

Freshwater Invasive Species in Rhode Island: Mapping & Outreach



CAUTION!
Invasive Asian Clams
Are here in this water, slow spread to other places!

Decontaminate Your Gear:

CLEAN

Remove mud & debris on:

- Boats, Trailers, Fishing rods
- Anchors, Paddles, Gear
- Hose off, use hot water if available (best at 140° F)

DRAIN

- Motor Boats
- Canoes and Kayaks
- Motors
- Live Wells
- Bait Buckets

DRY

All wet gear & equipment:

- Hang or leave out in sun
- Dry completely before going to another lake, pond or river

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

To report invasive animals, contact: Division of Fish and Wildlife (401) 789-0281
To report invasive plants, contact: Office of Water Resources (401) 222-4700

Invasive Water Chestnut

Spot **Pull** **Prevent**

Pull This Invasive Plant Out!

Spot

- Learn to recognize its triangular leaves that grow radiating from the center
- All the jagged leaves on one plant form a rosette that floats
- In August, up to 15-20 large, pointy seeds can develop under the leaves
- The following year, the seeds produced can make 10-15 new plants
- This aggressive plant grows large and reproduces exponentially to form a dense mat of plants that will cover several acres (see background photo)

Pull

- Paddlers can easily pull water chestnut plants up, as the roots are small
- In early June, new rosettes can fit in the palm of your hand, but as they grow larger over the summer, they can be 2 feet wide by the end of August
- It is easier to pull the smaller plants in June and July, before the seeds form
- After removing the plant, dispose as trash, or compost as far from the water as possible. As an annual, once pulled, it will not grow back (success!)

Prevent

- Pulling plants before the seeds form is most effective to stop spreading
- The large, pointy seeds are barbed, and if left to mature, will then attach to birds, wildlife, boats, waders or other gear to travel over land to new lakes
- Mature seeds that have dropped may become dormant in the lake bottom, and not germinate the next year, but can remain viable to sprout up to 12 years later, so pulling is a long term effort - keep looking every year!

Rhode Island Department of Environmental Management
To report water chestnut at a new location, contact: Office of Water Resources (401) 222-4700
For more info, go to: <http://www.dem.ri.gov/programs/benwiron/water/quality/surfwq/aifs/tranot-fs.pdf>



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RIDEM Office of Water Resources

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RI Rivers Council Presentation Outline – January 13, 2021:

1. Intro: Clean Water Act Monitoring & Assessment of Waterbody Conditions:

Survey Lakes/ponds and Outreach for AIS (Aquatic Invasive Species)
Stream Macroinvert Biomonitoring, Bioassessments and Biocriteria
Water Quality Monitoring in Rivers

2. Aquatic Invasive Species (AIS) Mapping – publicly available distribution info:

Statewide presence/absence map & list
Interactive GIS mapper
Species-specific maps and lists
Two Species Highlights: Asian Clam and Water Chestnut

3. AIS Management:

Quick Overview of Options
RIDEM Dispatches seasonal interns to hand-pull water chestnut
A water chestnut case study – lessons learned from Lake Champlain



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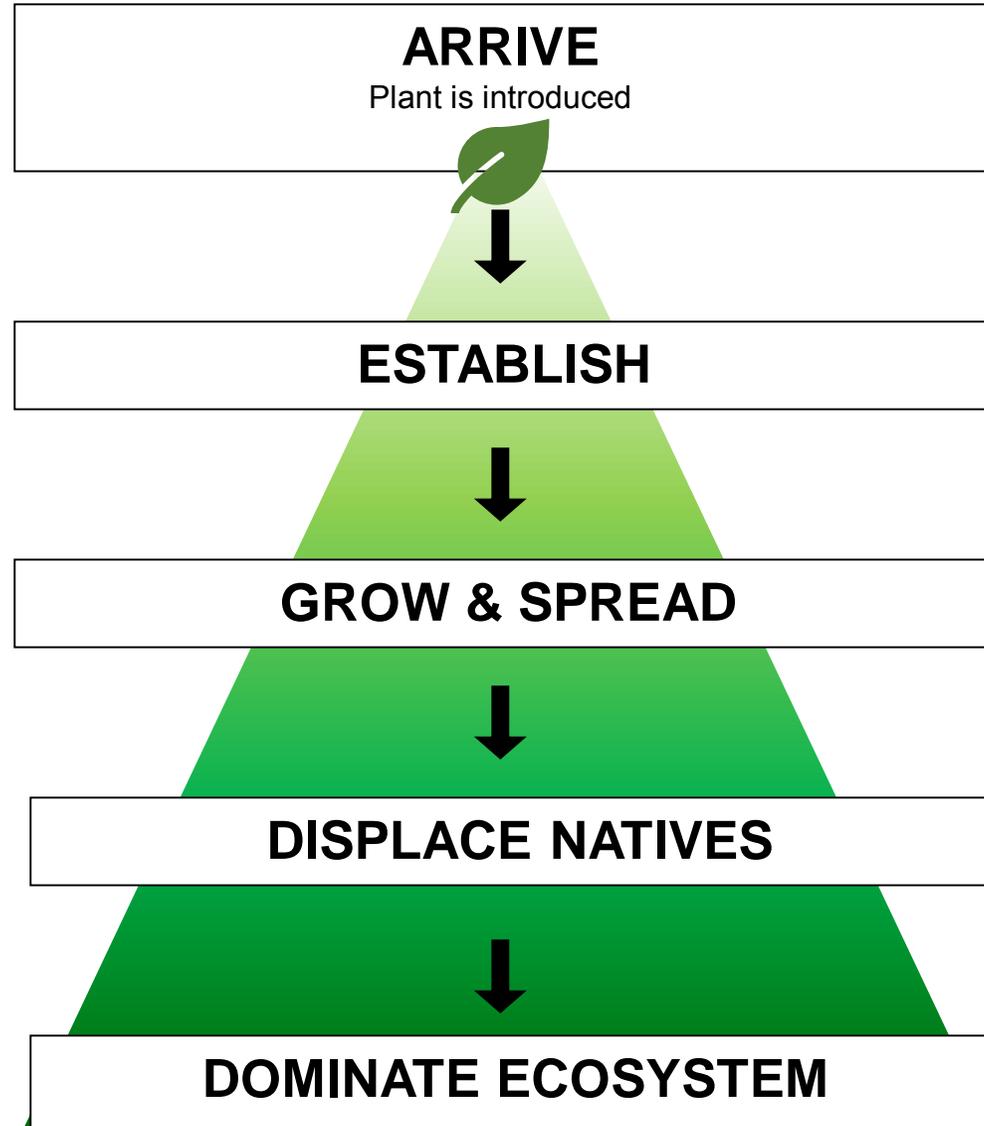


What are Aquatic Invasive Species (AIS)?

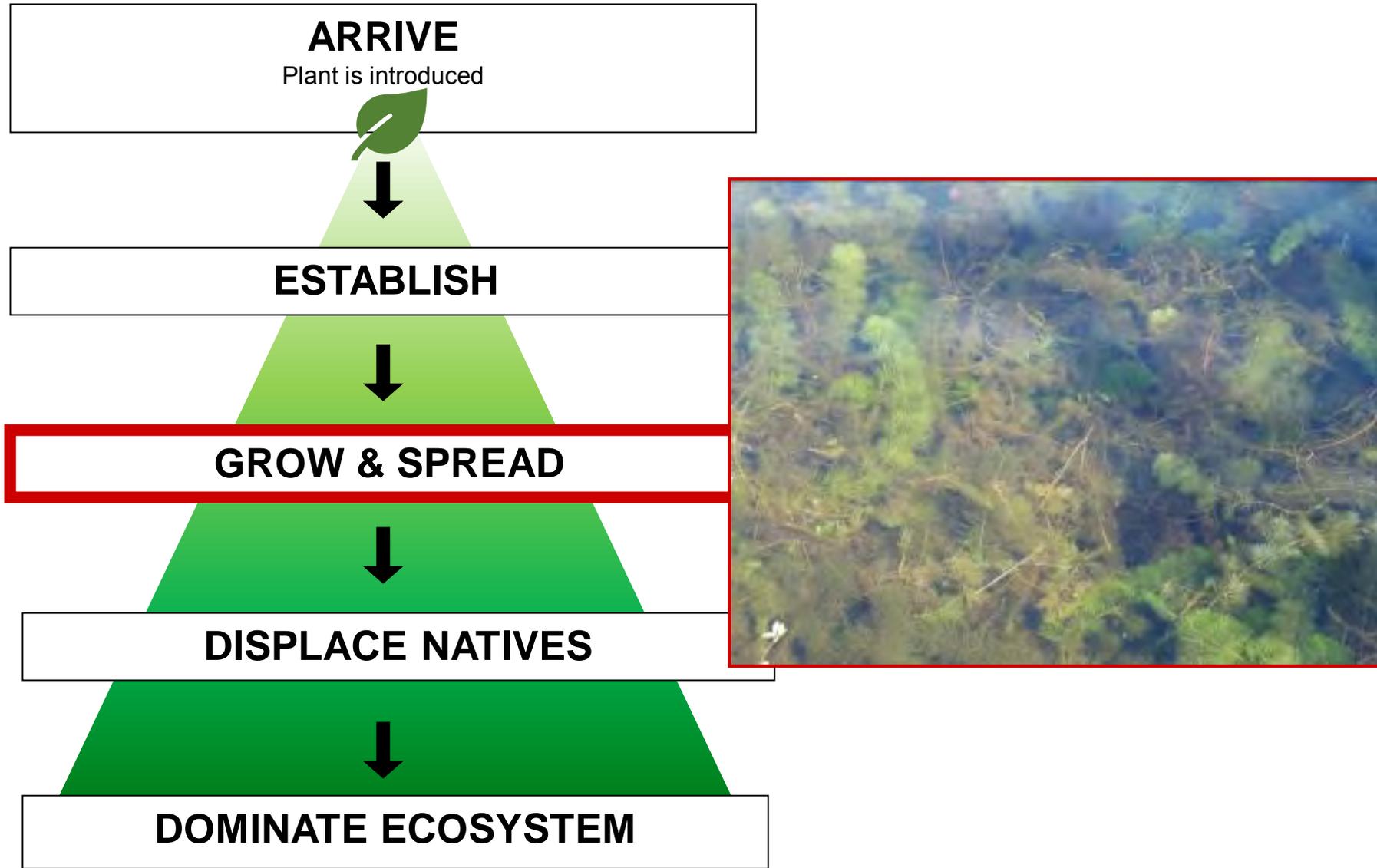
- Non-native plants/animals (no natural predators in Rhode Island)
- Introduced (accidentally or intentionally)
- Grow quickly or have another competitive advantage over natives
- Growth threatens the diversity/abundance of natives
- Jeopardize stability of the ecosystem
- Impedes use (swim, fish, boat) of the infested water body
- Can cause economic losses (recreation, property values & tax revenues, high cost to manage invasive plants annually and over the long term)



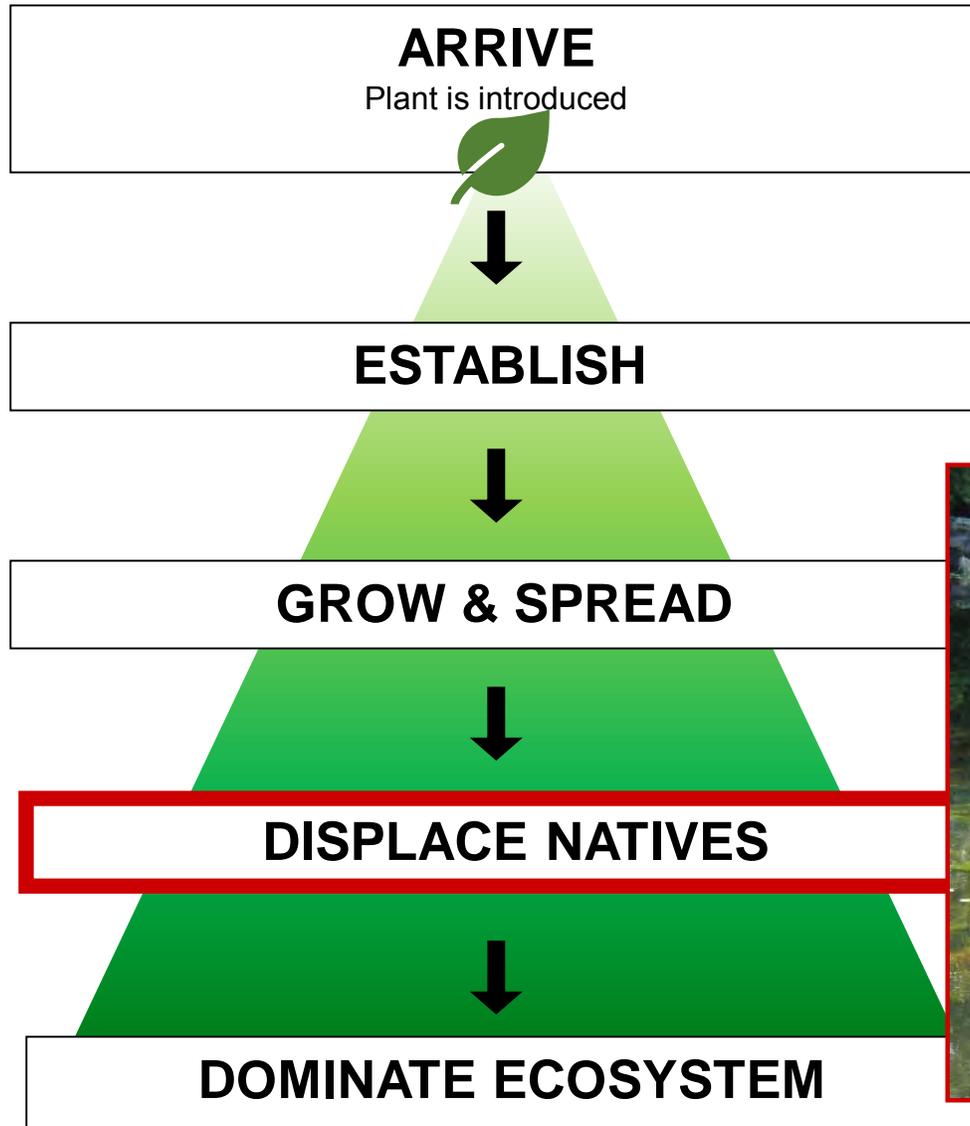
Its important to understand how big the problem is



