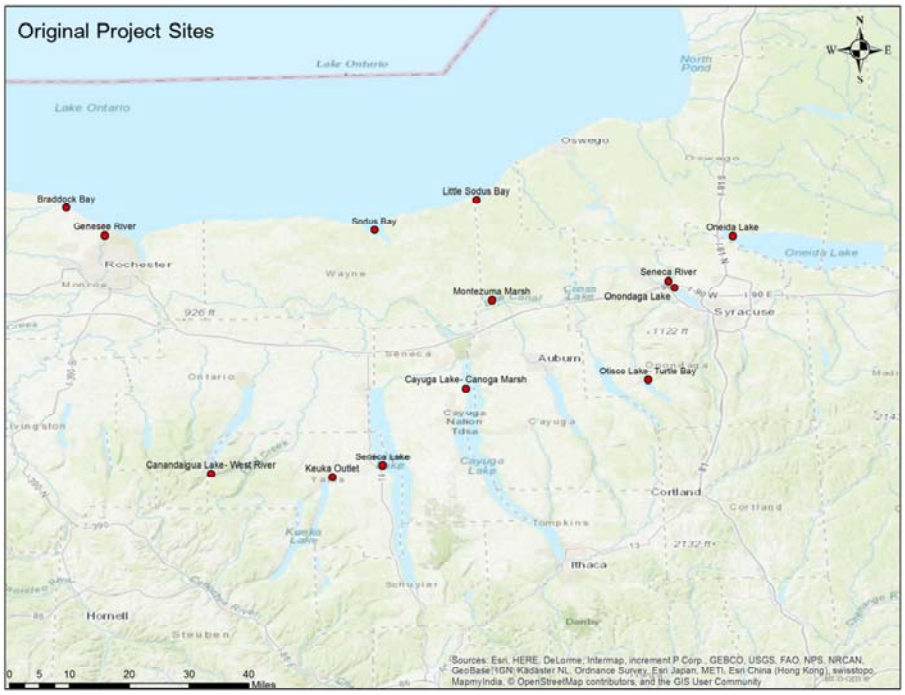
Great Lakes RESTORATION

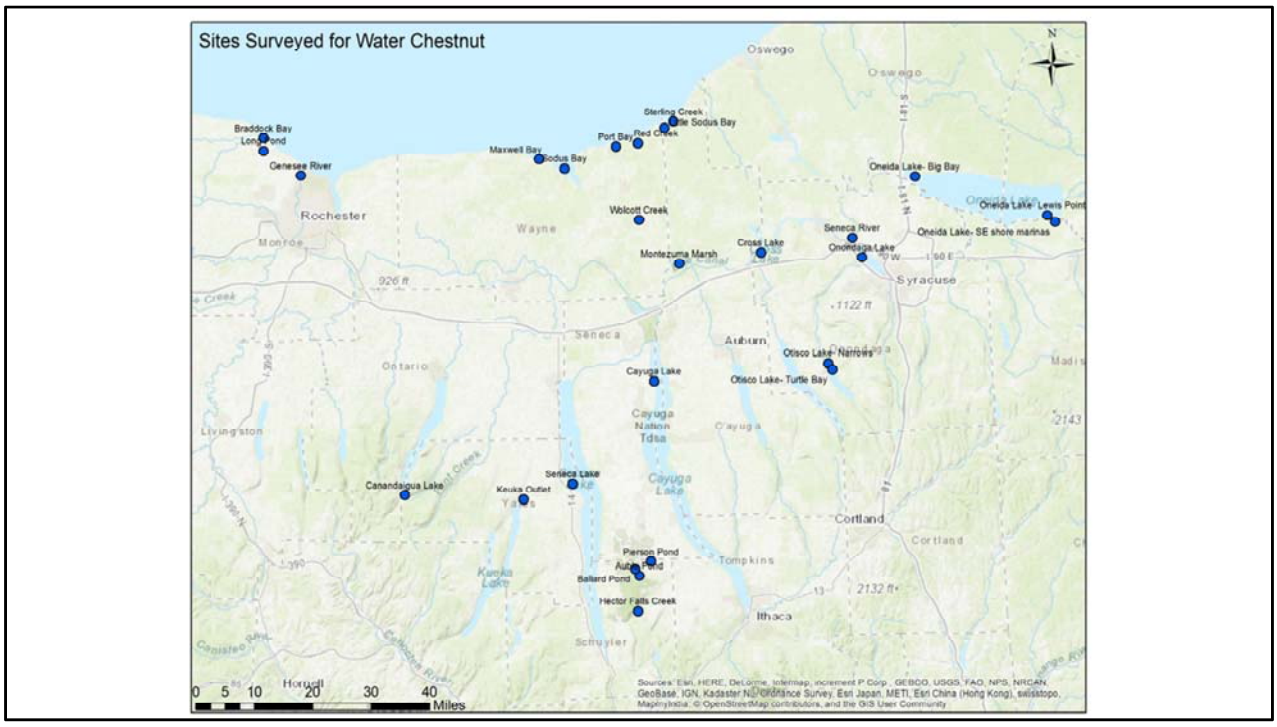
2016-2017 Goals

- Survey:
  - 13 sites for water chestnut
  - other invasive species
- Control:
  - 43 acres
- Educate:
  - Students, homeowners and recreationists, and community members
  - Finger Lakes invasive species field guide
  - Convene stakeholders to manage and prevent water chestnut and develop a management plan

