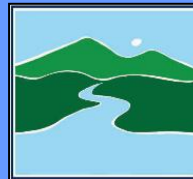




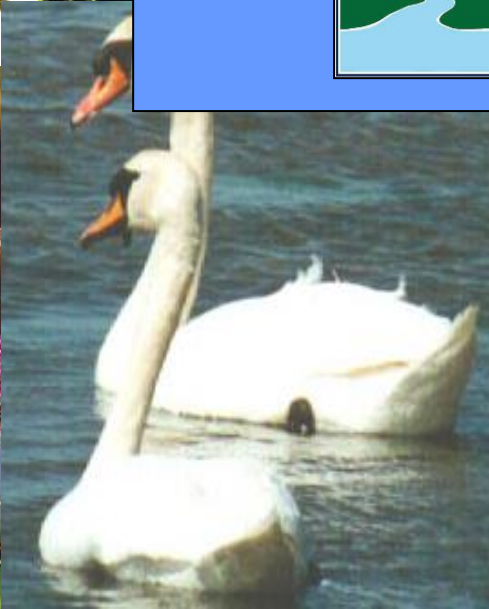
Vermont Public Access Greeter Program AIS Overview 2020



VERMONT DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

**WATERSHED
MANAGEMENT DIVISION**

LAKES & PONDS PROGRAM



Aquatic Invasive Species (AIS)

What are they? How did they get to Vermont? What are they doing to Vermont waters? What should we do about them?