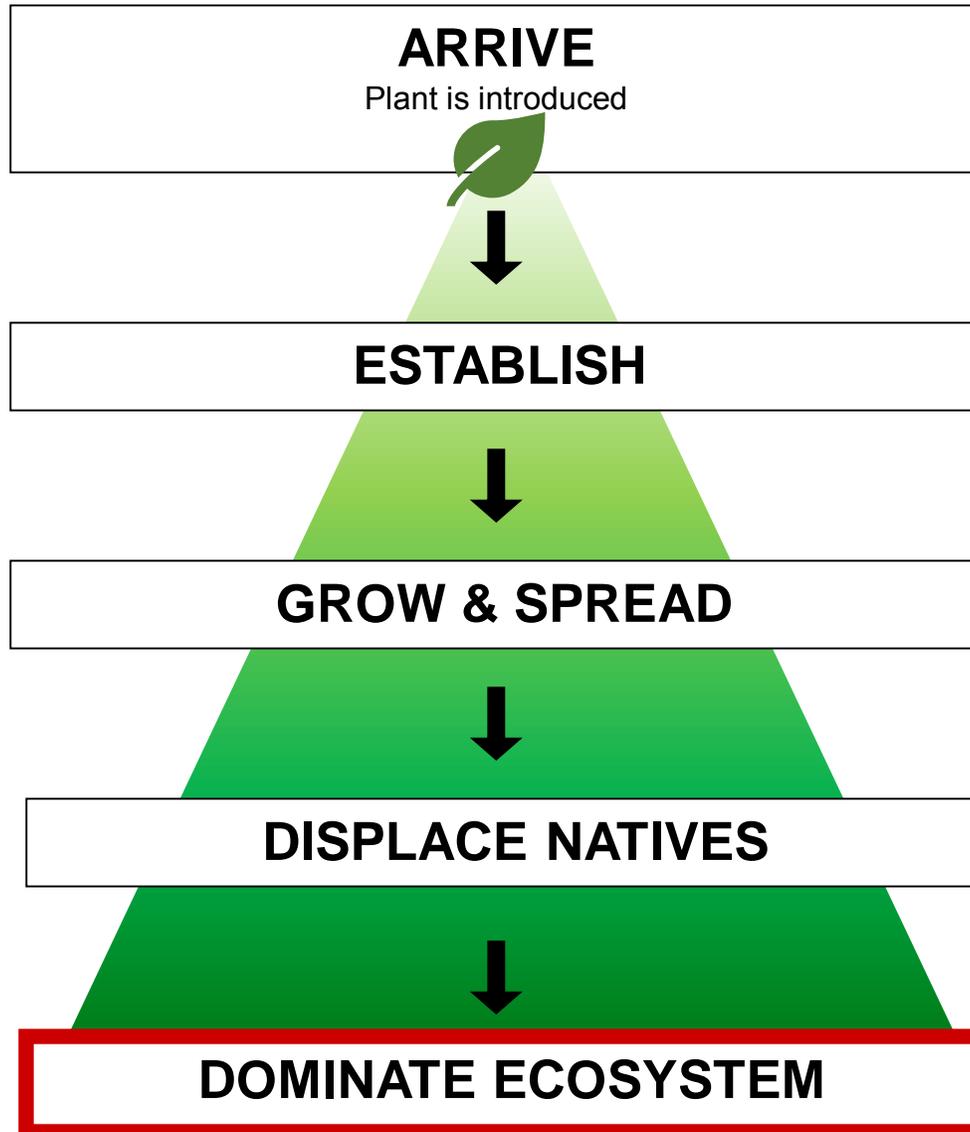
Stages of an Invasion



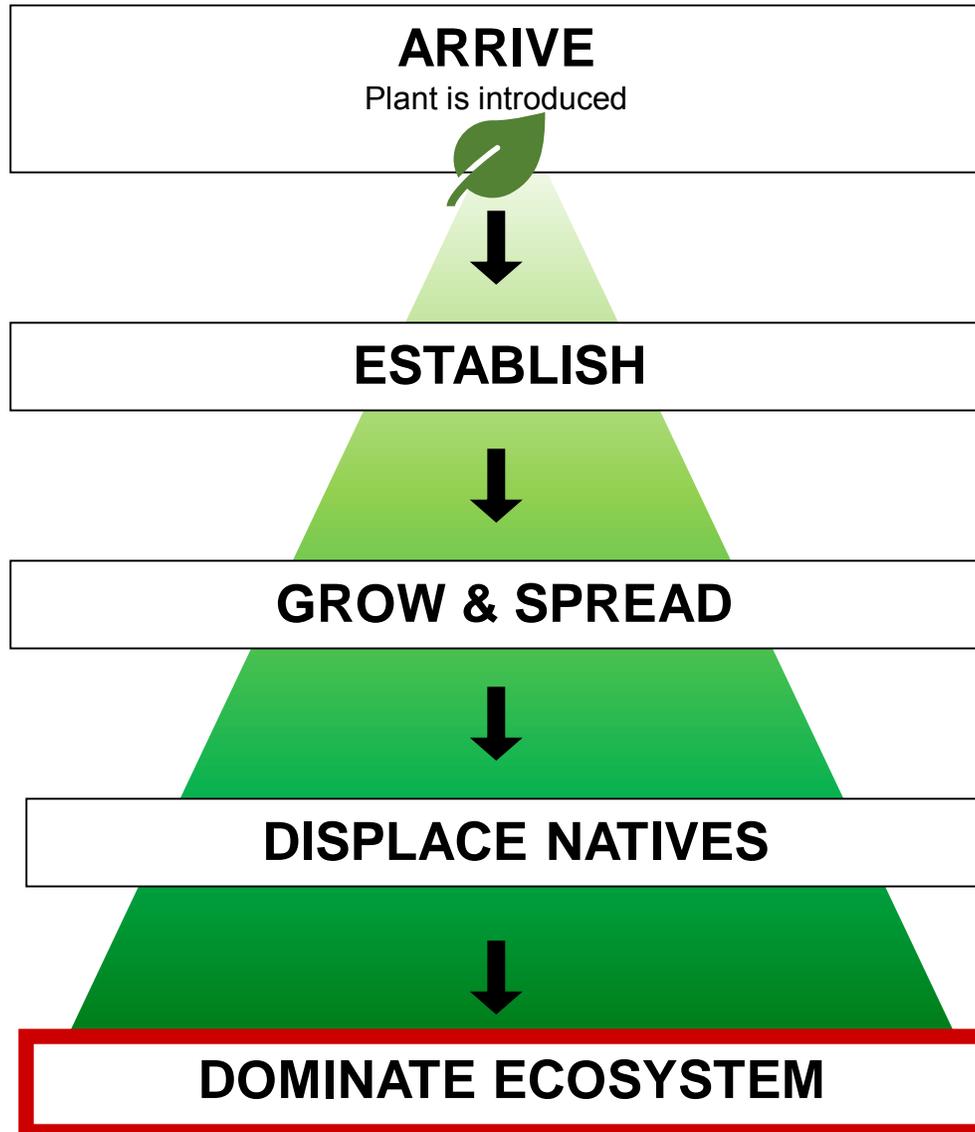
Stages of an Invasion



Stages of an Invasion



Stages of an Invasion



This is why we
MONITOR



RIDEM Aquatic Invasive Species (AIS) Monitoring Process



Belleville Pond, North Kingstown, RI



Locustville Pond, Hopkinton, RI

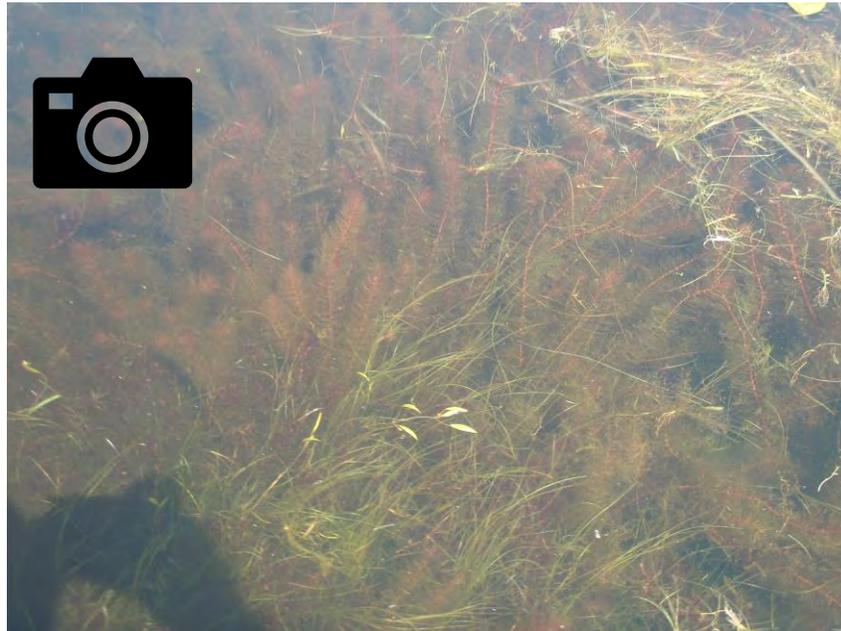


Johnson's Pond, Coventry, RI



How Does RIDEM Survey?

Survey Form



Aquatic Invasive Species Monitoring Survey Form
 Department of Environmental Management - Office of Water Resources
 235 Promenade Street, Providence, Rhode Island
 (401) 222-4700 last revision 9-11-2017

| | | | | | |
|--|--|---|--|--|---|
| Name of Water Body: | | Town: | Date: | | |
| Watershed: | | WBID: | Survey Personnel: | | |
| Weather: <input type="checkbox"/> clear sunny <input type="checkbox"/> partially cloudy <input type="checkbox"/> overcast <input type="checkbox"/> windy | | Water Clarity: <input type="checkbox"/> clear <input type="checkbox"/> cloudy <input type="checkbox"/> tannic/brown <input type="checkbox"/> cyanobacteria bloom | | | |
| Survey Level: L1: Vailed shoreline L2: Boated Footnote Other: | Access: <input type="checkbox"/> Public <input type="checkbox"/> Private | <input type="checkbox"/> State <input type="checkbox"/> Town Canal Ramp Smallcraft Launch Fishing Trail Access Roadside pull-off | Location of Access Point (If private, address and contact information) | | |
| Species Visually Observed in Water Body— Check Below | | | | | |
| INVASIVE SPECIES (take a picture) | Floating <input type="checkbox"/> <i>Trapa natans</i> (water chestnut) <input type="checkbox"/> <i>Utricularia inflata</i> (inflated bladderwort) <input type="checkbox"/> <i>Nelumbo lutea</i> (American lotus) <input type="checkbox"/> <i>Nymphoides peltata</i> (yellow floating heart) <input type="checkbox"/> <i>Eichhornia crassipes</i> (water hyacinth) <input type="checkbox"/> <i>Callitriche stagnalis</i> (pond water-starwort) <input type="checkbox"/> <i>Pistia stratiotes</i> (water lettuce) <input type="checkbox"/> <i>Glossostigma oleistanburum</i> (mudmat) <input type="checkbox"/> <i>Hydrocharis morsus</i> (European frog-bit) <input type="checkbox"/> <i>Sarvinia minima</i> (water fern) <input type="checkbox"/> <i>Sarvinia molesta</i> (giant sarvinia) <input type="checkbox"/> <i>Marsilea quadrifolia</i> (European water-clover) <input type="checkbox"/> <i>Myriophyllum heterophyllum</i> (variable milfoil) <input type="checkbox"/> <i>Cabomba caroliniana</i> (fanwort) <input type="checkbox"/> <i>Potamogeton crispus</i> (curly-leaf pondweed) <input type="checkbox"/> <i>Myriophyllum spicatum</i> (Eurasian milfoil) <input type="checkbox"/> <i>Najas minor</i> (spry naiad) <input type="checkbox"/> <i>Egeria densa</i> (Brazilian elodea) <input type="checkbox"/> <i>Myriophyllum aquaticum</i> (parrot feather) <input type="checkbox"/> <i>Hydrilla verticillata</i> (hydrilla) | Submergent <input type="checkbox"/> <i>Cipangopaludina chinensis</i> (mystery snail) <input type="checkbox"/> <i>Corbicula fluminea</i> (Asian clam) | Native Aquatic Plants: Floating <input type="checkbox"/> <i>Nymphaea odorata</i> (white water lily) <input type="checkbox"/> <i>Nuphar variegata</i> (NWL / cow WL / spatterdock) <input type="checkbox"/> <i>Brasenia</i> sp. (water shield) <input type="checkbox"/> <i>Lemna minor</i> (duckweed—one root) <input type="checkbox"/> <i>Spirodela polymiza</i> (big duckweed—many roots) <input type="checkbox"/> <i>Nymphoides cordata</i> (little floating heart) | Emergent <input type="checkbox"/> <i>Pontederia cordata</i> (pickerel weed) <input type="checkbox"/> <i>Sagittaria</i> sp. (arrowhead) <input type="checkbox"/> <i>Typha</i> sp. (cattail / typha) <input type="checkbox"/> <i>Peltandra virginica</i> (arrow arum) | Submergent <input type="checkbox"/> <i>Utricularia</i> sp. (bladderwort, unspecified) <input type="checkbox"/> <i>Utricularia radiata</i> (floating bladderwort) <input type="checkbox"/> <i>Potamogeton</i> sp. (pondweed, unspecified) <input type="checkbox"/> <i>Potamogeton robbinsi</i> (Robinson's pondweed) <input type="checkbox"/> <i>Vallisneria americana</i> (tapegrass / eelgrass) <input type="checkbox"/> <i>Ceratophyllum demersum</i> (coontail) <input type="checkbox"/> <i>Proserpinaca palustris</i> (mermaid weed) <input type="checkbox"/> <i>Elodea canadensis</i> (native / common elodea) <input type="checkbox"/> <i>Myriophyllum humile</i> (native milfoil / low watermilfoil) |
| | List Birds / Shellfish / wildlife observed | | | | |
| | Comments (problems, unusual observations, fishing/boating observed?, take any unknown sample to RIDEM, label!): | | | | |
| | IN OFFICE: Photos saved: J:\COMMONLakes\Pictures_____ | | | | |
| OFFICE USE ONLY | | | | | |
| <input type="checkbox"/> This survey has been entered into the AIS and Herbicide Database on (date): _____ by: (initials) _____ | | | | | |
| <input type="checkbox"/> The data here have been QAQC'd in the database on (date): _____ by (initials) _____ | | | | | |

J:\COMMONAIS\Monitoring\AIS Survey Form.pub



Enter Data into Database & write Field Reports

AIS Surveys

DATE Month [XX] 08 Day [XX] 08 Year [XXXX] 2009
 Weather (C=clear sunny PC=partly cloudy O=overcast W=windy) 0
 Waterbody Abbott Run Brook North & Tribs
 WBID RI0001006R-01A
 Water Clarity (C=clear CL=cloudy T=tannic/brown BG=cyanbact)
 Survey Level L1 Field Team

AIS PLANT Present Emergent Invasive Present **!!!MUST TYPE ENTRY BELOW!!! if none use "VEGET" for plants**

| Plant Code | CommonPlant | LatinPlar |
|------------|-----------------------|-----------|
| ACEPLA | Norway maple | Acer pla |
| AIALT | tree of heaven | Ailanthu |
| ALGUNS | algae, unspecified | |
| AMPBRE | Porcelain berry | Ampelop |
| ALGANA | algae, blue-green | anabaer |
| ALGACS | algae | Anacysti |
| ALGAPH | algae | Aphanizi |
| BERTHU | japanese barberry | Berberis |
| BIDBEC | water mangold | Bidens t |
| BRASPP | watershield | Braseni |
| CABCAR | fanwort | Cabomb |
| CALHET | water starwort, large | Callitric |

Plant Species Observed (Type in Plant Code EXACTLY as shown in refere)

| Survey ID | Plant Code |
|-----------|------------|
| 1 | MYRHET |
| 1 | GLOCLE |

Record: 1 of 2 Search

| Organism Code | Comon name | Latin nar |
|---------------|--------------------------|-----------|
| ACCCOO | Cooper's Hawk | Accipiter |
| AGEPHO | red-winged blackbird | Agelaius |
| AIXSPD | wood duck | Aix spon |
| ANAPLA | mallard duck | Anas pla |
| ANARUB | black duck | Anas rub |
| ARCCOL | ruby-throated hummingbir | Archiloch |
| ARDALB | white egret | Ardea all |
| ARDHER | great blue heron | Ardea he |
| BOMCED | cedar waxwing | Bombyci |
| BRACAN | Canada geese | Branta c |
| RIITIAM | red-tailed hawk | Rithen ia |

Non-Plant Species Observed (Type in Organism Code EXACTLY as show)

| Survey Numbr | Organism Code |
|--------------|---------------|
| 1 | none |
| 1 | |

Record: 1 of 1 Search

RIDEM Office of Water Resources
 Monitoring and Assessment Program
 Aquatic Invasive Species Monitoring Field Report

Blackstone River (Central Falls north to Pratt Dam)
 Waterbody ID: RI0001006R-01A
 Woonsocket/ Cumberland, RI
 Date Surveyed: August 11th, 2020

Investigation

On Tuesday, August 11th, 2020, two personnel from RI DEM investigated the presence of aquatic invasive species (AIS) in the Blackstone River in from Central Falls Landing up to the Pratt Dam (Figure 1). This visit was part of follow-up monitoring provided by RIDEM following an e-mail photograph of *Zostera oostera* (water chestnut) "in a wetland marsh" along the Blackstone River near Lonsdale. The RI DEM team launched two kayaks from a DEM cement ramp off of *Madison* Street at the Central Falls landing, and paddled up to Pratt Dam and back, approximately 4.2 miles, identifying plants in the littoral zone (Figure 1). The weather was sunny, and the water was clear.

Aquatic Invasive Species (AIS) Observed

- Zostera oostera* (water chestnut)
- Myriophyllum spicatum* (Eurasian milfoil)

Native Aquatic Species Observed

- Sparganium angustifolium* (spatterdock)
- Lythrum minor* (duckweed - one root)
- Elodea canadensis* (native elodea)

Emergent Species Observed

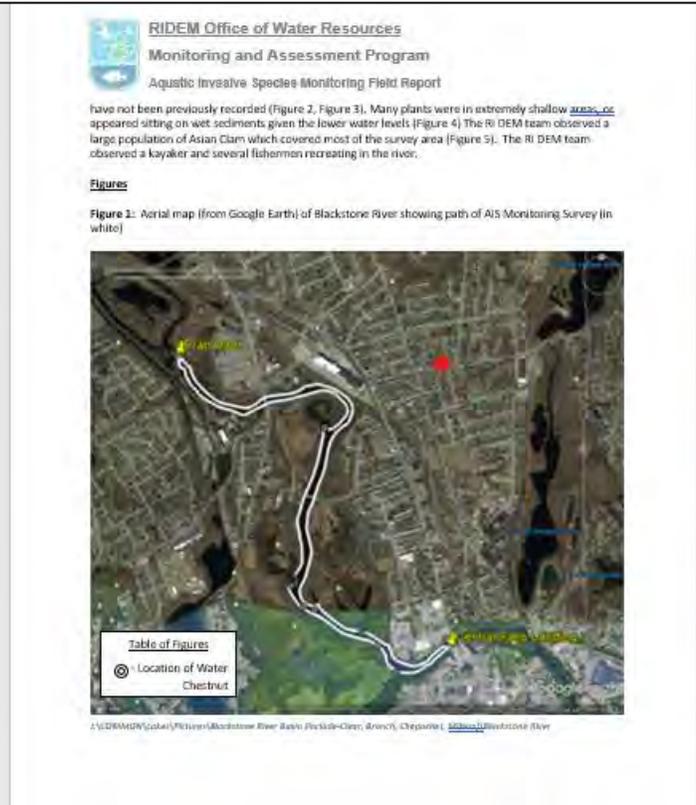
- Potamogeton amplifolius* (pickernel weed, native)
- Sagittaria* sp. (arrowhead, native)
- Typha* sp. (Cattails, native)
- Elodea virginica* (arrow arum, native)

Animal Species Observed

- Corbicula fluminea* (Asian Clam, invasive)