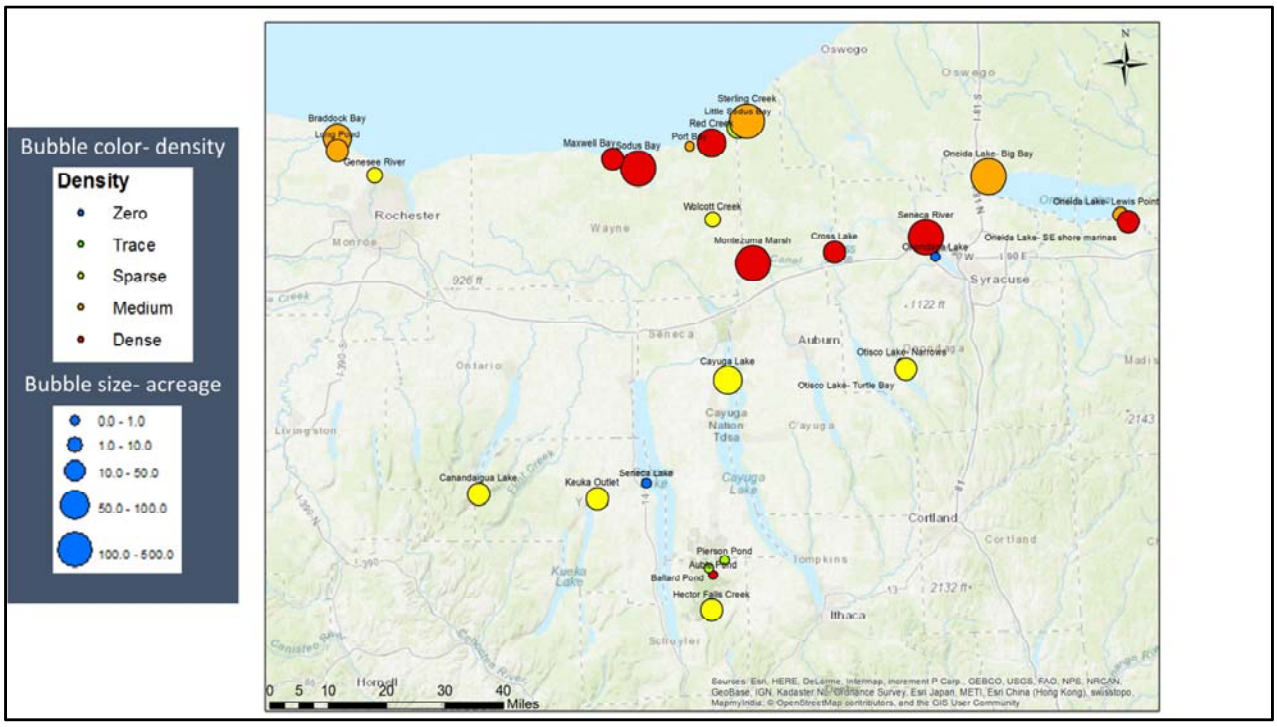


Project Description- focus on management


Original Project Sites
Lake Ontario
Braddock Bay
Genesee River
Sodus Bay
Little Sodus Bay
Oneida Lake
Seneca River
Onondaga Lake
Montezuma Marsh
Cayuga Lake- Canoga Marsh
Otisco Lake- Turtle Bay
Canandaigua Lake- West River
Keuka Outlet
Seneca Lake
Rochester
Syracuse
Auburn
Ithaca
Cortland