Nonnative + Nuisance = Invasive



Japanese knotweed



Zebra mussels



Emerald Ash Borer

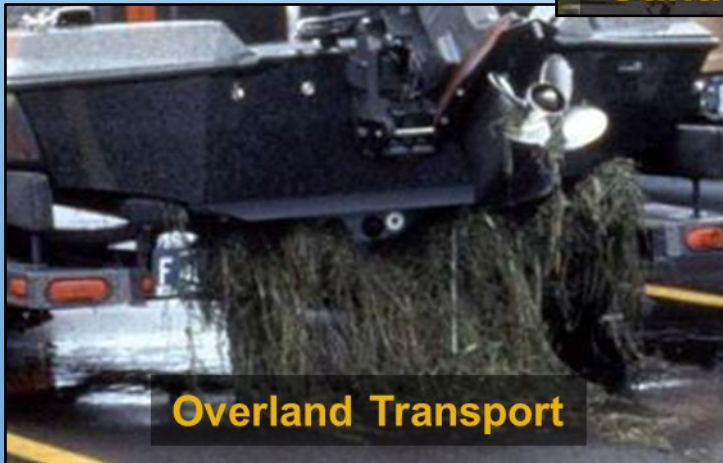


Hemlock Woolly Adelgid



Eurasian watermilfoil

Invasive Species Pathways



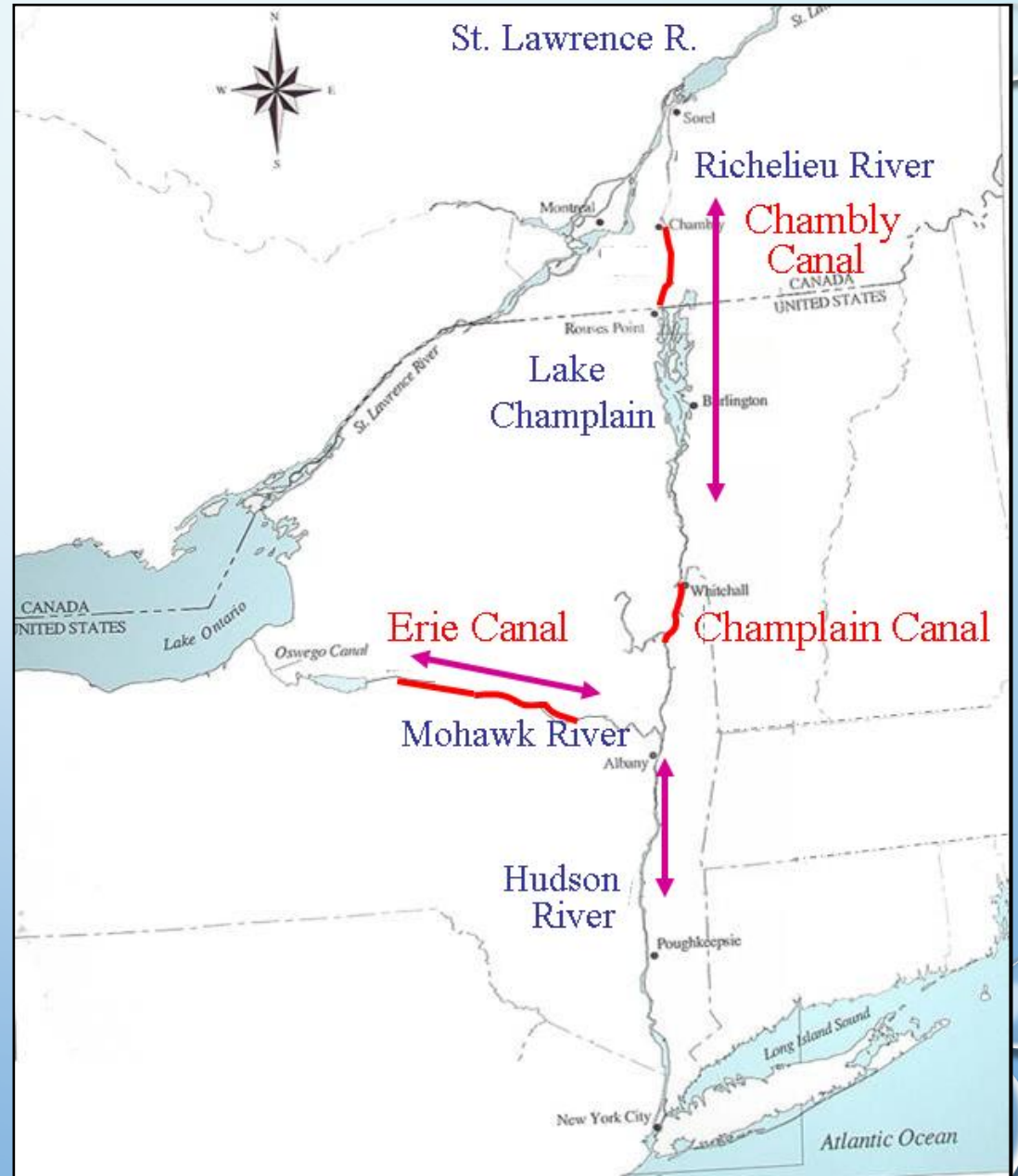
Ballast Water, Canals, and Waterways



Ballast Water Discharge



Canals & Waterways



Overland Transport



Invasive Species Impacts