Comments

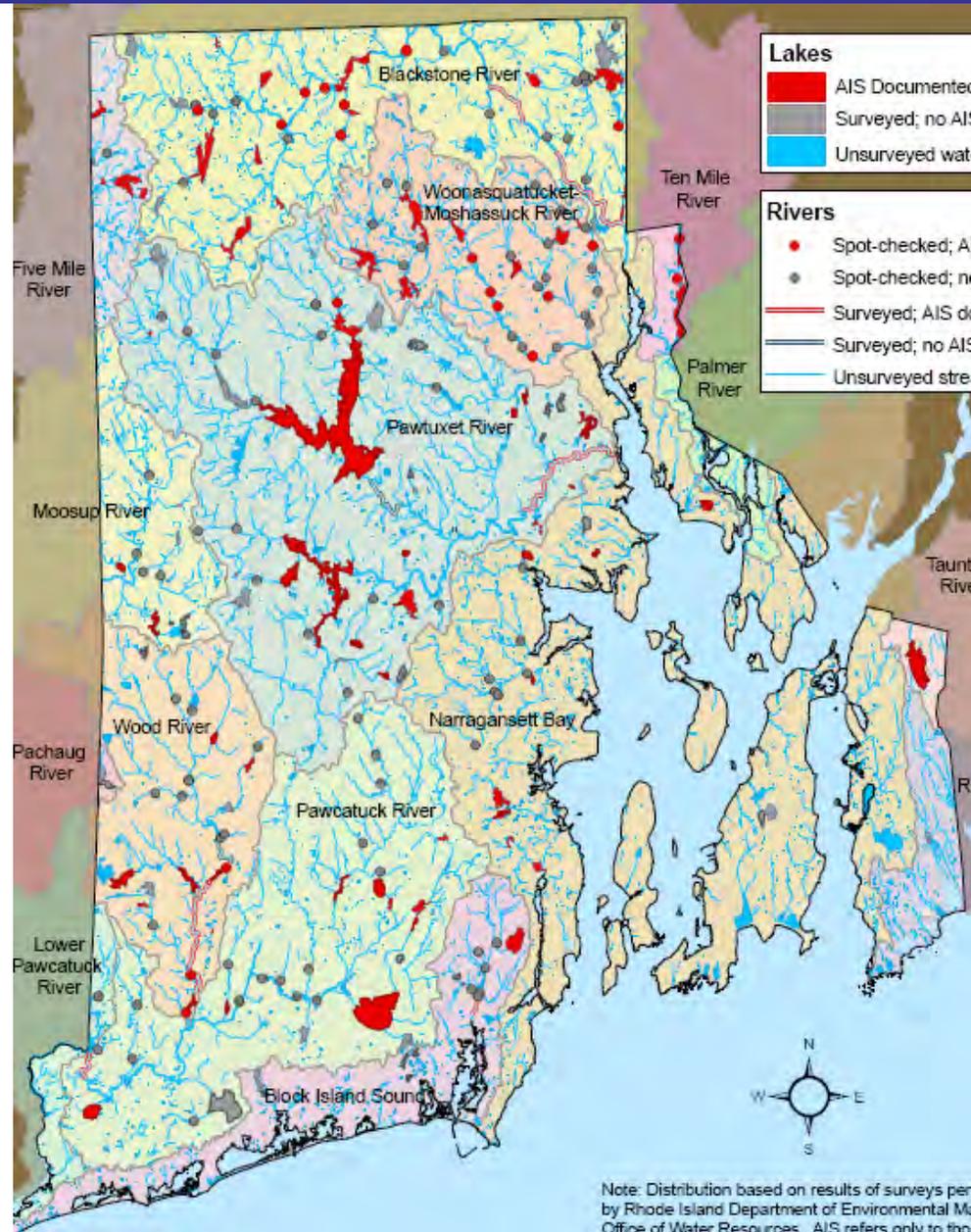
The RI DEM team put two kayaks into the water at Central Falls Landing, on *Madison* Ave, just above the Broad Street bridge (Figure 1). The RI DEM team then paddled to Pratt Dam and back, identifying native and invasive plant species, and searching for instances of water chestnut growth (Figure 1). *Zostera oostera* (water chestnut) was found in several large patches. The RI DEM team recorded GPS points for each of the large patches found along the Blackstone River, including a small cluster of plants which



If you are interested in the report for a particular water body, or are interested in data from any particular location, please email to request it: Katie.degoosh@dem.ri.gov



Map with GIS – static and online maps



Mapping AIS Distributions: Statewide presence/absence map & list:

<http://www.dem.ri.gov/programs/benviron/water/wetlands/pdfs/invasive.pdf>



Rhode Island

| Town | Waterbody |
|---------------|-----------|
| RIVERS | |
| 1 Abbot | |
| 2 Adam | |
| 3 Black | |
| 4 Brand | |
| 5 Brand | |
| 6 Chipu | |
| 7 Clear | |
| 8 Clear | |
| 9 Mosh | |
| 10 Pawc | |
| 11 Pawt | |
| 12 Pawt | |
| 13 Pawt | |
| 14 Pawt | |

Rhode Island Fr

| Town | Waterbody |
|-----------------|-----------|
| RIVERS | |
| 27 Woonasquat | |
| 28 Brickyard Po | |
| 29 Echo Lake | |
| 30 Echo Lake (P | |
| 31 Round Top S | |
| 32 Spring Lake | |
| 33 Sucker Pond | |
| 34 Wakefield Po | |
| 35 Wilson Rese | |
| 36 Valley Falls | |
| 37 Watchaug P | |
| 38 Arnold Pond | |

Rhode Island Freshwaters with Invasive Clams and Snails
rivers listed first, then lakes listed by city or town, alphabetically

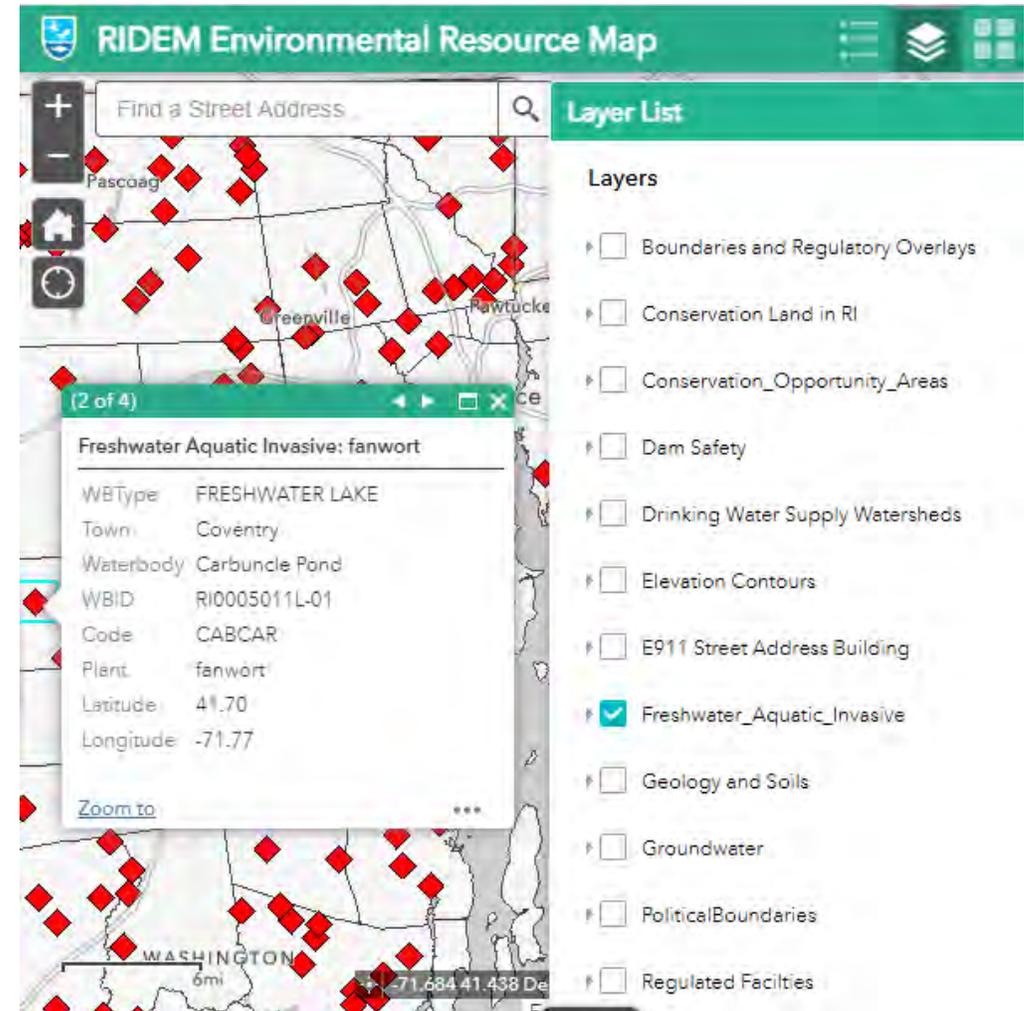
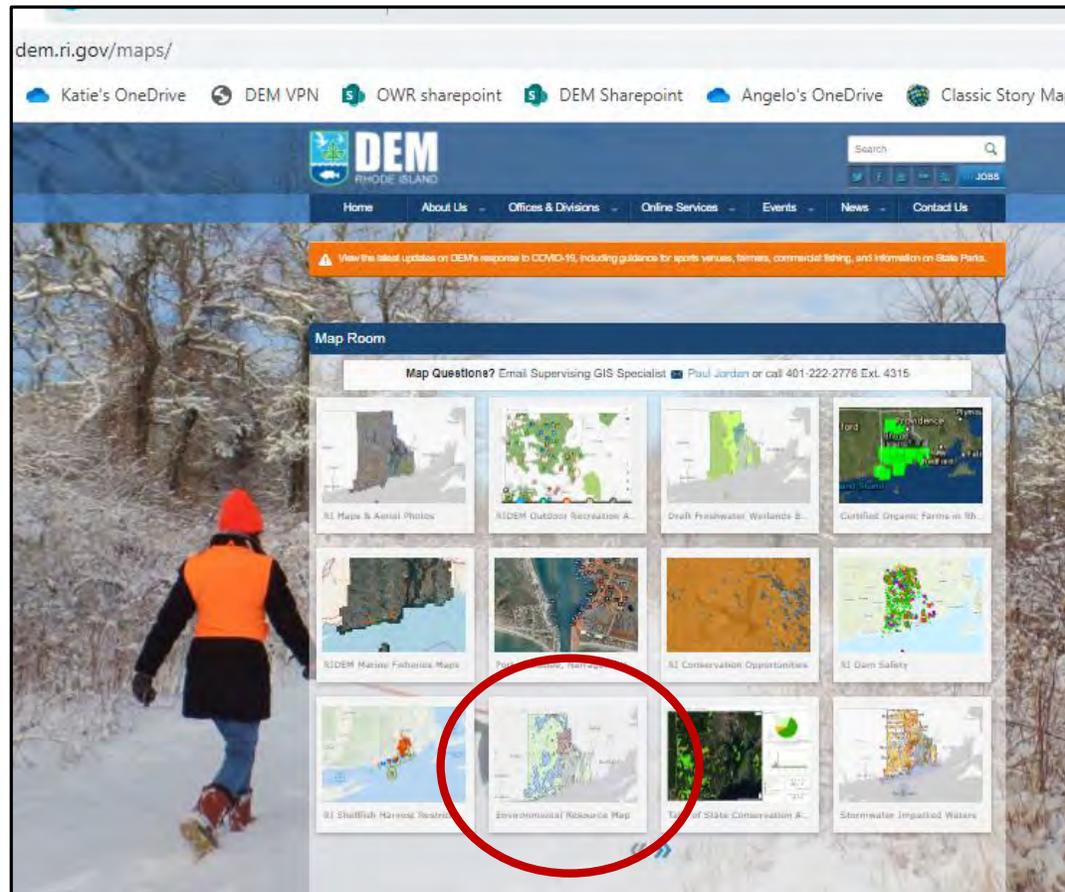
| Town | Waterbody | Common Name |
|---------------|-------------------------------------|-------------------------------------|
| RIVERS | | |
| 1 | Blackstone River (Seg A) | Chinese mystery snail Asian clam |
| 2 | Cold (Cole) Brook & Tribs | Chinese mystery snail |
| 3 | Pawcatuck River & Tribs (Seg E) | Asian clam |
| 4 | Pawtuxet River (Main Stem) | Asian clam |
| 5 | Pawtuxet River (South Branch Seg A) | Chinese mystery snail Asian clam |
| 6 | Roaring Brook & Tribs | Asian clam |
| 7 | Ten Mile River & Tribs (Seg A) | Asian clam |
| 8 | Ten Mile River & Tribs (Seg B) | Asian clam |
| 9 | Woonasquatucket River (Seg D) | Asian clam |
| 10 | Echo Lake | Chinese mystery snail |
| 11 | Spring Lake (Herring Pond) | Chinese mystery snail |
| 12 | Saw Mill Pond | Chinese mystery snail |
| 13 | Tiogue Lake | Asian clam |
| 14 | Upper Dam Pond | Asian clam |
| 15 | | |



Mapping AIS Distributions: Interactive GIS Mapper:

dem.ri.gov/maps/ → Choose Environmental Resource Map

<https://ridemgis.maps.arcgis.com/apps/webappviewer/index.html?id=87e104c8adb449eb9f905e5f18020de5>



Mapping AIS Distributions: Species-specific maps and lists:

<http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/aisridist.pdf>

Freshwater Aquatic Invasive Species in Rhode Island

Species-specific Statewide Distributions

November 2020

Overview and Contents

Between 2007 and 2020 the Rhode Island Department of Environmental Management, Office of Water Resources (OWR) has been documenting the presence of aquatic invasive species (AIS) in lakes, ponds and rivers, statewide. RIDEM OWR monitors approximately 20 lakes or ponds during the summer by visually surveying for invasives, and as resources allow, may visit additional ponds in response to public concerns. To date, RIDEM has visited 164 lakes or ponds, and visited hundreds of sites on streams.

As of November 2020, at least one invasive species was documented by RIDEM staff at 106 lakes or ponds (65% of the visited locations) in addition to invasives found at sites along 27 distinct rivers. A map of this data and list of each location by town, with the invasives species that were identified can be downloaded here: <http://www.dem.ri.gov/programs/benviron/water/wetlands/pdfs/invasive.pdf>. Provided herein are maps showing the species-specific statewide distribution of 16 different invasive species, each accompanied by a list of locations where the species was documented (listed most common to least common).

Number of Documented Freshwaters with Invasive Species (listed most common to least common)

| Invasive Species | Scientific Name | Rivers |
|--|-----------------------------------|-----------|
| 1. Variable milfoil | <i>Myriophyllum heterophyllum</i> | 19 |
| 2. Fanwort | <i>Cabomba caroliniana</i> | 16 |
| 3. Curly-leaf pondweed | <i>Potamogeton crispus</i> | 7 |
| 4. Mudmat | <i>Glossostigma cleistanthum</i> | 1 |
| 5. Water chestnut | <i>Trapa natans</i> | 1 |
| 6. Eurasian milfoil | <i>Myriophyllum spicatum</i> | 2 |
| 7. Spiny naiad | <i>Najas minor</i> | 0 |
| 8. Inflated bladderwort | <i>Utricularia inflata</i> | 0 |
| 9. Water hyacinth | <i>Eichhornia crassipes</i> | 1 |
| 10. Brazilian elodea | <i>Egeria densa</i> | 0 |
| 11. Yellow floating heart | <i>Nymphoides peltata</i> | 0 |
| 12. American lotus | <i>Nelumbo lutea</i> | 0 |
| 13. Parrot feather | <i>Myriophyllum aquaticum</i> | 0 |
| 14. Sacred lotus | <i>Nelumbo nucifera</i> | 0 |
| 15. Asian clam | <i>Corbicula fluminea</i> | 8 |
| 16. Chinese mystery snail | <i>Cipangopulsa chinensis</i> | 3 |
| Total waterbodies with at least one invasive* | | 27 |

Number of Documented Freshwaters with Invasive Species (as of November 6, 2020) (listed most common to least common)

| Invasive Species | Scientific Name | Rivers | Lakes/Ponds | Total | Page Number |
|------------------------|-----------------------------------|--------|-------------|-------|-------------|
| 1. Variable milfoil | <i>Myriophyllum heterophyllum</i> | 19 | 69 | 88 | (1) |
| 2. Fanwort | <i>Cabomba caroliniana</i> | 16 | 61 | 77 | (8) |
| 3. Curly-leaf pondweed | <i>Potamogeton crispus</i> | 7 | 13 | 20 | (14) |
| 4. Mudmat | <i>Glossostigma cleistanthum</i> | 1 | 12 | 13 | (17) |
| 5. Water chestnut | <i>Trapa natans</i> | 1 | 13 | 14 | (19) |



Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street – Room 200
Providence, RI 02908



Page 4 lists links to factsheets for more info on each species

Mapping AIS Distributions: Species-specific maps and lists:

<http://www.dem.ri.gov/programs/benviron/water/quality/surfswq/pdfs/aisridist.pdf>