Hornell
Oswego
Wayne
Ontario
Tompkins
Steuben
Schuyler
0 5 10 20 30 40
Miles
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Sites selected for ecological importance, AOC,



Site locations

Site Survey

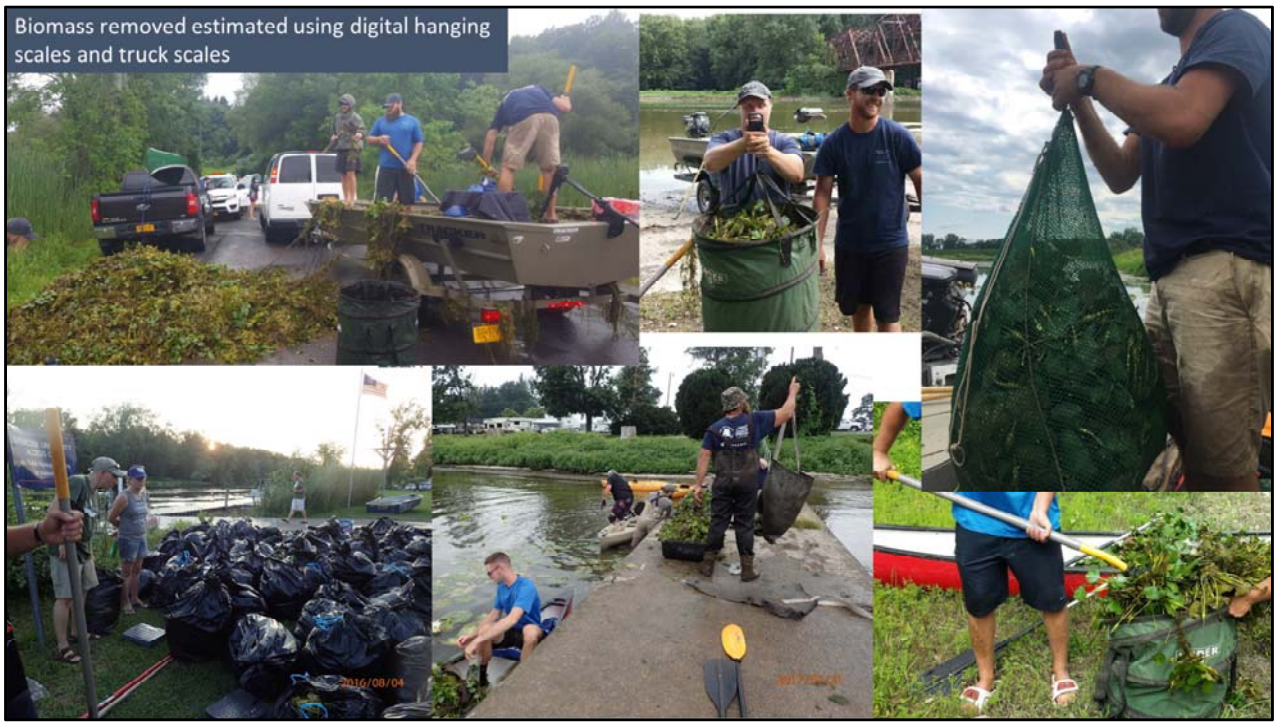
Water chestnut
- Area infested- acres
  - GPS, GIS, Google Earth Pro, Google Maps
  - 1 mile from infestation
- Density Scale →