Ecological Impacts

- ❖ Loss of native species...competition
- ❖ Water quality deterioration

Recreation Impacts

- ❖ Boating/swimming
- ❖ Fisheries

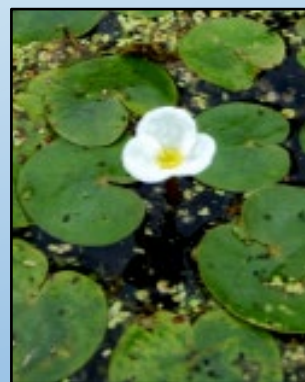
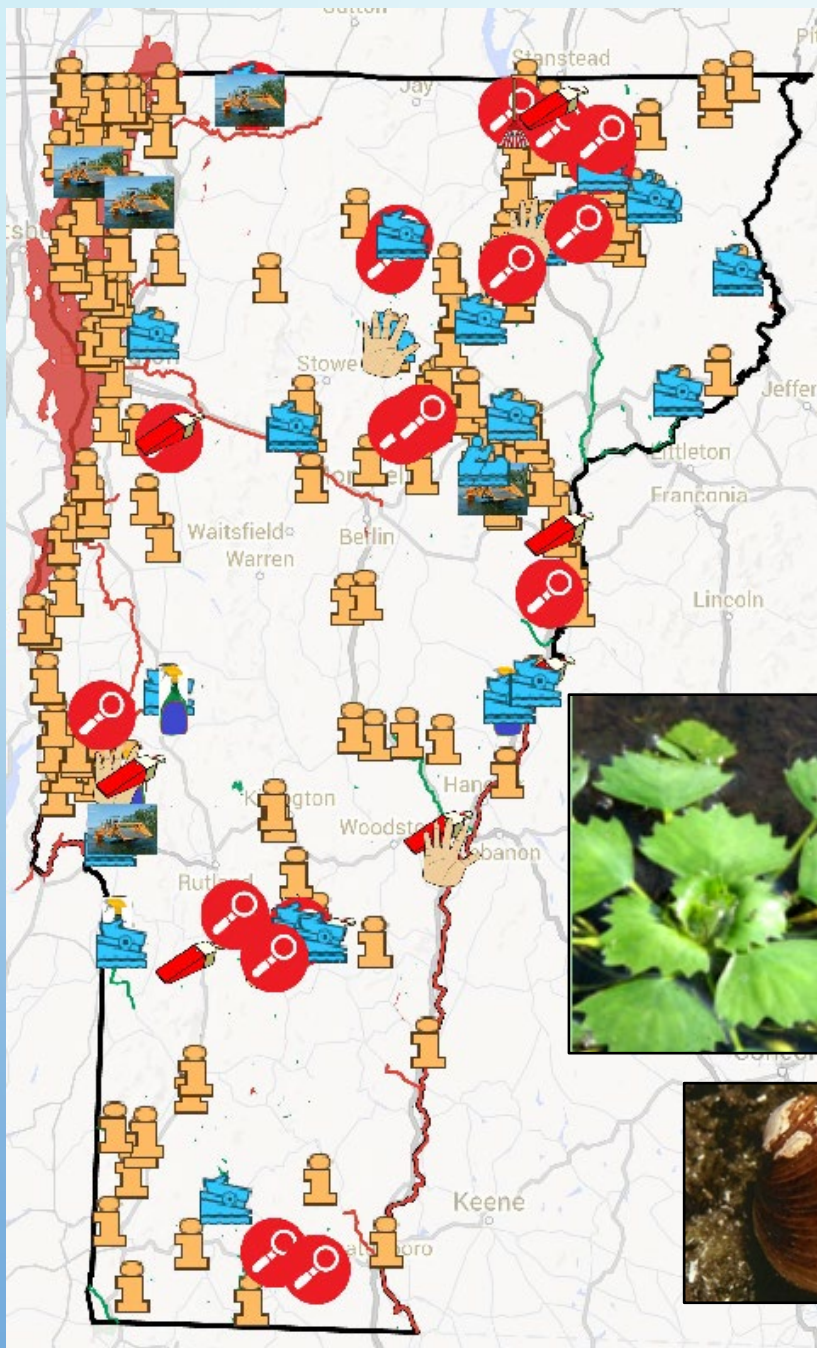
Commercial Impacts

- ❖ Impede navigation

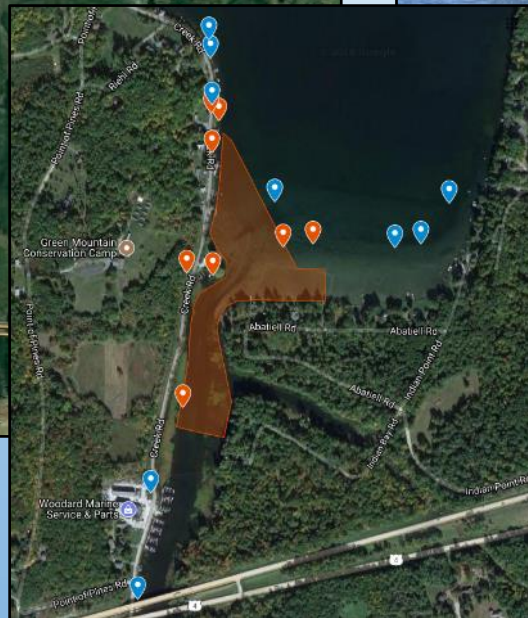


*Millions of dollars spent annually in VT alone!