Freshwater Aquatic Invasive Species in Rhode Island

Species-specific Statewide Distributions

November 2020



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Number of Documented Freshwaters with Invasive Species (as of November 6, 2020) (listed most common to least common)

| Invasive Species | Scientific Name | Rivers | Lakes/Ponds | Total | Page Number |
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| 1. Variable milfoil | <i>Myriophyllum heterophyllum</i> | 19 | 69 | 88 | (1) |
| 2. Fanwort | <i>Cabomba caroliniana</i> | 16 | 61 | 77 | (8) |
| 3. Curly-leaf pondweed | <i>Potamogeton crispus</i> | 7 | 13 | 20 | (14) |
| 4. Mudmat | <i>Glossosigma cleistanthum</i> | 1 | 12 | 13 | (17) |
| 5. Water chestnut | <i>Trapa natans</i> | 1 | 13 | 14 | (19) |
| 6. Eurasian milfoil | <i>Myriophyllum spicatum</i> | 2 | 11 | 13 | (22) |
| 7. Spiny naiad | <i>Najas minor</i> | 0 | 9 | 9 | (24) |
| 8. Inflated bladderwort | <i>Utricularia inflata</i> | 0 | 7 | 7 | (26) |
| 9. Water hyacinth | <i>Eichhornia crassipes</i> | 1 | 4 | 5 | (28) |
| 10. Brazilian elodea | <i>Egeria densa</i> | 0 | 5 | 5 | (30) |
| 11. Yellow floating heart | <i>Nymphoides peltata</i> | 0 | 3 | 3 | (32) |
| 12. American lotus | <i>Nelumbo lutea</i> | 0 | 2 | 2 | (34) |
| 13. Parrot feather | <i>Myriophyllum aquaticum</i> | 0 | 1 | 1 | (36) |
| 14. Sacred lotus | <i>Nelumbo nucifera</i> | 0 | 1 | 1 | (38) |
| 15. Asian clam | <i>Corbicula fluminea</i> | 8 | 16 | 24 | (40) |
| 16. Chinese mystery snail | <i>Cipangopaludina chinensis</i> | 3 | 22 | 25 | (43) |
| Total waterbodies with at least one invasive* | | 27 | 106 | | |

*some waterbodies have more than one invasive species; therefore, total reflects distinct waterbodies



49 pages
(wait for
download)

Distribution of fanwort (*Cabomba caroliniana*) in RI

river segments listed first alphabetically; then lakes listed by city or town

| Town | Waterbody Name | First documented | Last Surveyed |
|----------------------|-------------------------------------|------------------|---------------|
| Burrillville | | | |
| 18 | Echo Lake (Pascoag Reservoir) | 9/25/2007 | 9/13/2012 |
| 19 | Spring Lake (Herring Pond) | 9/25/2007 | 6/8/2018 |
| 20 | Sucker Pond | 10/9/2009 | 8/20/2018 |
| 21 | Wakefield Pond | 9/10/2007 | 8/22/2017 |
| Central Falls | | | |
| 22 | Valley Falls Pond | 8/9/2017 | 8/9/2017 |
| Coxe | | | |
| 23 | Carbuncle Pond | 9/5/2007 | 8/31/2020 |
| 24 | Flat River Reservoir (Johnson Pond) | 9/5/2007 | 9/21/2018 |
| 25 | Maple Root Pond | 7/27/2016 | 7/27/2016 |
| 26 | Tiogue Lake | 9/5/2007 | 9/9/2020 |
| Cranston | | | |
| 27 | Meshanicut Pond | 8/6/2018 | 9/11/2020 |
| 28 | Print Works Pond | 8/7/2009 | 8/7/2009 |
| 29 | Randall Pond | 7/13/2011 | 7/19/2017 |
| Cumberland | | | |
| 30 | Happy Hollow Pond | 8/18/2010 | 8/18/2010 |
| 31 | Robin Hollow Pond | 8/18/2010 | 8/18/2010 |
| 32 | Sneech Pond | 6/3/2010 | 9/24/2018 |
| 33 | | | |

RI lakes and river segments with fanwort as of 10/19/2020

10 of 45



January RIRC Presentation Outline – things RIDEM works on:

1. Clean Water Act Monitoring & Assessment of Waterbody Conditions:

Lake, pond, and river surveys for AIS (Aquatic Invasive Species)

Water Quality Monitoring in Rivers

Stream Macroinvert Biomonitoring, Bioassessments and Biocriteria

2. Mapping Resulting AIS Distributions:

Statewide presence/absence map & list:

Interactive GIS mapper

Species-specific maps and lists:

Top two concerns: Asian Clam and Water Chestnut



Mapping AIS Distributions: Species-specific maps and lists:

Concerns – Asian Clam is on the rise

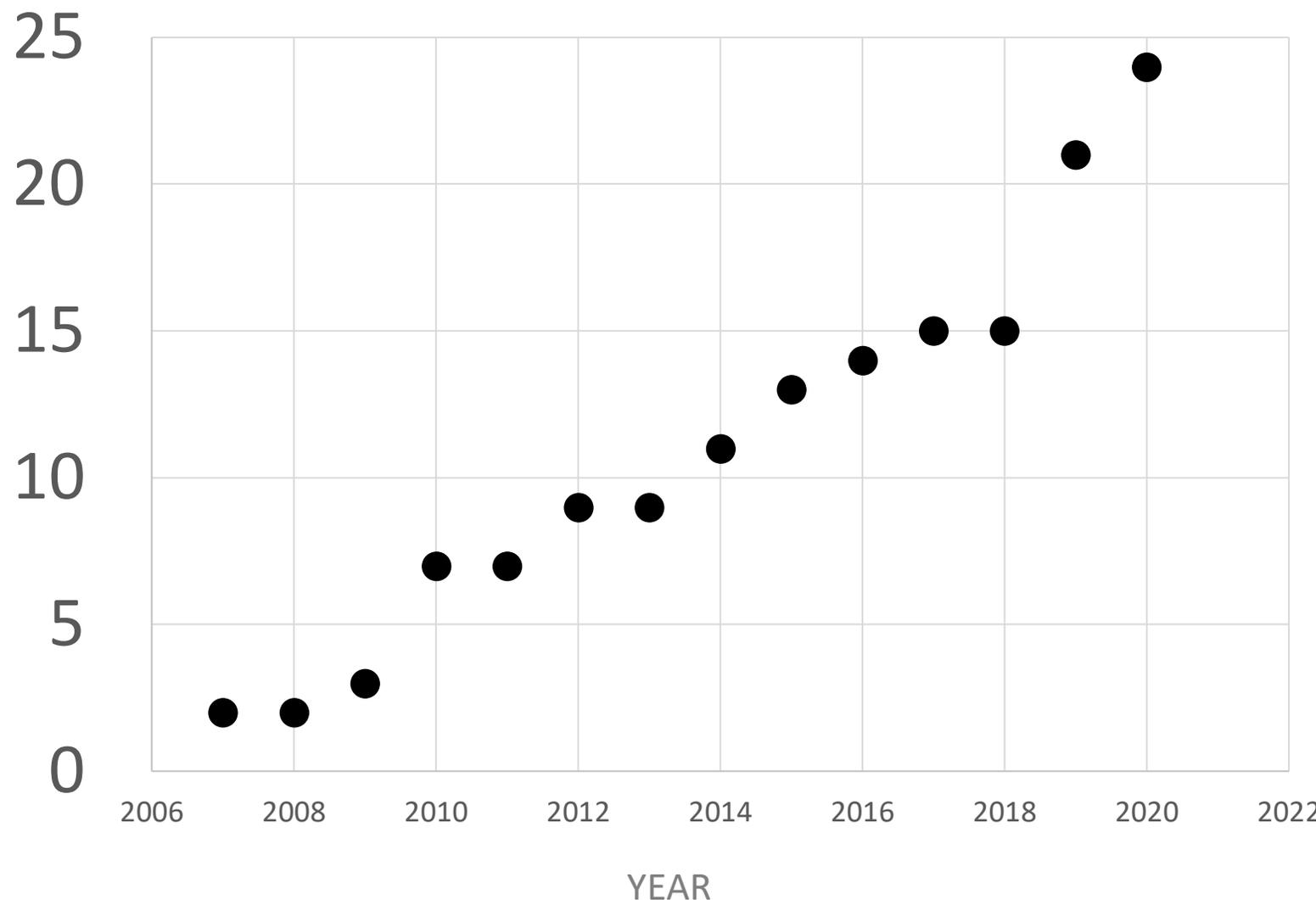


One mature clam can release thousands of larvae per day



Mapping AIS Distributions: Species-specific maps and lists:

Number Lakes with Asian Clam



CAUTION!
Invasive Asian Clams
Are here in this water, slow spread to other places!

Decontaminate Your Gear:

CLEAN Remove mud & debris on:

- Boats, Trailers, Fishing rods
- Anchors, Paddles, Gear
- Hose off, use hot water if available (best at 140° F)

DRAIN

- Motor Boats
- Canoes and Kayaks
- Motors
- Live Wells
- Bait Buckets

DRY All wet gear & equipment:

- Hang or leave out in sun
- Dry completely before going to another lake, pond or river

 **RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**
To report invasive animals, contact: Division of Fish and Wildlife (401) 789-0281
To report invasive plants, contact: Office of Water Resources (401) 222-4700



Mapping AIS Distributions: Species-specific maps and lists:

Concerns – Water Chestnut is on the rise

Valley Falls Pond, Central Falls/Lincoln (~30 acres covered)



Central Pond, East Providence (~50 acres covered)

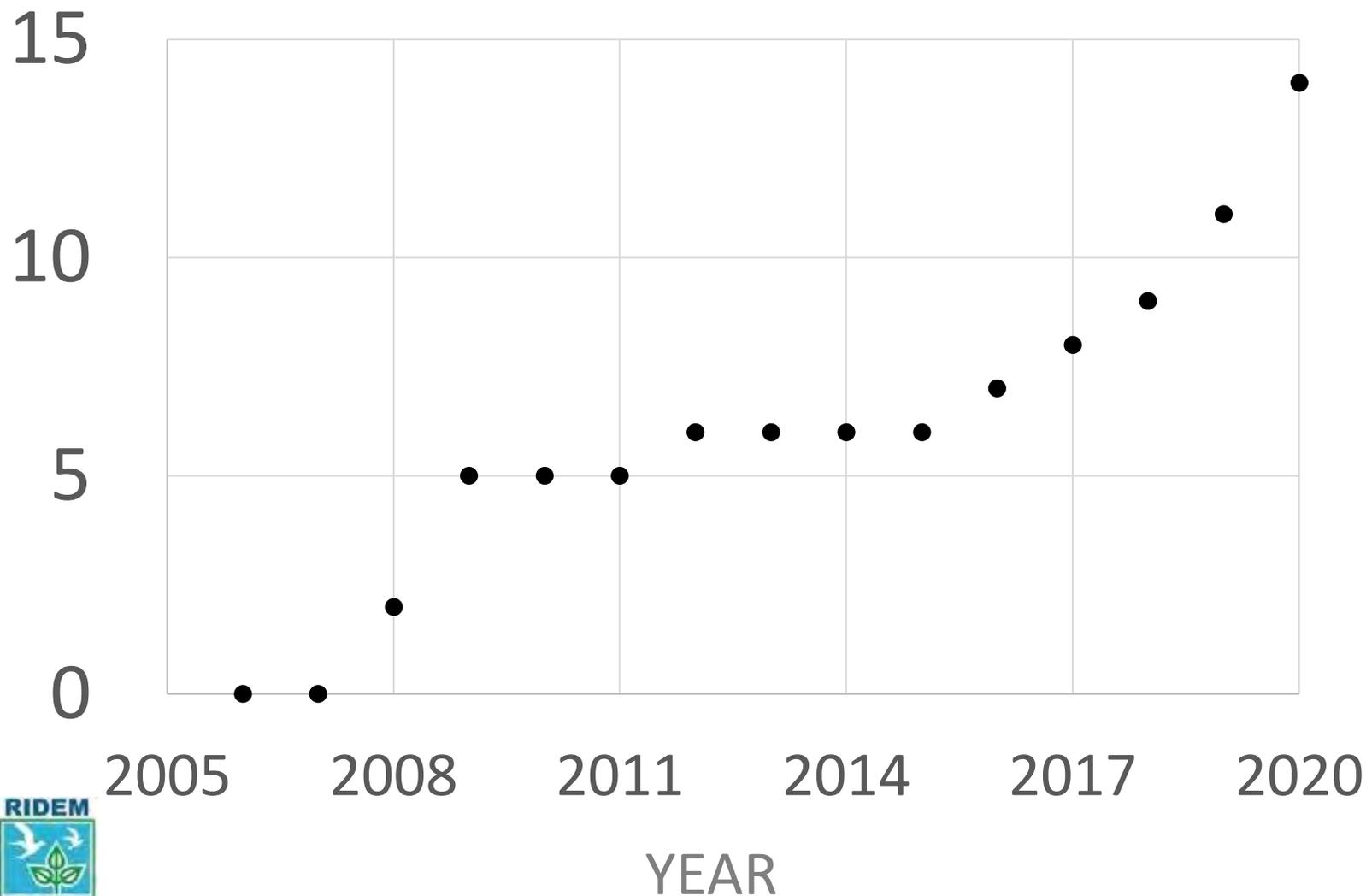


Chapman Pond, Westerly (~9 acres covered)



Mapping AIS Distributions: Species-specific maps and lists:

Number Lakes w/ Water Chestnut



Invasive Water Chestnut

Spot • Learn to recognize its triangular leaves that grow radiating from the center
• All the jagged leaves on one plant form a rosette that floats
• In August, up to 15-20 large, pointy seeds can develop under the leaves
• The following year, the seeds produced can make 10-15 new plants
• This aggressive plant grows large and reproduces exponentially to form a dense mat of plants that will cover several acres (see background photo)

Pull • Paddlers can easily pull water chestnut plants up, as the roots are small
• In early June, new rosettes can fit in the palm of your hand, but as they grow larger over the summer, they can be 2 feet wide by the end of August
• It is easier to pull the smaller plants in June and July, before the seeds form
• After removing the plant, dispose as trash, or compost as far from the water as possible. As an annual, once pulled, it will not grow back (success!)

Prevent • Pulling plants before the seeds form is most effective to stop spreading
• The large, pointy seeds are barbed, and if left to mature, will then attach to birds, wildlife, boats, waders or other gear to travel over land to new lakes
• Mature seeds that have dropped may become dormant in the lake bottom, and not germinate the next year, but can remain viable to sprout up to 12 years later, so pulling is a long term effort - keep looking every year!

Rhode Island Department of Environmental Management
To report water chestnut at a new location, contact: Office of Water Resources (401)-222-4700
For more info, go to: <http://www.dem.ri.gov/programs/benviron/water/quality/surfeq/aists/tranet-4s.pdf>

RI Rivers Council Presentation Outline – January 13, 2021:

1. Intro: Clean Water Act Monitoring & Assessment of Waterbody Conditions:

Survey Lakes/ponds and Outreach for AIS (Aquatic Invasive Species)
Stream Macroinvert Biomonitoring, Bioassessments and Biocriteria
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2. Aquatic Invasive Species (AIS) Mapping – publicly available distribution info:

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Species-specific maps and lists
Two Species Highlights: Asian Clam and Water Chestnut

3. AIS Management:

Quick Overview of Options
RIDEM Dispatches seasonal interns to hand-pull water chestnut
A water chestnut case study – lessons learned from Lake Champlain



Stages of an Invasion

ARRIVE
Plant is introduced

ESTABLISH

GROW & SPREAD

DISPLACE NATIVES

DOMINATE ECOSYSTEM

PREVENT



Education and Outreach

PREVENT

Reminders at Boat Ramps

ARRIVE
Plant is introduced



ESTABLISH



GROW & SPREAD



DISPLACE NATIVES



DOMINATE ECOSYSTEM

STOP

THE SPREAD OF AQUATIC INVASIVE SPECIES

Zebra Mussel (1/8 inch), Variable Milfoil, Water Chestnut, Asian Clam (1/2 inch), Eurasian Milfoil, Fanwort, Carp, Goldfish, Koi

BOATERS: INSPECT VESSEL CAREFULLY BEFORE & AFTER USE!

- Remove ALL weeds and plant fragments from watercraft & trailer before & after use
- Drain boat & motor far from water; allow to dry before next use
- Clean off all waders, boots and gear after use in any waterbody
- Do not release bait or aquarium fish, shellfish or plants

For more information contact:
RI DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Fish and Wildlife
(401) 789-0281 or (401) 789-7481
www.dem.ri.gov



www.dem.ri.gov/programs/benviron/water/quality/surfwq



Education and Outreach

PREVENT

ARRIVE
Plant is introduced

ESTABLISH

GROW & SPREAD

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DOMINATE ECOSYSTEM

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Freshwater Aquatic Invasive Species in Rhode Island
Species-specific Statewide Distributions January 2018

OFFICE OF WATER RESOURCES / WATER QUALITY / SURFACE WATER QUALITY
INTRODUCTION TO AQUATIC INVASIVE SPECIES

Introduction to Aquatic Invasive Species

Aquatic invasive species (non-native plants and animals introduced intentionally) into lakes and streams can reduce biodiversity and abundance of native species, the stability of the ecosystem and/or the use of the infested water body. AIS are a major threat to freshwater ecosystems and a significant management concern because of their ecological and economic costs.

Invasive Plants **Invasive Animals**

Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street – Room 200
Providence, RI 02908

Invasive Water Chestnut

Spot Pull Prevent

Pull This Invasive Plant Out!