Early Detection, Rapid Response
- Rake Tosses

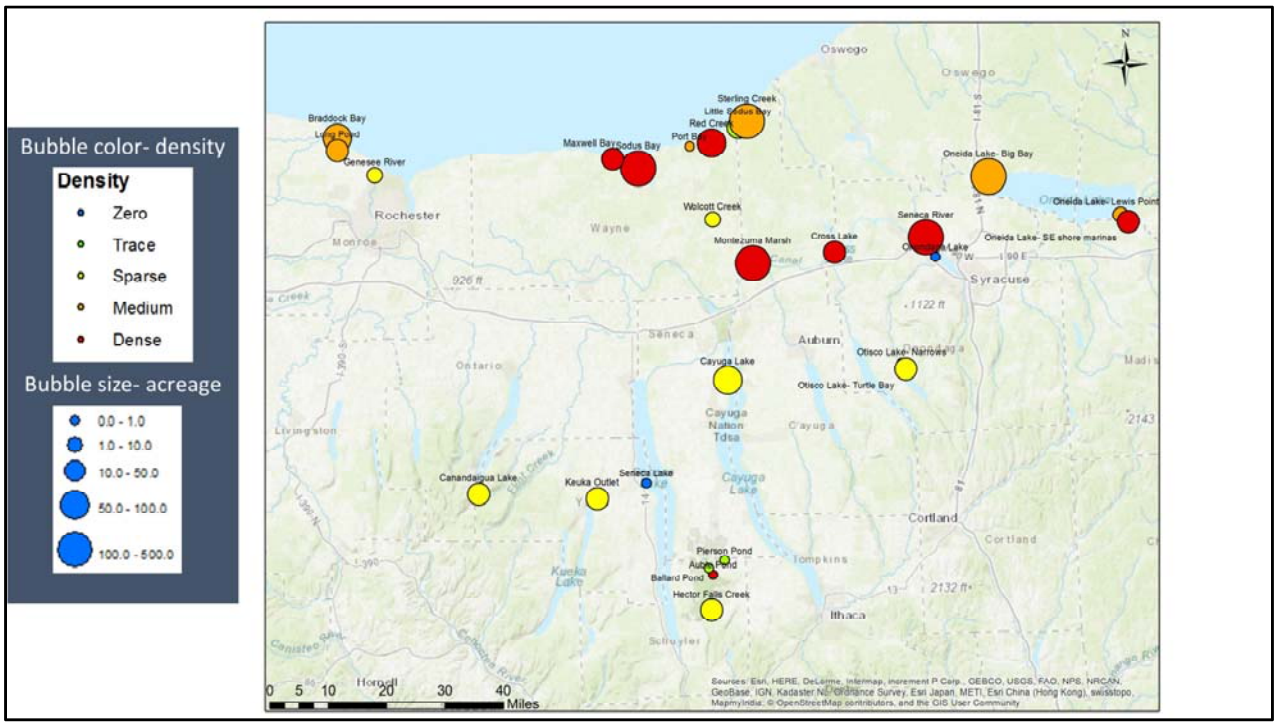
Density Scale	
Zero (0)	none
Trace (1)	1 or 2 solitary rosettes
Sparse (2)	10 or fewer rosettes, small patches, rosettes may not be touching
Medium (3)	More than 10 rosettes, larger patches, rosettes touching or almost
Dense (4)	Interlocking mats