Aquatic Invasive Species Management in Vermont



The main photograph depicts two individuals in wetsuits standing waist-deep in a calm lake. They are positioned next to a wooden dock on the right side of the frame. The person on the left is gesturing with their hands while talking to the person on the right, who appears to be holding a small object. In the background, there is a dense forest of tall trees and a small white building nestled among them. The sky is clear and blue. An inset map in the bottom-left corner provides geographical context, showing a section of land with several blue location pins. Labels on the map include "Adirondack Park", "Hudson River", and "Indian Point".



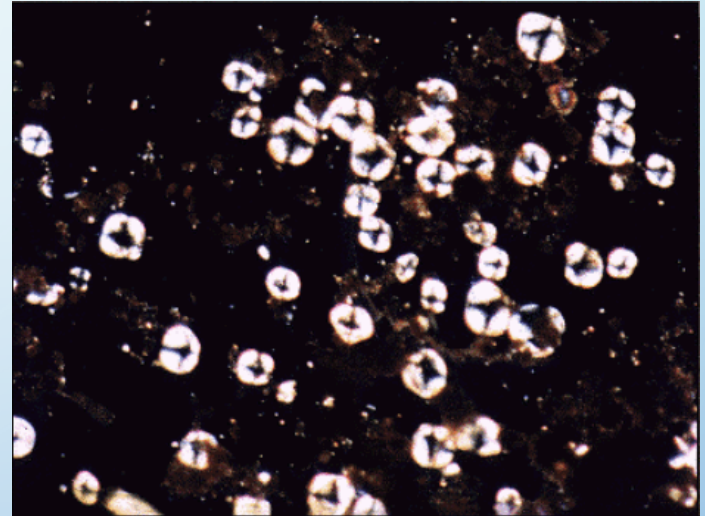
Monitoring

Starry Stonewort Surveys, Lake Derby



Monitoring

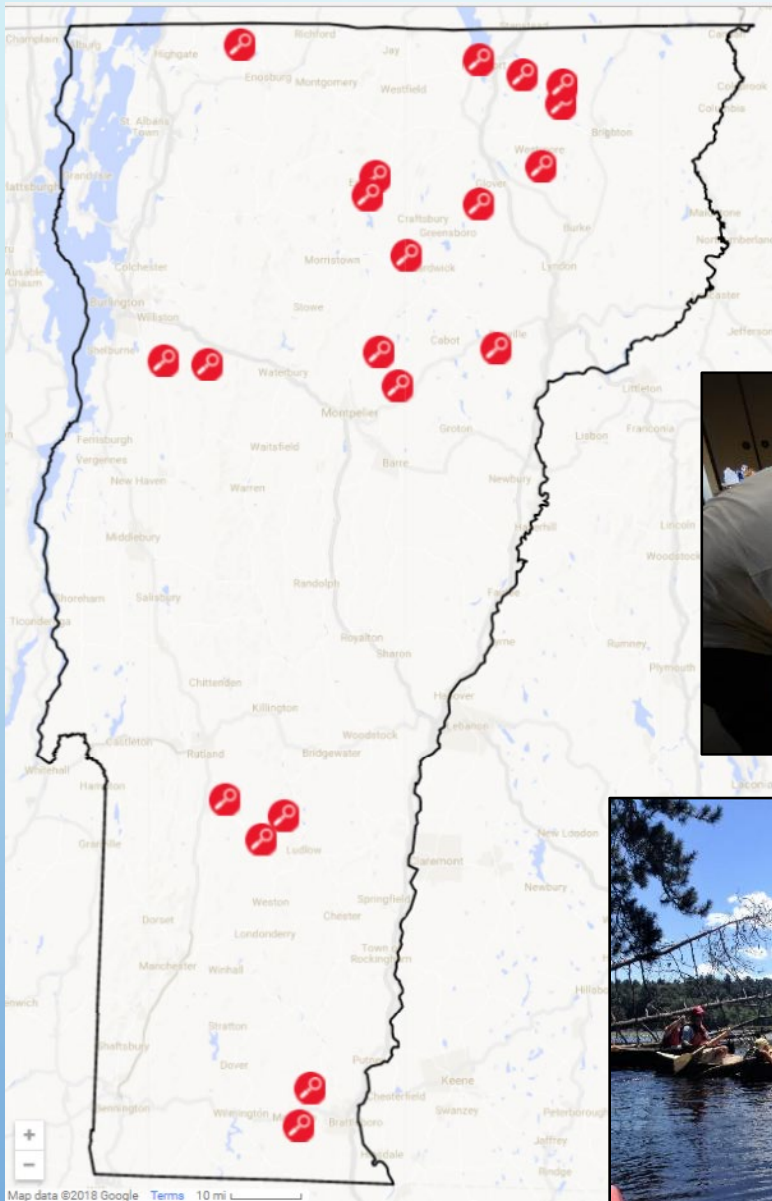
Zebra Mussel, Asian Clam, and Spiny Waterflea Surveys Inland Lakes