Spot

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- All the jagged leaves on one plant form a rosette that floats
- In August, up to 15-20 large, pointy seeds can develop under the leaves
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For more info, go to: <http://www.dem.ri.gov/programs/benviron/water/quality/surfhwq/ranat/fs.pdf>

CAUTION!
Asian Clams
Water, slow spread to other places!
Contaminate Your Gear:

Remove mud & debris on:

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Motor Boats
 Canoes and Kayaks
 Motors
 Live Wells
 Bait Buckets

All wet gear & equipment:

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DRY

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
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www.dem.ri.gov/programs/benviron/water/quality/surfhwq



Education and Outreach

PREVENT

ARRIVE
Plant is introduced



ESTABLISH



GROW & SPREAD



DISPLACE NATIVES



DOMINATE ECOSYSTEM

G.R.E.A.T. Boaters Program:

Greeting Recreationalists to Empower And Train Boaters



Smith and Sayles Reservoir, RI



Education and Outreach

PREVENT

ARRIVE
Plant is introduced



ESTABLISH



**GROW &
SPREAD**



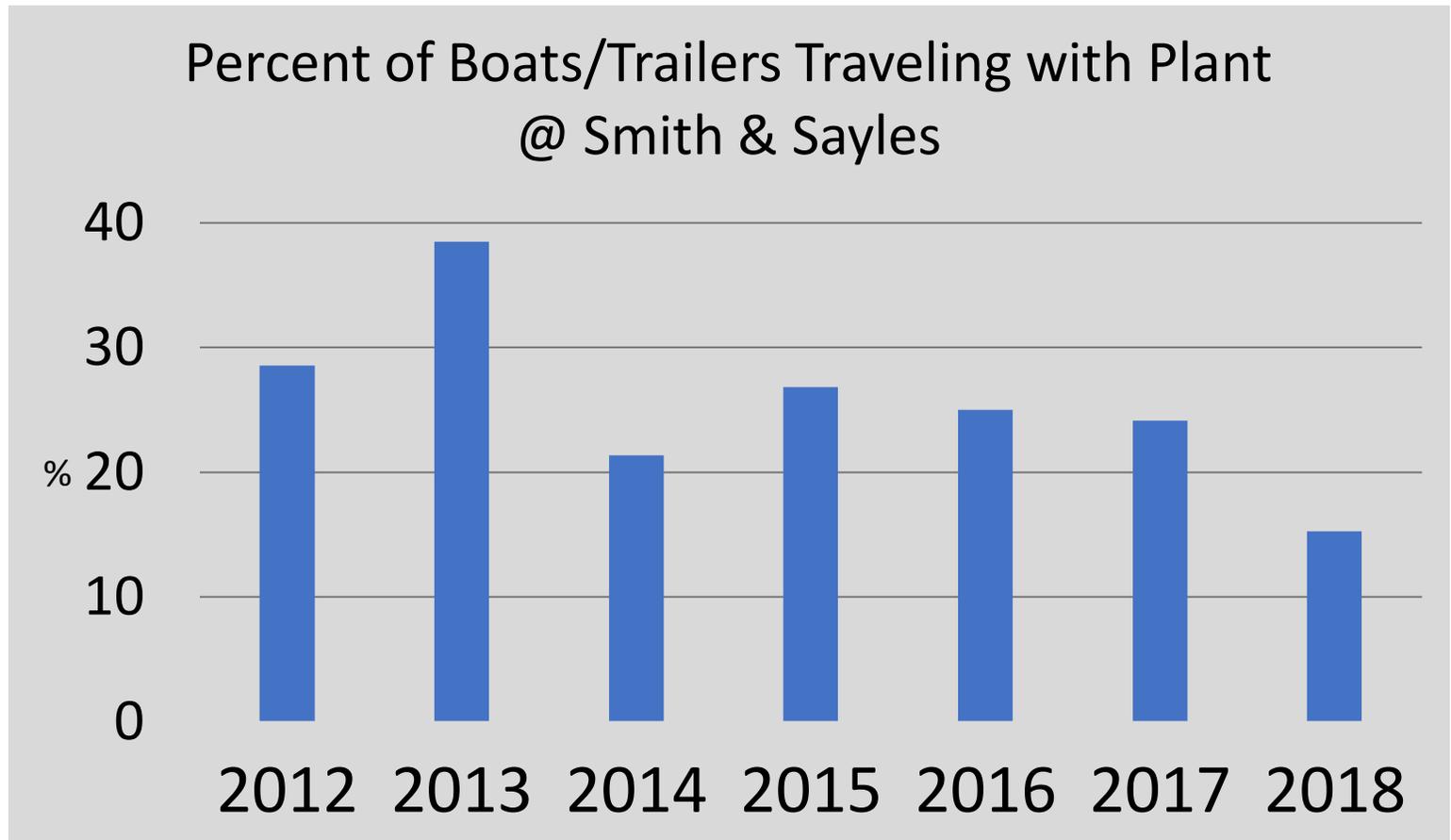
**DISPLACE
NATIVES**



**DOMINATE
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GROW & SPREAD



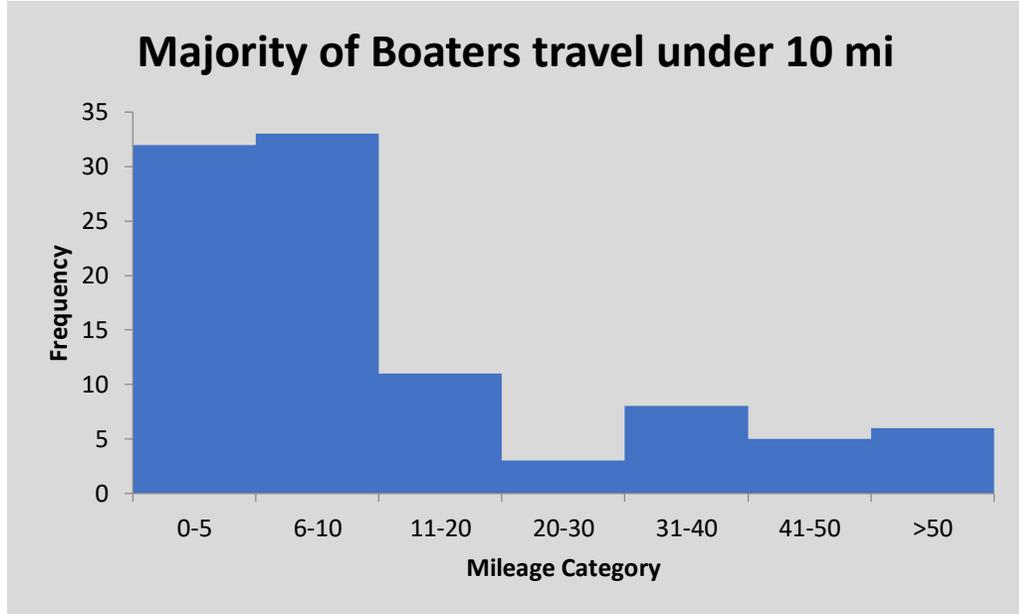
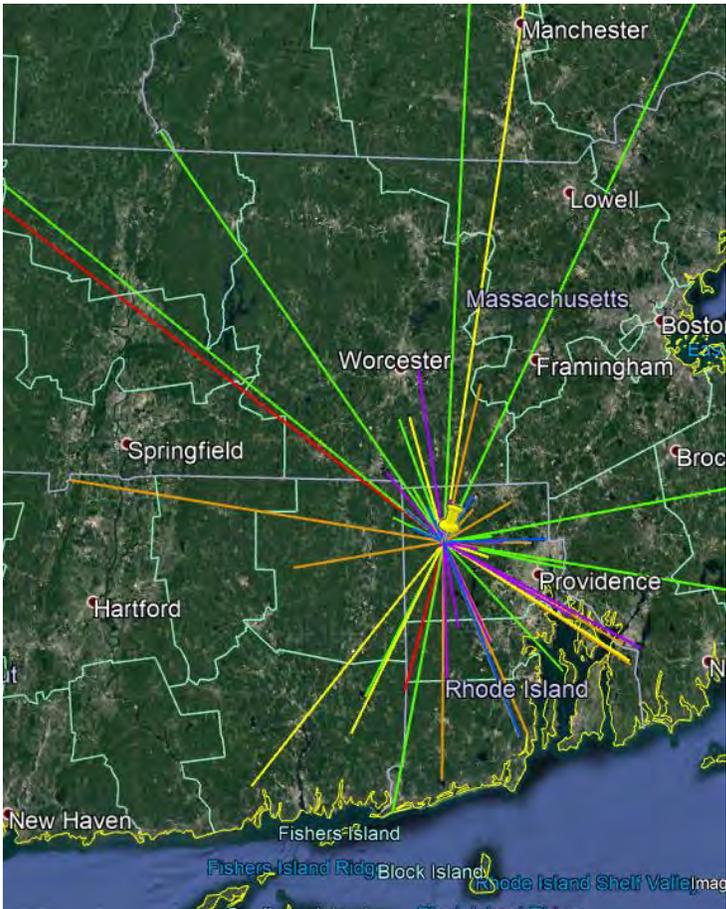
DISPLACE NATIVES



DOMINATE ECOSYSTEM

G.R.E.A.T. Boaters Program:

Greeting Recreationalists to Empower And Train Boaters



Plant Removal

Hand Pulling



Belleville Pond, NK, RI

ERADICATE

- Completely removes plant
- Timing is important
- Effective on individual plants (small areas)
- Highly specific to target (plant species)
- Least environmentally abrasive option
- May require DEM approval

ARRIVE

Plant is introduced

ESTABLISH

**GROW &
SPREAD**

**DISPLACE
NATIVES**

**DOMINATE
ECOSYSTEM**

Hand Pulling: Water Chestnut Control in RI- Volunteer Events



Volunteer Pulls
organized by:
2008
RINHS (Belleville)

2009-2011
Westerly Land
Trust & RINHS
(Chapman Pond)



Hand Pulling: Water Chestnut Control in RI using RIDEM interns

Places to Pull in 2021:

In Blackstone Watershed:

1. Blackstone River (launch from Central Falls Landing)
2. Carle's Pond, Cumberland
3. Sylvestre Pond, Woonsocket

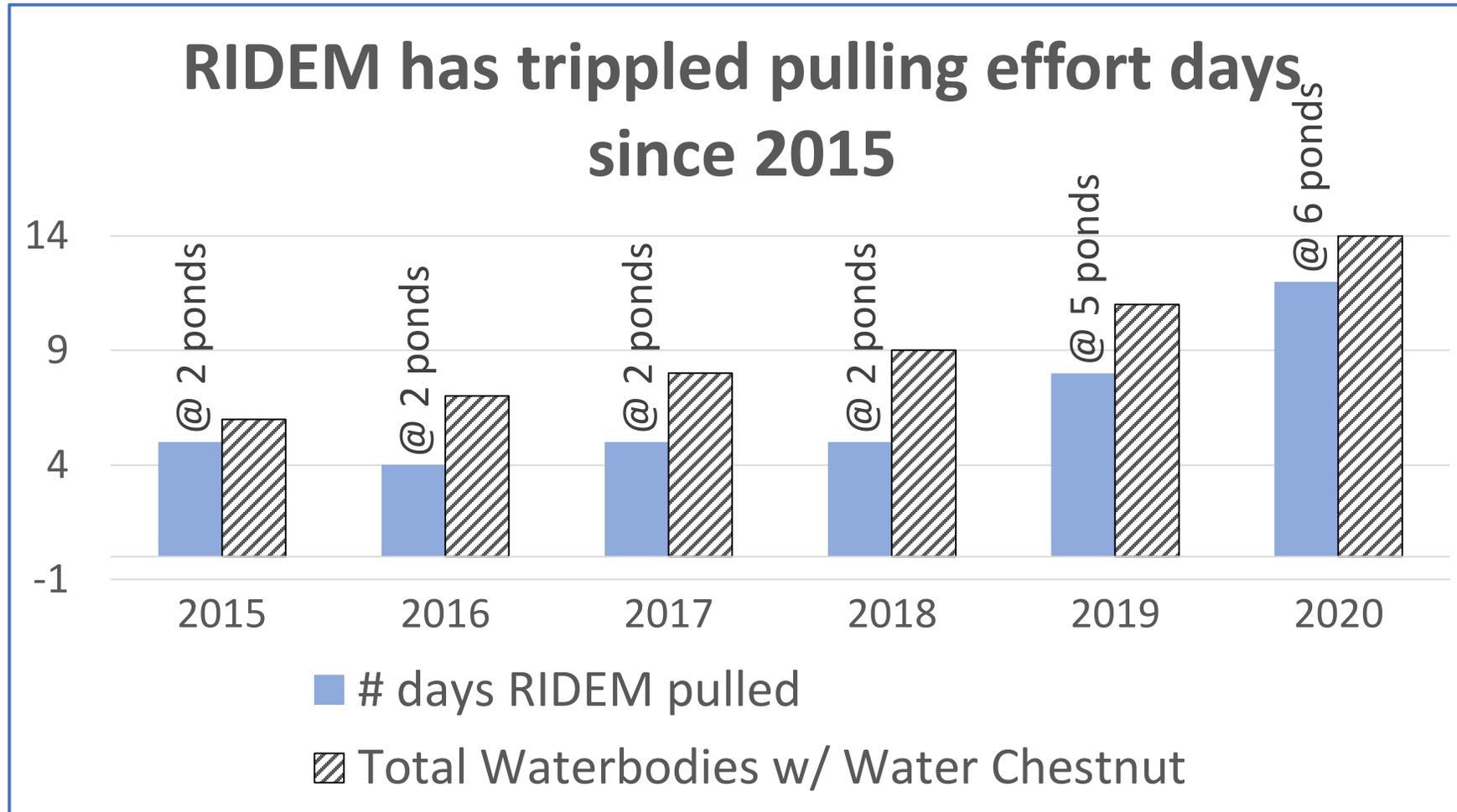
Ten Mile River Watershed:

4. Turner Reservoir, EP
5. Cemetery Pond, EP

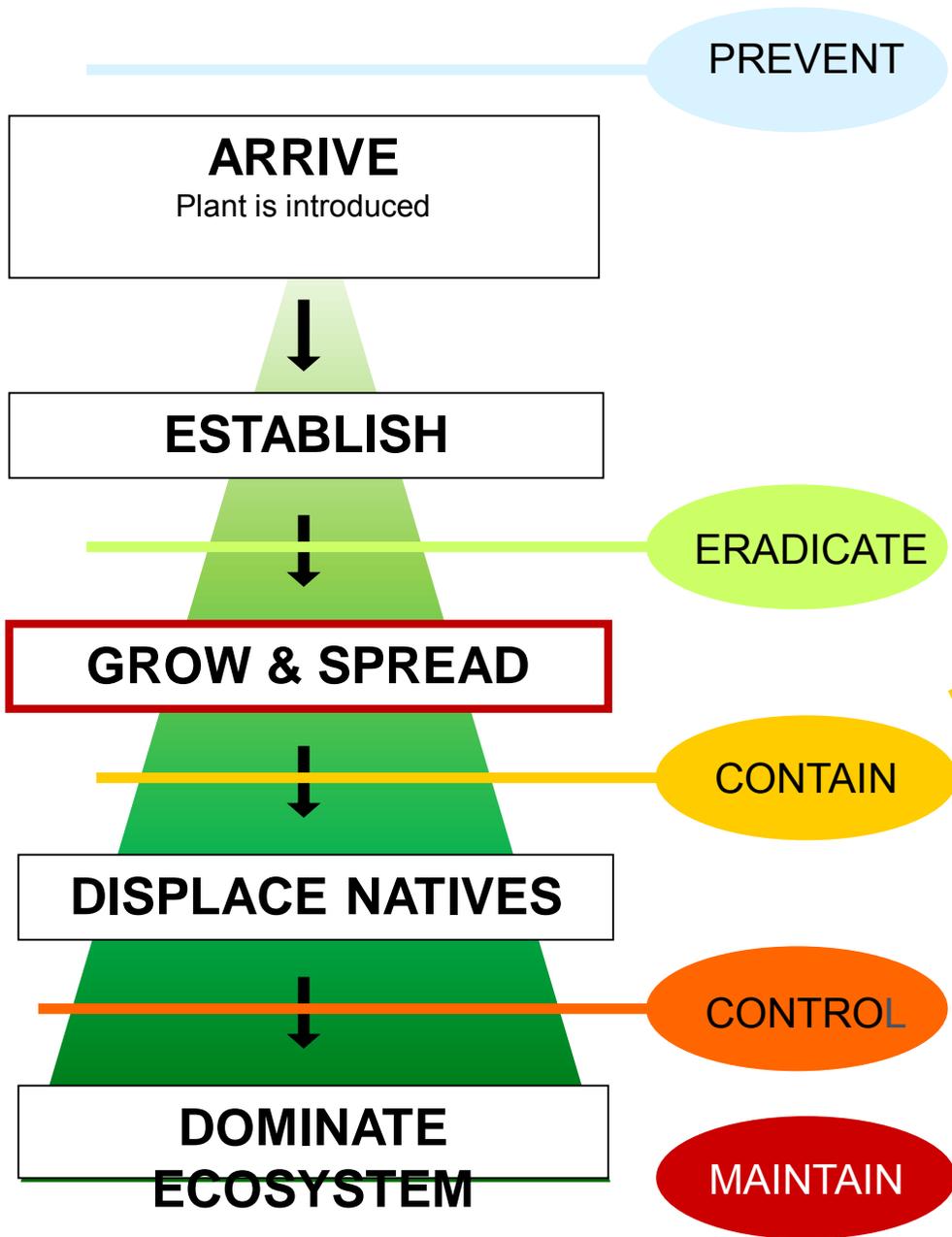
Moshassuck River Watershed:

6. Barney Pond, Lincoln
7. Olney Pond, Lincoln
8. Monitor Butterfly Pond!

9. Belleville Pond, NK

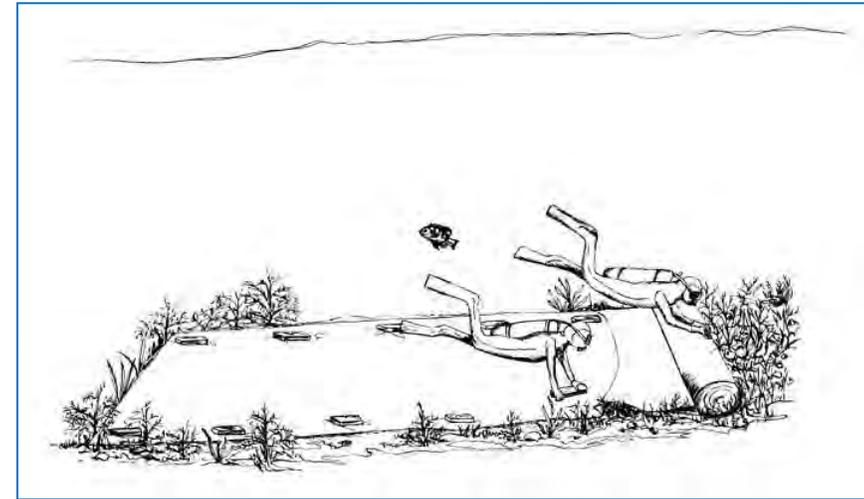


RIDEM is currently setting up meetings with Ten Mile River WC and Blackstone River WC to talk about ways they may be able to help – if your organization is interested, please email katie.degoosh@dem.ri.gov

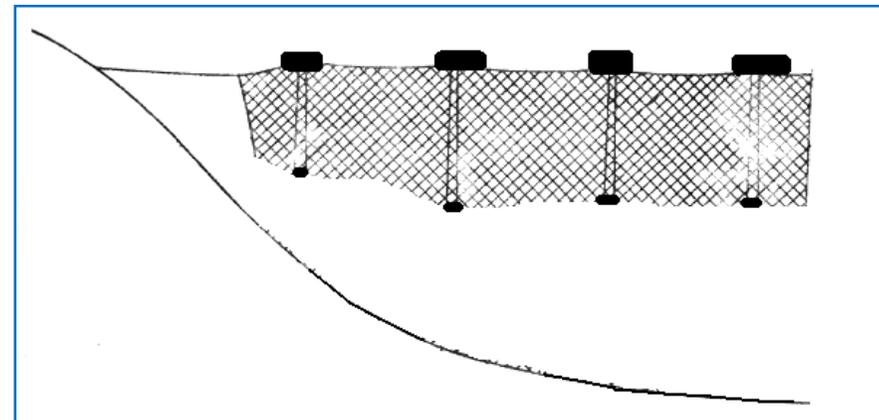


Enclose Small Area

Benthic Barriers

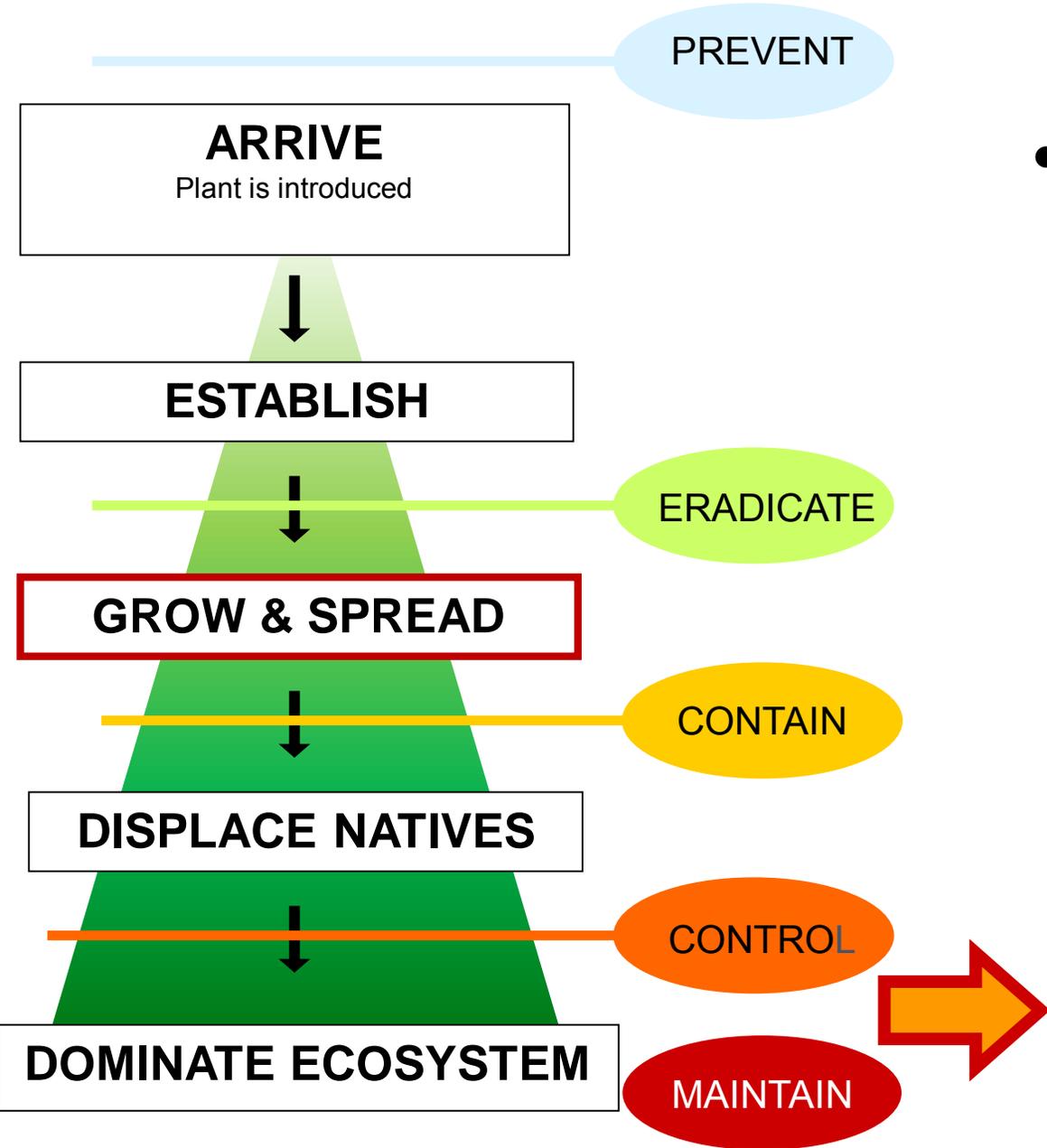


Floating Nets



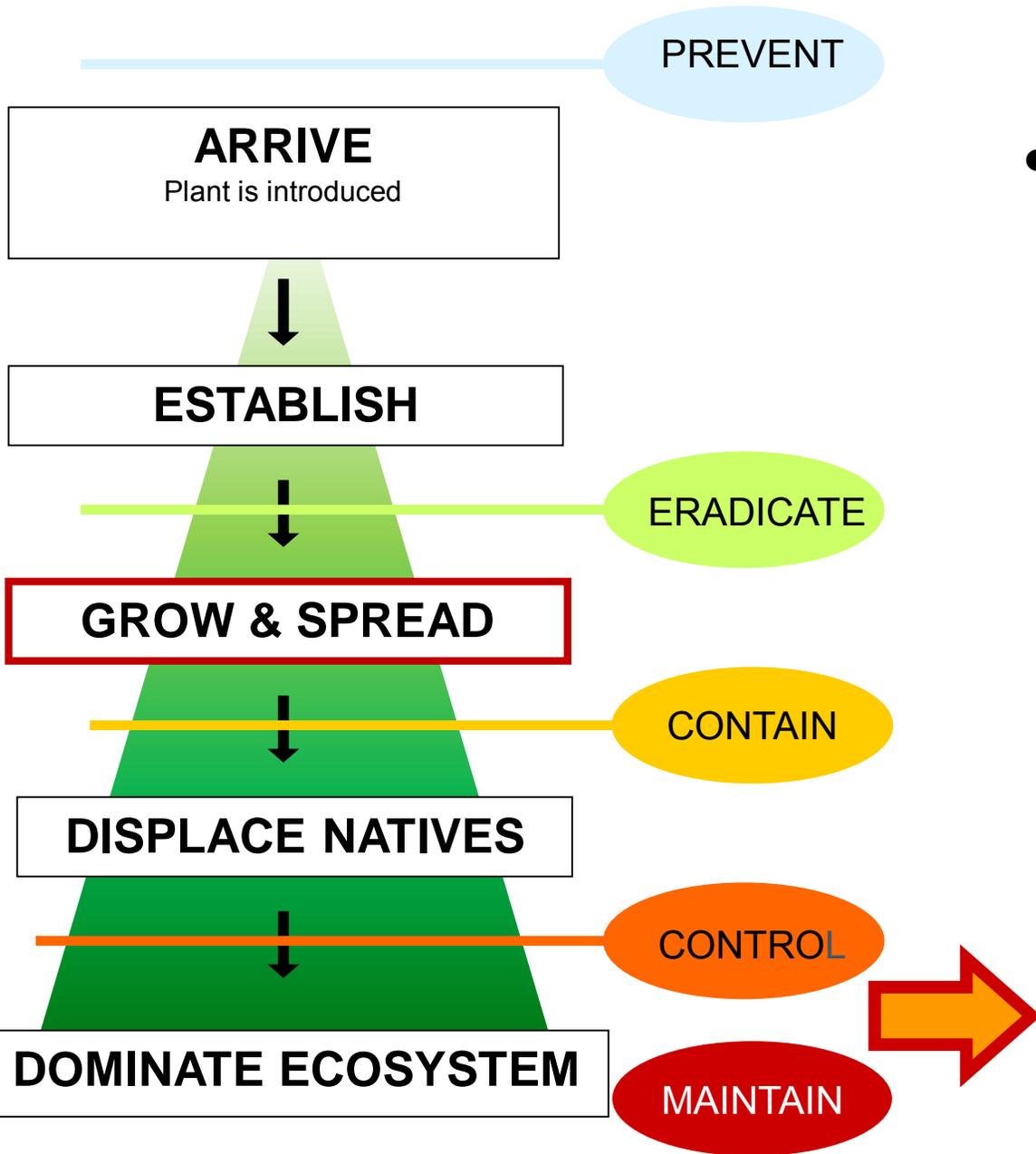
Common Control Types:

- Physical Methods
 - Mechanical



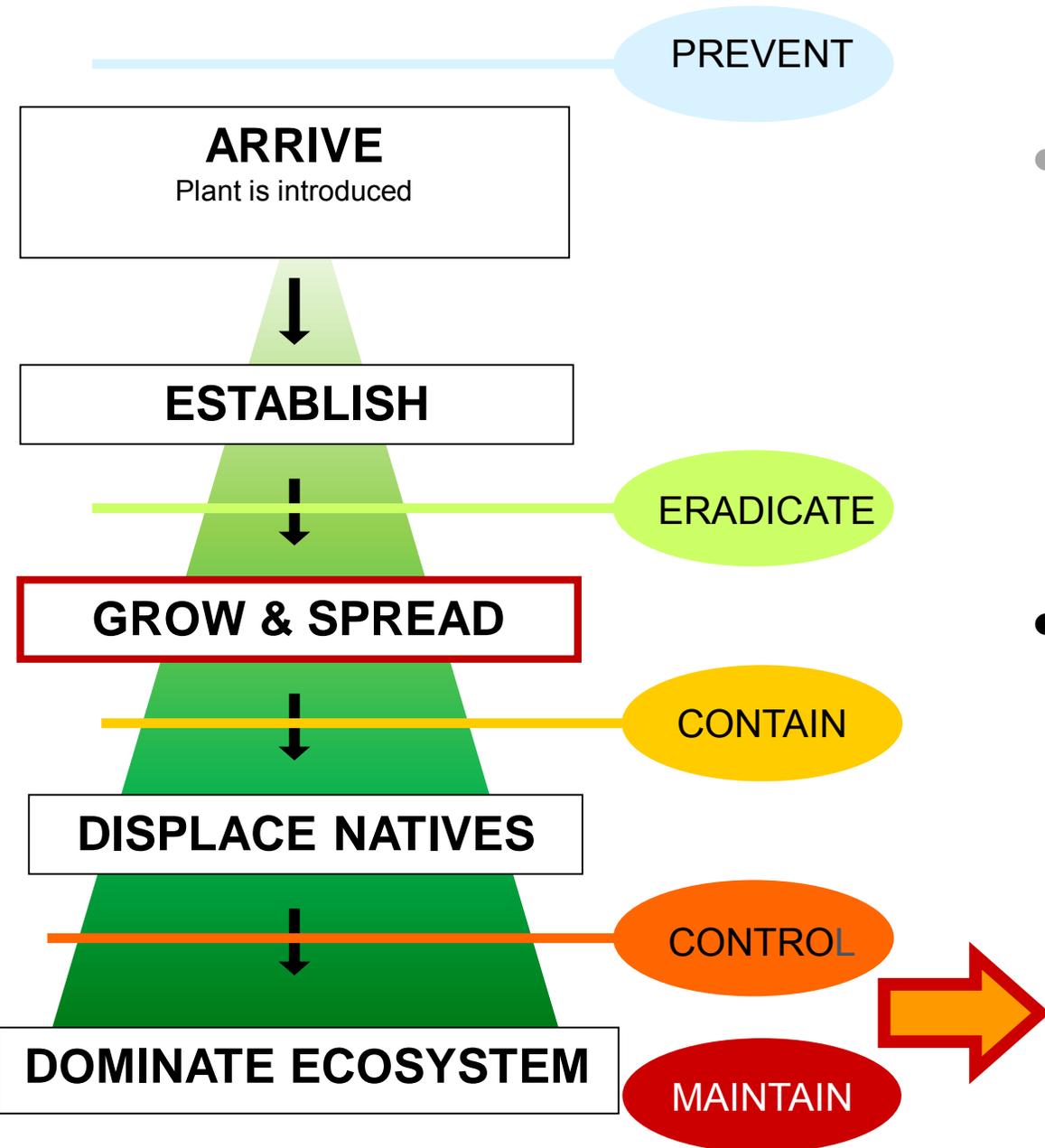
Common Control Types:

- Physical Methods
 - Mechanical
 - Hand Pulling (as discussed earlier)



Common Control Types:

- Physical Methods
 - Mechanical
 - Hand Pulling
- Chemical Methods



Common Control Types:

- Physical Methods
 - Mechanical
 - Hand Pulling
- Chemical Methods
- Biological Methods



PREVENT

ARRIVE

Plant is introduced



ESTABLISH



GROW & SPREAD



DISPLACE NATIVES



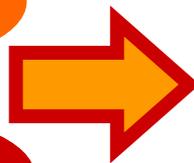
DOMINATE ECOSYSTEM

ERADICATE

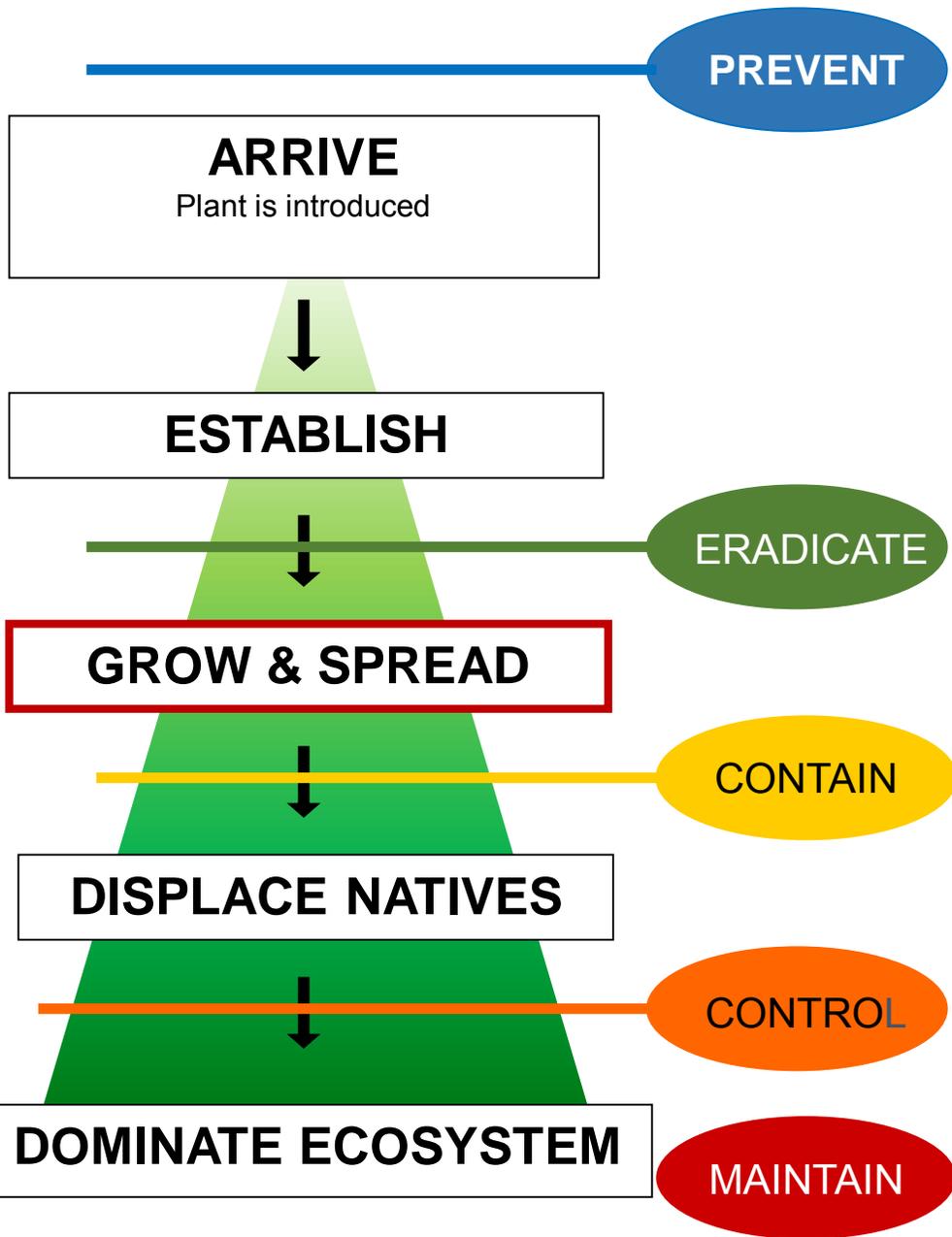
CONTAIN

CONTROL

MAINTAIN



AIS Management Options

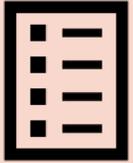
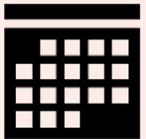