How we measured infestations

Density scales

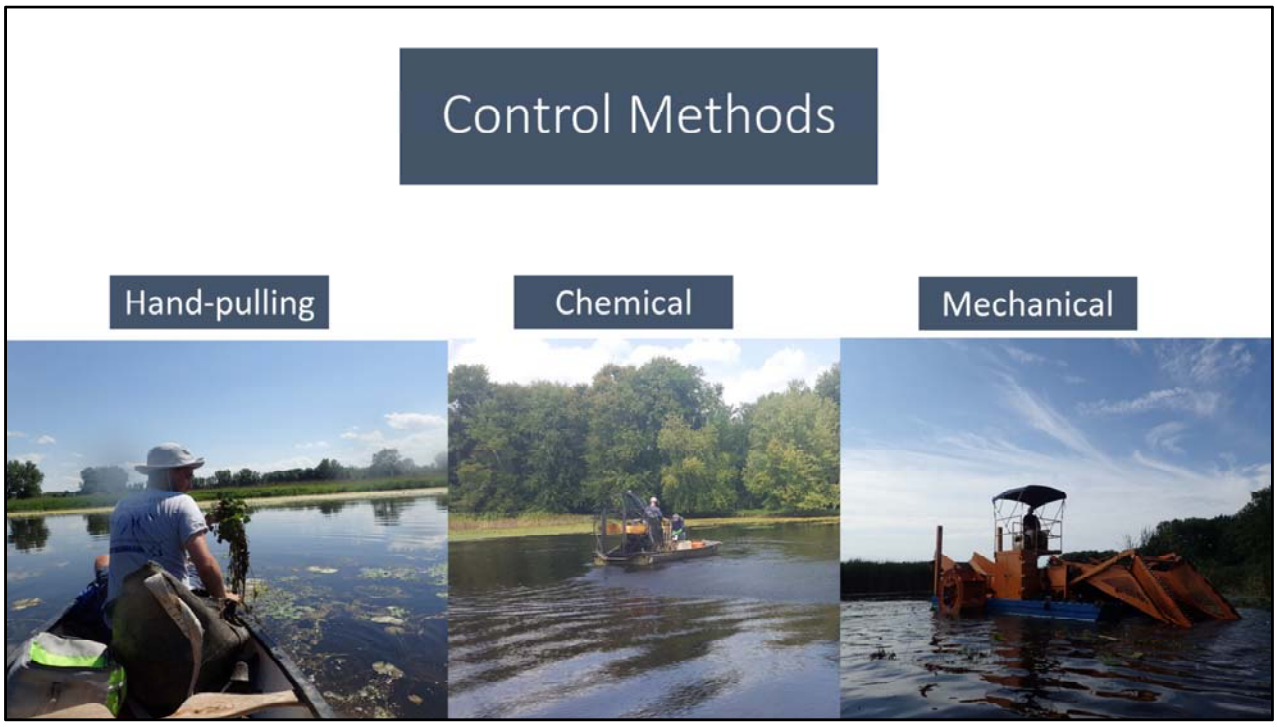


Measured wet weight removed from sites


Bubble color- density
Density
Zero
Trace
Sparse
Medium
Dense
Bubble size- acreage
0.0 - 1.0
1.0 - 10.0
10.0 - 50.0
50.0 - 100.0
100.0 - 500.0
Oswego
Rochester
Wayne
Monroe
Seneca
Ontario
Livingston
Cayuga
Tompkins
Cortland
Syracuse
Auburn
Ithaca
Braddock Bay
Genesee River
Sterling Creek
Little Sodus Bay
Red Creek
Port Bay
Maxwell Bay
Sodus Bay
Wolcott Creek
Montezuma Marsh
Cross Lake
Seneca River
Oneida Lake- Big Bay
Oneida Lake- Lewis Point
Oneida Lake- SE shore marinas
Otisco Lake- Narrows
Otisco Lake- Turtle Bay
Cayuga Lake
Cayuga Nation Tdsa
Canandaigua Lake
Keuka Outlet
Seneca Lake
Pierson Pond
Auburn Pond
Ballard Pond
Hector Falls Creek
926 ft
1122 ft
2132 ft
0 5 10 20 30 40
Miles
Sources: Esri, HERE, DeLorme, MapmyIndia, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Red- dense infestations look like these

Worked with stakeholders, partners, volunteers to manage each site



Control methods- compare?