<http://ucanr.edu/sites/WAEMAP/files/137106.gif>

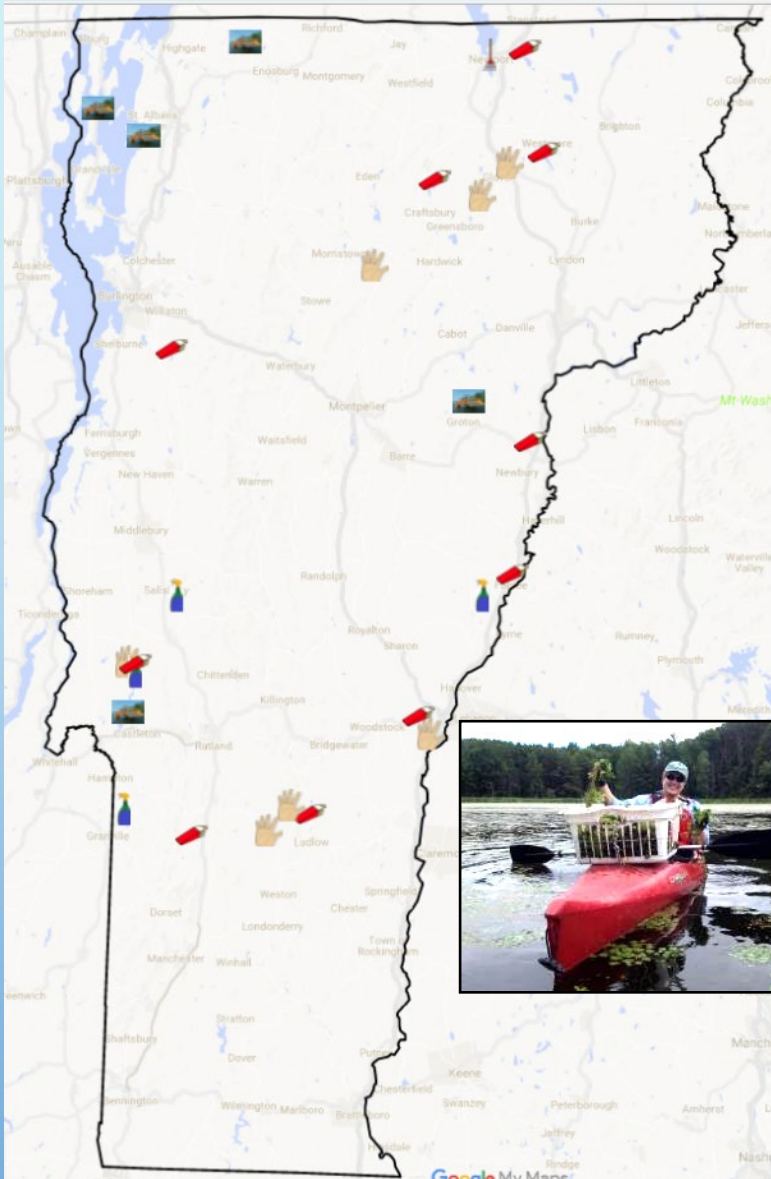


Vermont Invasive Patrollers (VIPs)



Aquatic Invasive/ Nuisance Species Control Efforts

- ❖ Handpulling
- ❖ Bottom Barriers
- ❖ Diver Operated Suction Harvesting
- ❖ Hydroraking
- ❖ Mechanical Harvesting
- ❖ Herbicide Treatment



Clean Boats Clean Waters

off any mud,
and animals
boats, trailers,
equipment.