Best when **PLANNED**
in Combination
(**INTEGRATED PEST MANAGEMENT**)

Follow this link for a table with details of all common management options:
<http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/control.pdf>



Integrate Options into a Lake Management Plan

| | |
|---|--|
|   | <ul style="list-style-type: none">• Written document for specific lake |
|   | <ul style="list-style-type: none">• Outlines & prioritizes specific goals of management (eradicate or control) |
|   | <ul style="list-style-type: none">• lists factors at a particular lake that contribute to a specific plant problem |
|   | <ul style="list-style-type: none">• Provides options and recommends strategies for specific goals |
|   | <ul style="list-style-type: none">• Names which people will complete management strategies |
|   | <ul style="list-style-type: none">• Provides a specific, measurable timeframe with quantifiable endpoints |

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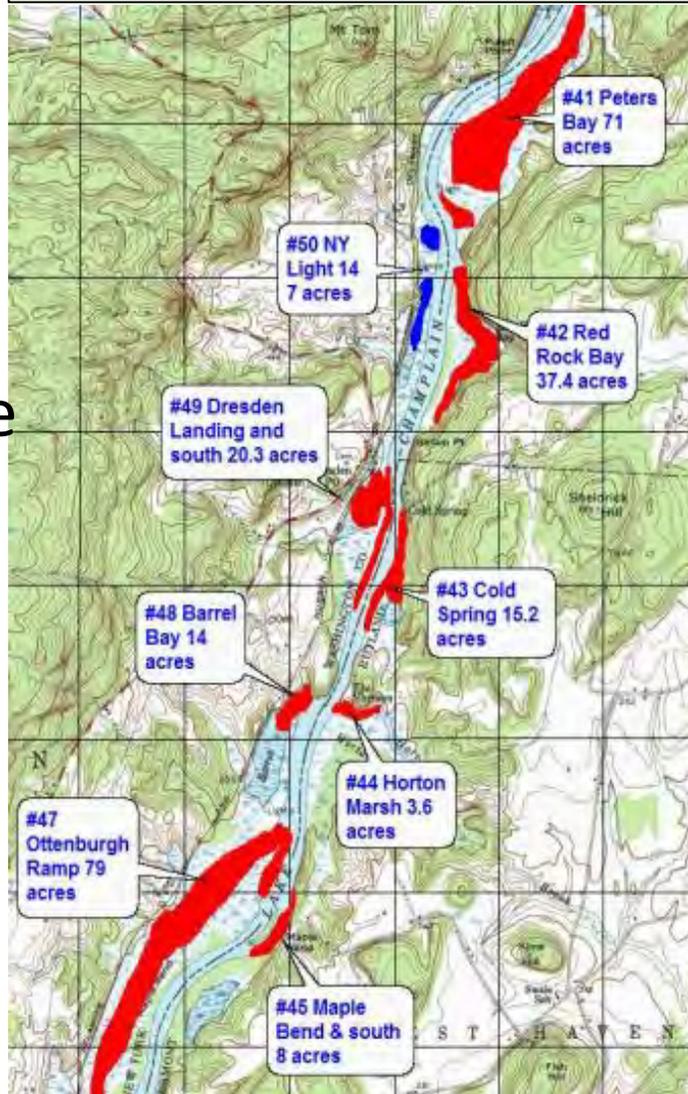


Water Chestnut Management Lessons from Lake Champlain

1. It's not so bad! Rhode Island populations are relatively small, and with resources, could also be managed over time



2014 MECHANICAL HARVESTING SITES



- 2014 mechanical harvesting sites.
- Prior mechanical harvesting site; 2014 coverage less than 25%
- Shallow water sites with less than 25% water chestnut

<http://www.lcbp.org/wp-content/uploads/2017/09/>

Largest Populations (acres)

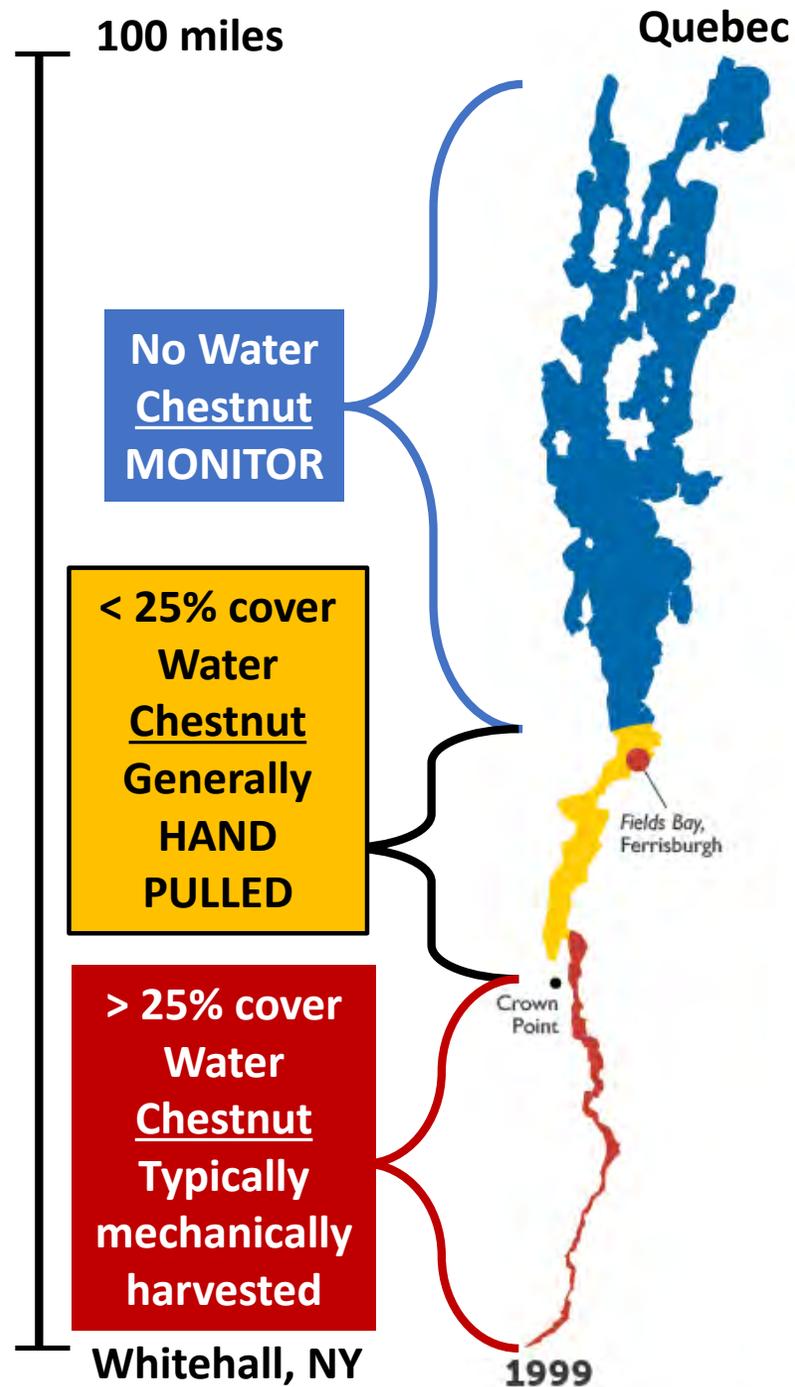
| Lake Champlain (2014) | Rhode Island (2020) | RI Waterbodies |
|-----------------------|---------------------|--------------------|
| 79 | ~ 50 | Central Pond |
| 71 | ~ 30 | Valley Falls Pond |
| 37.4 | ~ 9 | Chapman Pond |
| 20.3 | < 1 | Turner Reservoir |
| 15.2 | < 1 | Lakeside Cem. Pond |
| 14 | < 1 | Belleville Pond |
| 8 | < 1 | Porters Pond |
| 7 | < 1 | Blackstone River |
| 3.6 | < 1 | Olney Pond |
| | < 1 | Carls Pond |
| | < 1 | Roger Williams Pk |
| | < 1 | Sol Spring Farm |
| | < 1 | Barney Pond |
| | < 1 | Sylvestre Pond |

Water Chestnut Management Lessons from Lake Champlain

1. It's not so bad! Rhode Island populations are relatively small, and with resources, could also be managed over time



<https://sol.lcbp.org/en/figures-and-graphics/>

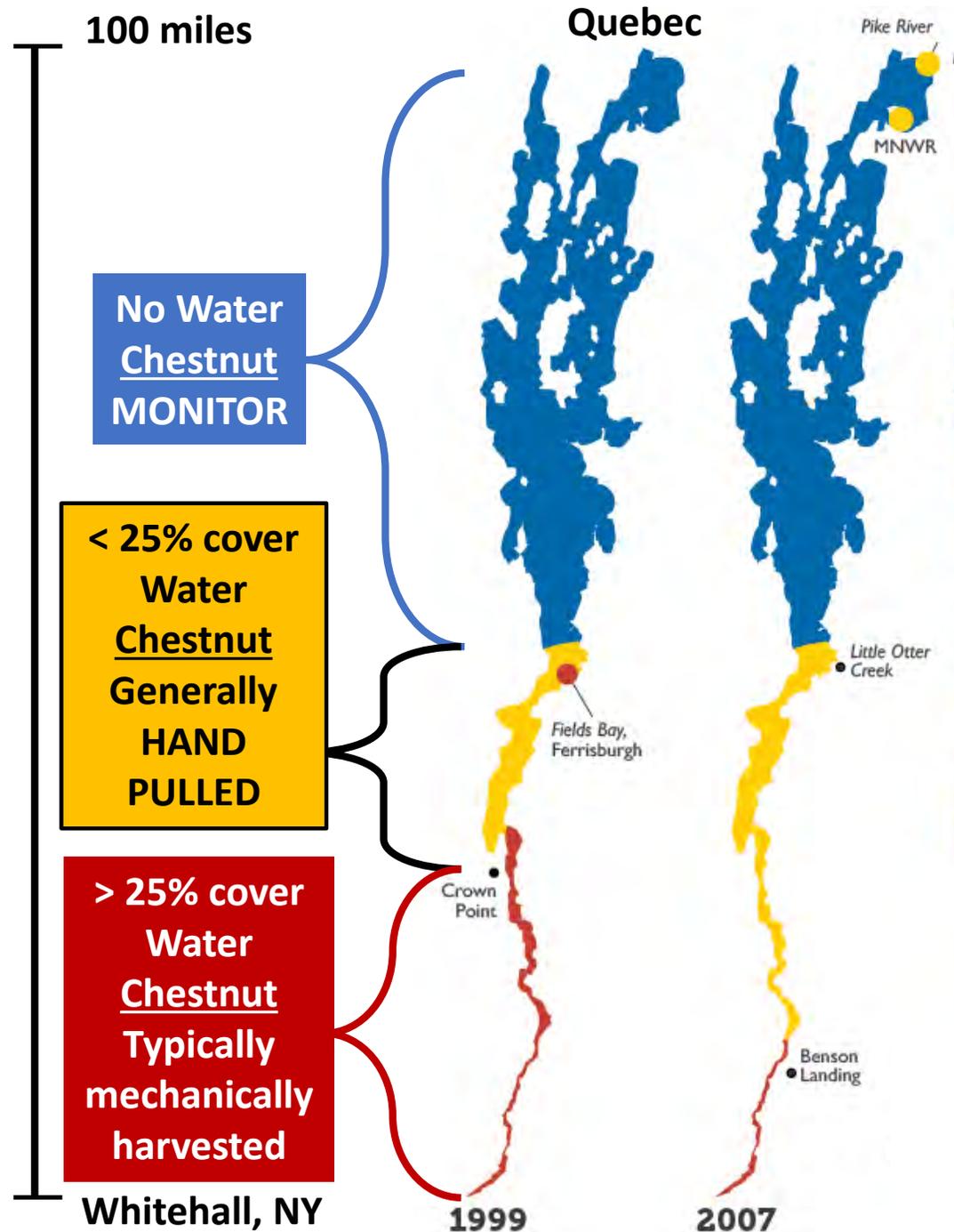


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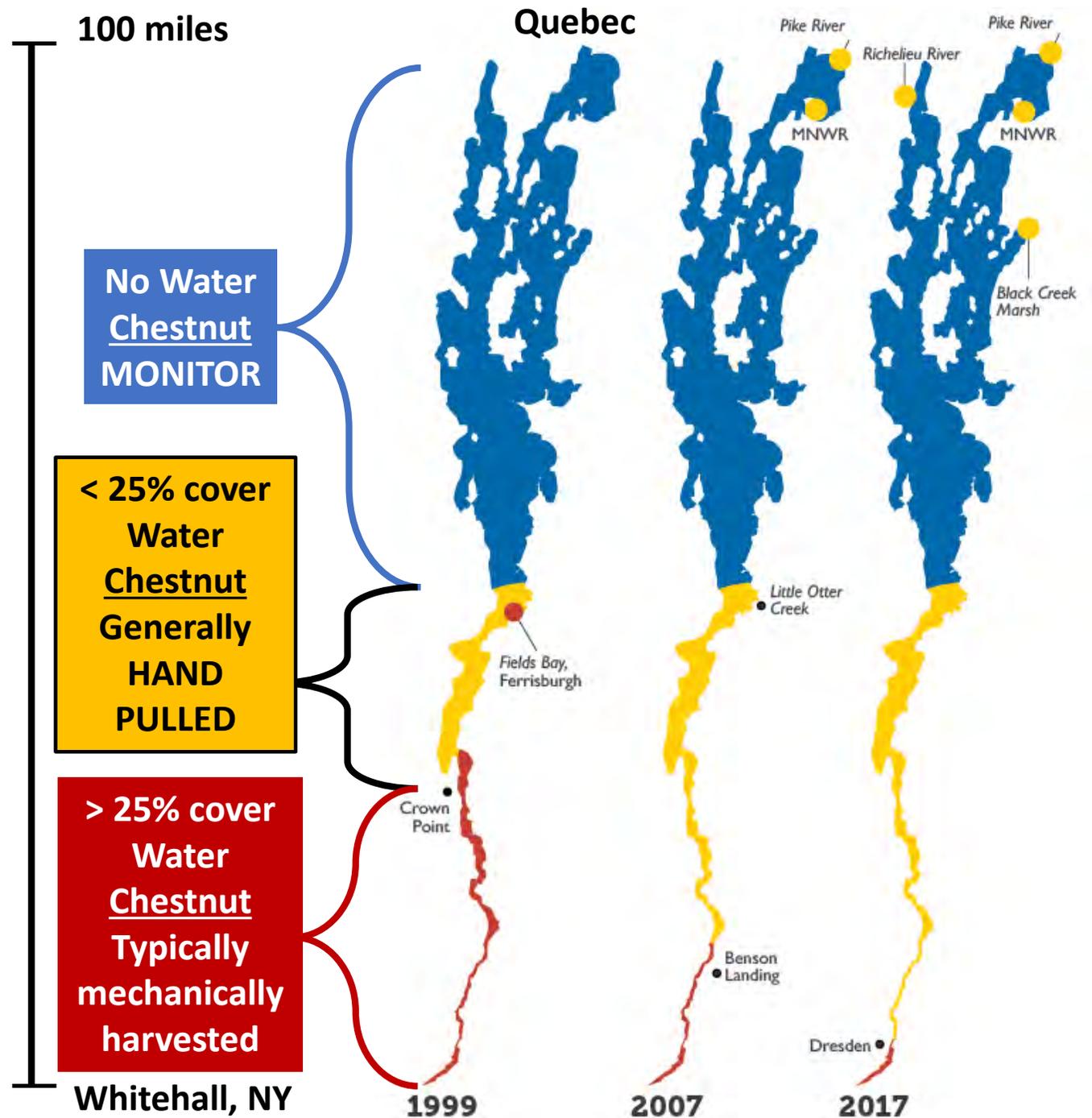