Braddock Bay: Hand-pulling

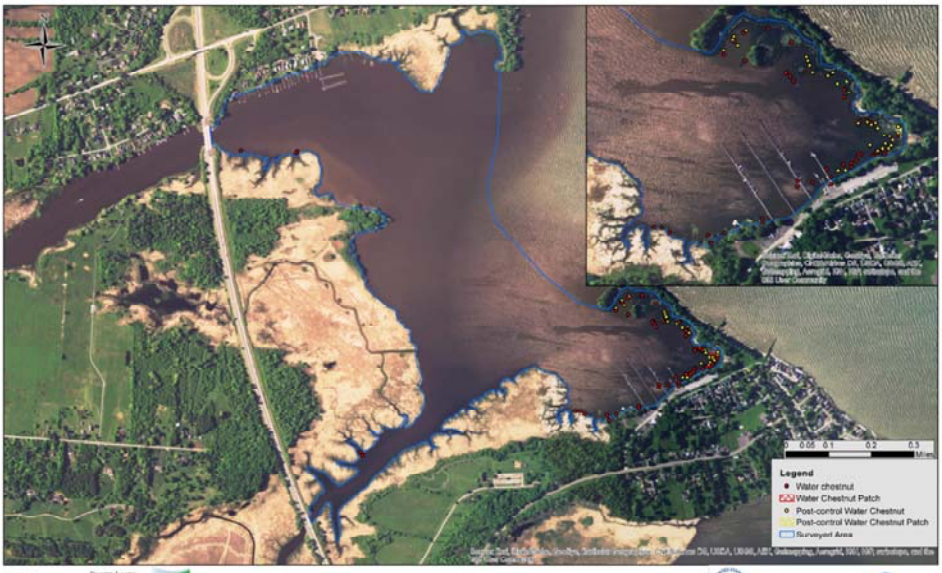
Where/What is Braddock Bay
Shows hand pulling is effective

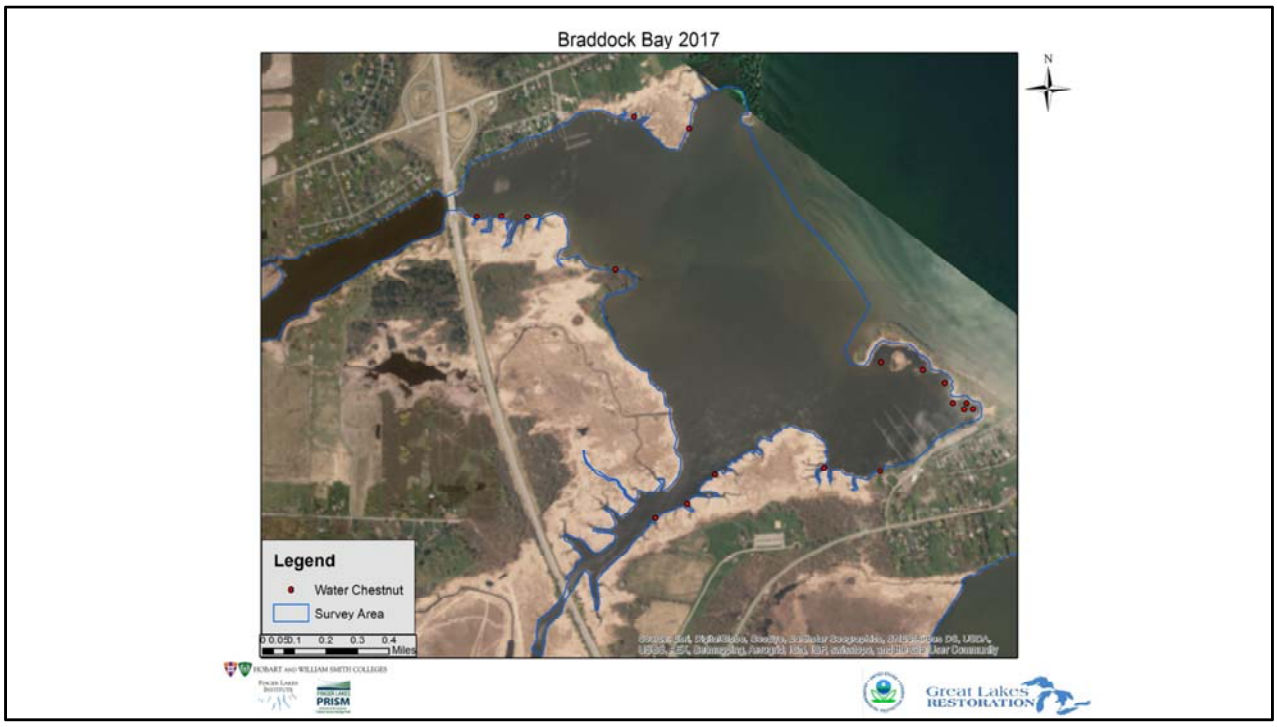
Original infestation- 2013


2014
5 days of pulling, 9 tons of water chestnut removed
2015
One of 9 days of pulling
7 tons of water chestnut
Ethics, Sportsmanship, Conservation
Photo: K. Loverling

Reduction by weight

Braddock Bay 2016




Braddock Bay 2017
N
Legend
Water Chestnut
Survey Area
0 0.05 0.1 0.2 0.3 0.4
Miles
HOBART AND WILLIAM SMITH COLLEGES
PRISM
Great Lakes
RESTORATION

Montezuma Marsh (Howland Island WMA): Chemical

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

MONTEZUMA Audubon CENTER

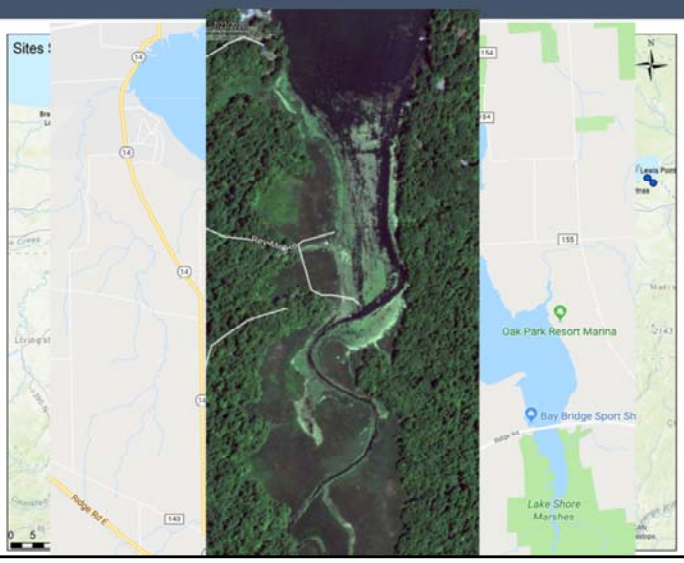
U.S. FISH & WILDLIFE SERVICE

Chemically treated August 2017

Sodus Bay- Second Creek: Mechanical

WAYNE COUNTY
SOIL & WATER
CONSERVATION DISTRICT

Save
Our
Sodus



2016- low water levels, could not be harvested beyond mid-summer
2017- high water levels, harvested, little to hand-pull
Extreme weather events will affect management strategies

2017

Results

- **796 acres** (original sites) managed over two field seasons - **18x** the project goal of 43 acres.
- **+157 acres** were managed across additional sites where populations were reported- **~4x** the project goal of 43 acres.
- **~12,877 acres** surveyed for water chestnut and other high priority species

	Project Target (acres)	Survey Area (acres)	Managed Area (acres)	Biomass Removed (lbs)	Days on Site	Volunteer Hours	Volunteer Pulls	Notes
2016	43	9,679	179	72,314	48.5 (2056 hrs)	1,060	22	Biomass Removed includes harvested weight
2017		3,198	775	29,264	40 (2342 hrs)	1,210	16	Biomass removed does not include harvested weight
Total		12,877	954	101,578	88.5	2,270	38	

Effective Control: Population Reduction

Site	2016 Pull Weight (lbs)	2017 Pull Weight (lbs)	Population Reduction (%)
Braddock Bay	3,000	217	92.8
Canandaigua Lake- West River	375	174	53.6
Cayuga Lake- Canoga Marsh	271	20	92.6
Genesee River	750	224	70.1
Keuka Outlet	525	464	11.6
Oneida Lake- Lewis Point	3,850	2,595	32.6
Otisco Lake- Turtle Bay	506	61	88.0

Calculated for sites where entire water chestnut populations were removed in consecutive years (2016 and 2017 field seasons) using the same methods each year: hand-pulling via air boat, canoes/kayaks, or wading.

Other Invasive Species

Co-occurring invasive species included:

- Eurasian watermilfoil (*Myriophyllum spicatum*)
- curly-leaf pondweed (*Potamogeton crispus*)
- common frogbit (*Hydrocharis morsus-ranae*)
- brittle naiad (*Najas minor*)
- starry stonewort (*Nitellopsis obtusa*)

Also surveying for other invasive species by doing rake tosses


Questions?