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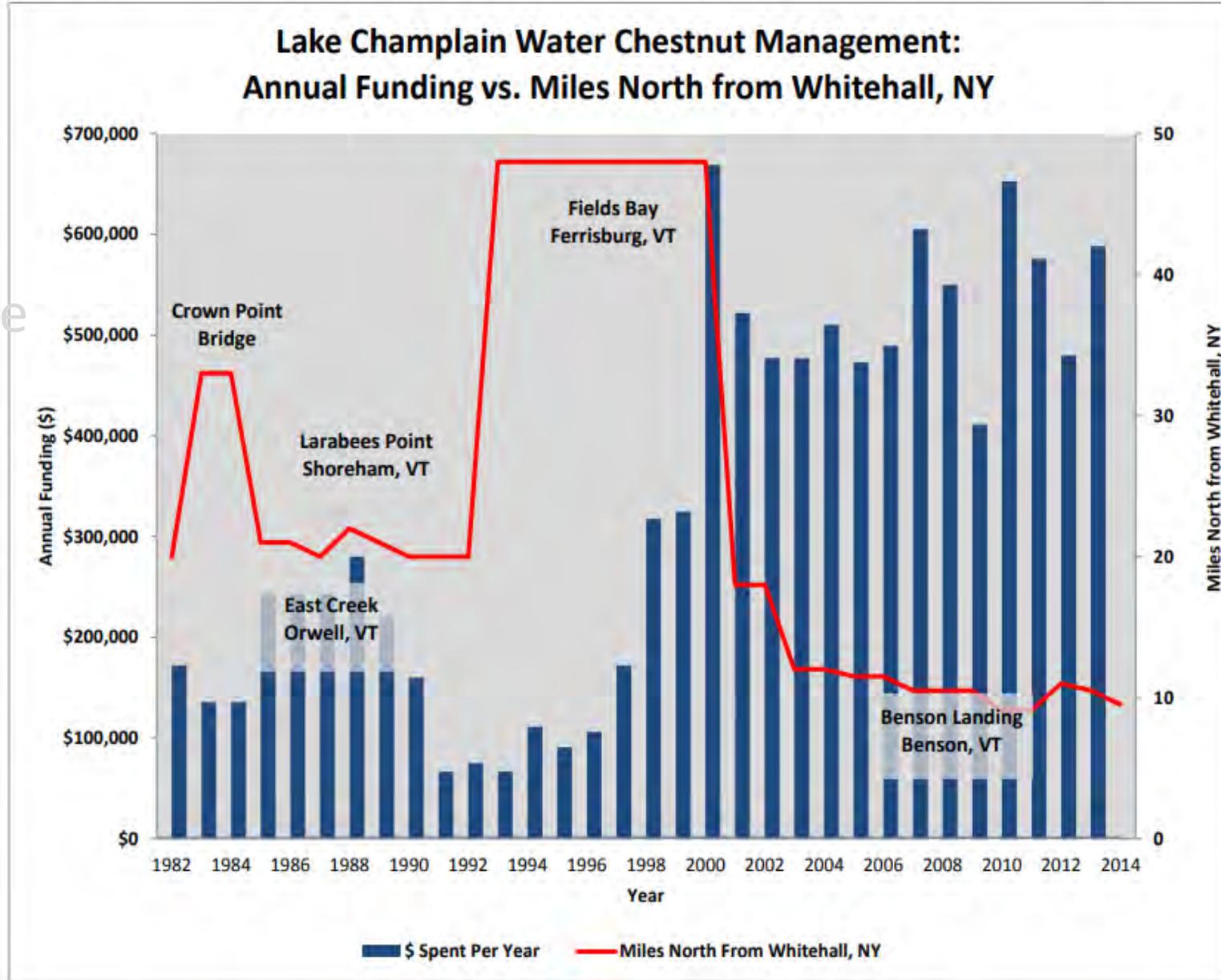


<https://sol.lcbp.org/en/figures-and-graphics/>



Water Chestnut Management Lessons from Lake Champlain

Figure 2-5: Annual water chestnut funding vs. northernmost mechanical harvest site in Lake Champlain, 1982-2014



1. It's not so bad! Rhode Island populations are relatively small, and with resources, could also be managed over time

2. Management is a long term effort that requires sustained funding



Figure 2-5: Annual water chestnut funding vs. northernmost mechanical harvest site in Lake Champlain, 1982-2014

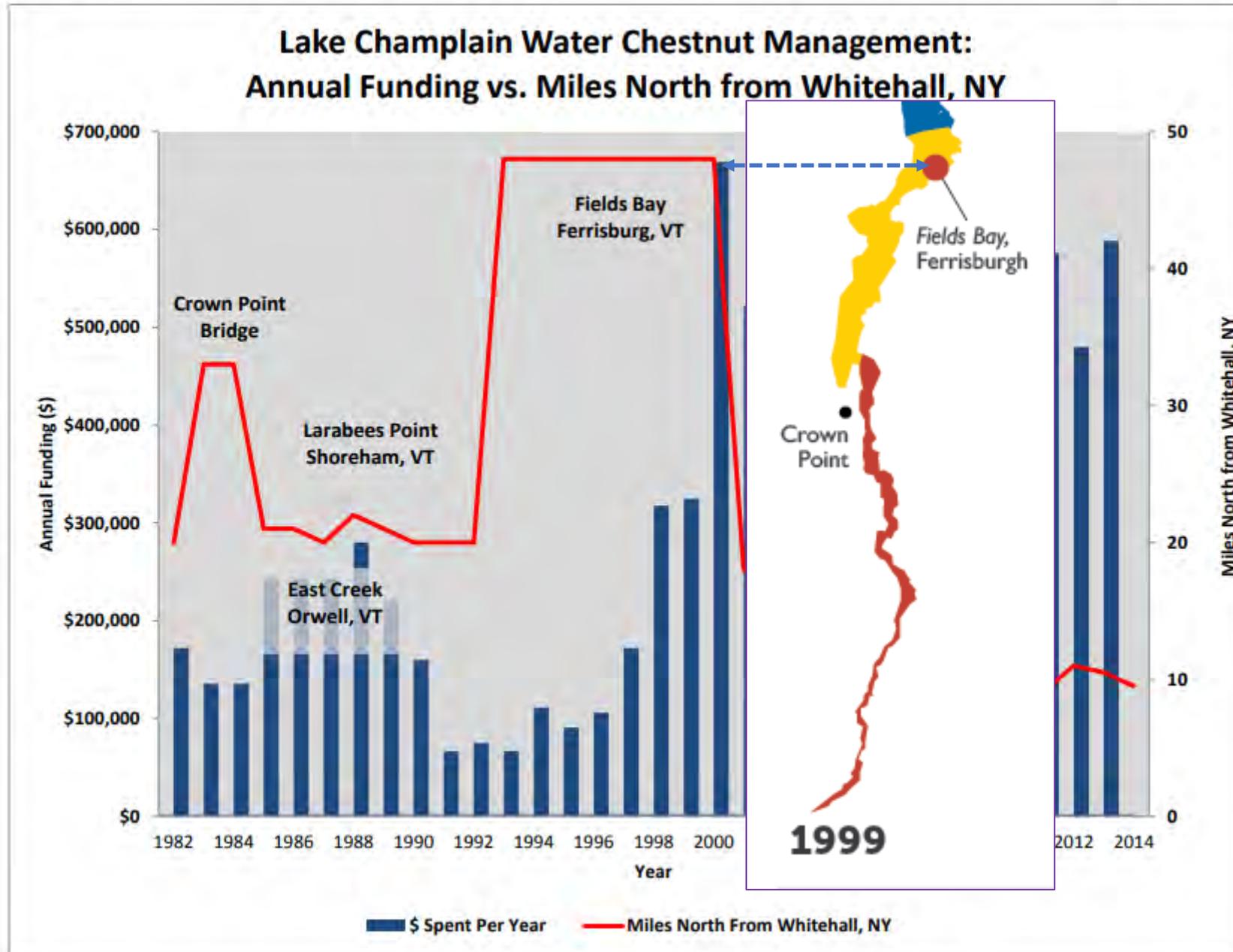


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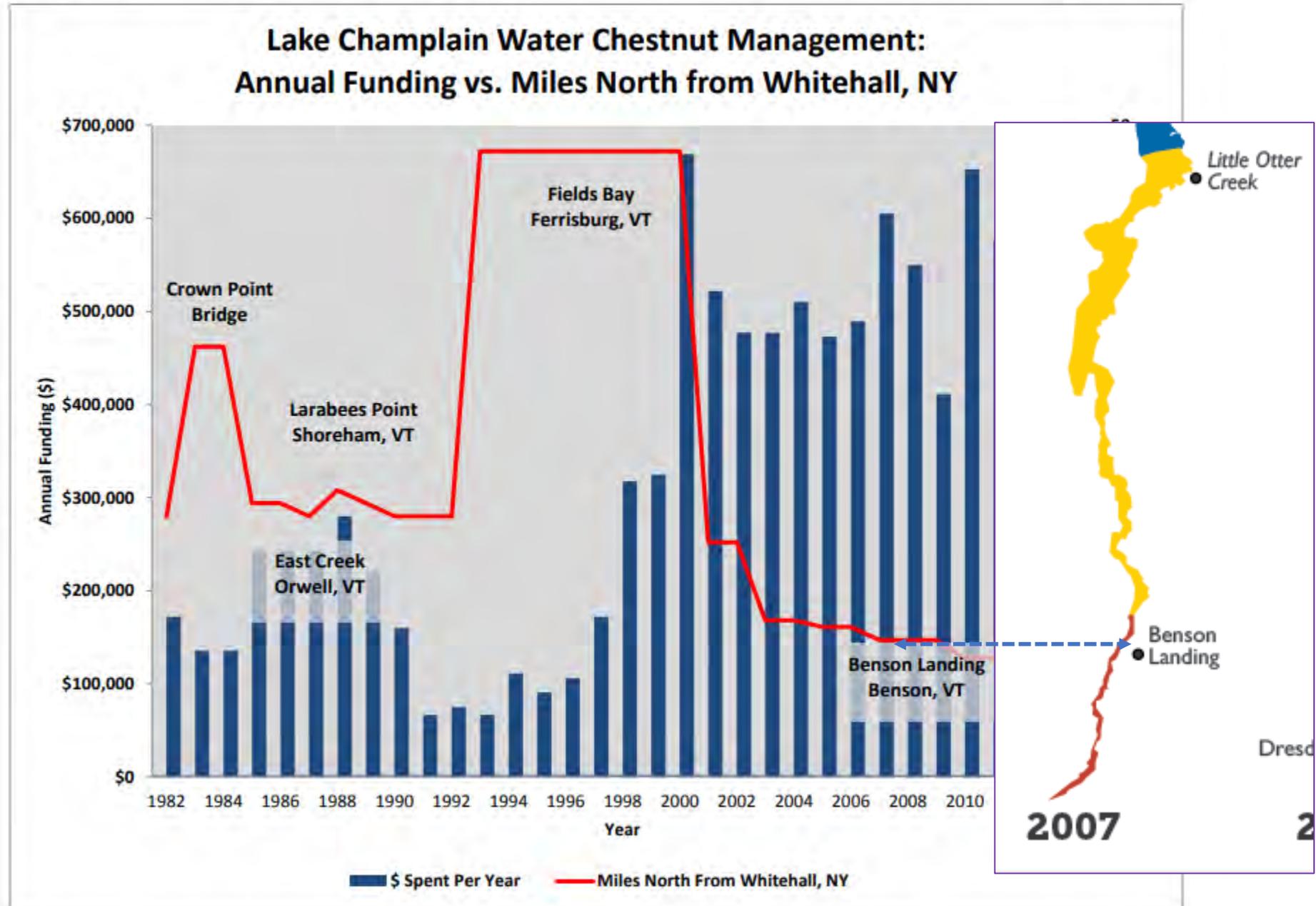
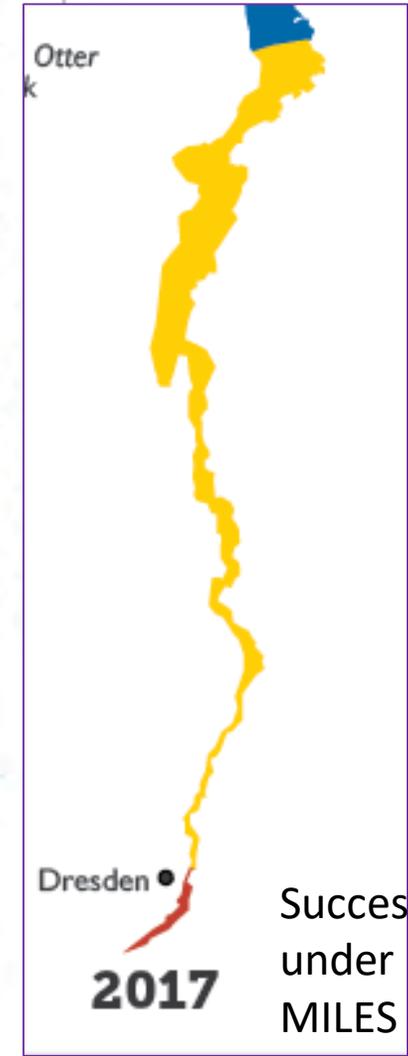
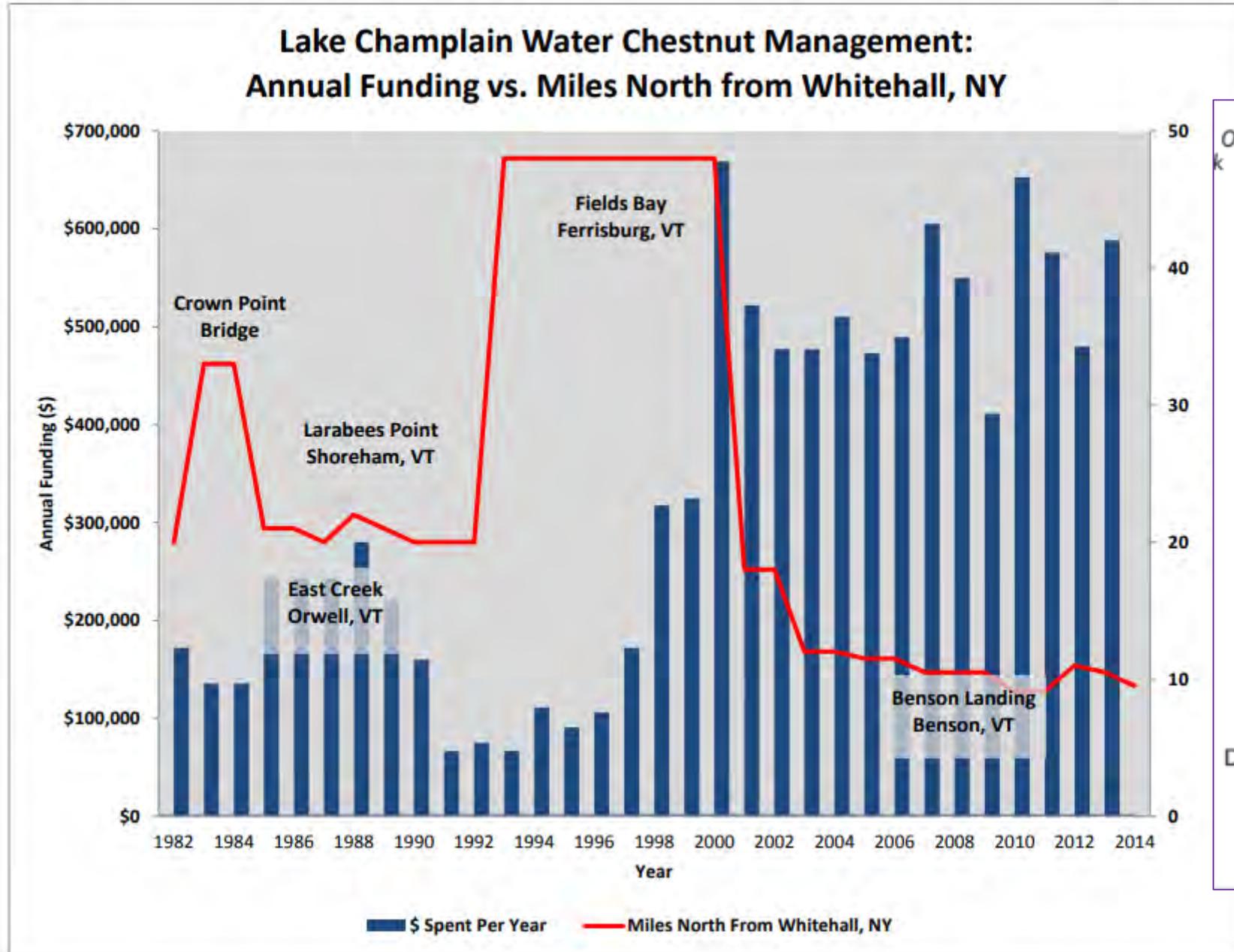


Figure 2-5: Annual water chestnut funding vs. northernmost mechanical harvest site in Lake Champlain, 1982-2014



Successfully
under 10
MILES of
mechanical
harvesting!



Questions?



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Invasive Water Chestnut

Spot **Pull** **Prevent**

Pull This Invasive Plant Out!

Spot

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Katie DeGoosh-DiMarzio
 RIDEM Office of Water Resources

katie.degoosh@dem.ri.gov