Drain your boat
and equipment
away from the
water.

Dry anything that
comes into
contact with the
water.

A diagram illustrating the components of a boat's transom well and live well system. The boat is shown on a trailer with an axle and rollers. A person is shown operating the transom well, which is connected to the live well. The diagram labels the Transom Well, Live Well, Anchor, Lower Unit Propeller, and Axle.

pubs. under 40 U.S.C. § 1452; 20 U.S.C. § 3747; 6 U.S.C. § 4704; 1077 A-1000



VERMONT
AGENCY OF NATURAL RESOURCES

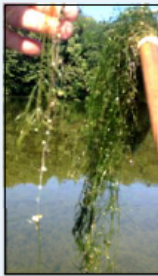
- Boaters are required to **inspect** their watercraft before and after use, and **remove** all plants and aquatic animals
- Vessels and internal compartments must be **drained** when leaving a water, and drain plugs must remain out during transport
- Persons who transport aquatic plant material or invasive aquatic animals may be fined up to \$1000
- It is a violation to refuse inspection and decontamination services at an authorized inspection station

BE AWARE!

While fishing on Lake Memphremagog, please help prevent the spread of the newly discovered **invasive plant species, Starry stonewort**. To prevent the spread of this species to new areas of the lake, **please clean off** your anchor, propellers, lower unit, power poles, live wells and other boating equipment that could become fouled with **aquatic vegetation before moving** to a different location on the lake.

LAKE MEMPHREMAGOG

The first discovery
in Vermont of
**STARRY
STONEWORT**
was found here.



Protect the Waters

**CLEAN
YOUR
GEAR**

INVASIVE SPECIES ALERT

Asian Clam

(*Corbicula fluminea*)



Confirmed in
Lake Bomoseen
in 2016

How can you identify them?

- This invasive freshwater bivalve is slightly triangular in shape with distinct concentric rows of elevated ridges on its shell.

Why the concern?

- Asian clams are filter feeding organisms that deplete resources needed by native species and reduce biodiversity.
- They can form dense populations very quickly in sediment, clogging intake pipes to lakeside houses, industrial water systems, and irrigation canals.

What can you do?

- Take these steps before launching **AND** before leaving any waterbody.

- ✓ **Clean** off any mud and sediment from boats, trailers, and anchors. Rinse with hot water.
- ✓ **Drain** your boat and equipment, including motors, all live-wells, bait buckets, bilges, ballast tanks, and other reservoirs that could transport lake water.
- ✓ **Dry** anything that comes into contact with the water.



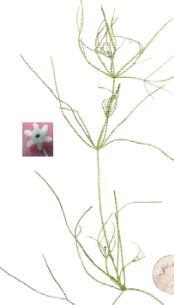
For more information or to report an invasive species sighting, call 802-628-1636, or visit dec.vermont.gov/watershed/lakes-ponds



Lake Memphremagog has **STARRY STONEWORT**, an invasive plant-like algae

This was the first discovery of this species in Vermont.

Enjoy your visit but help us prevent this **invasive species** from spreading and degrading aquatic habitats in other areas of this or other lakes.



- ✓ **Clean** Inspect and remove plants, animals and mud from boat, trailer, anchor lines and equipment.
- ✓ **Drain** boat and equipment away from water.
- ✓ **Dry** anything that comes into contact with the water for five days.
- ✓ **Never** release plants or animals into a body of water unless they came out of that body of water.

Source: Paul Stankiewicz (UM Extension Lakes Program)

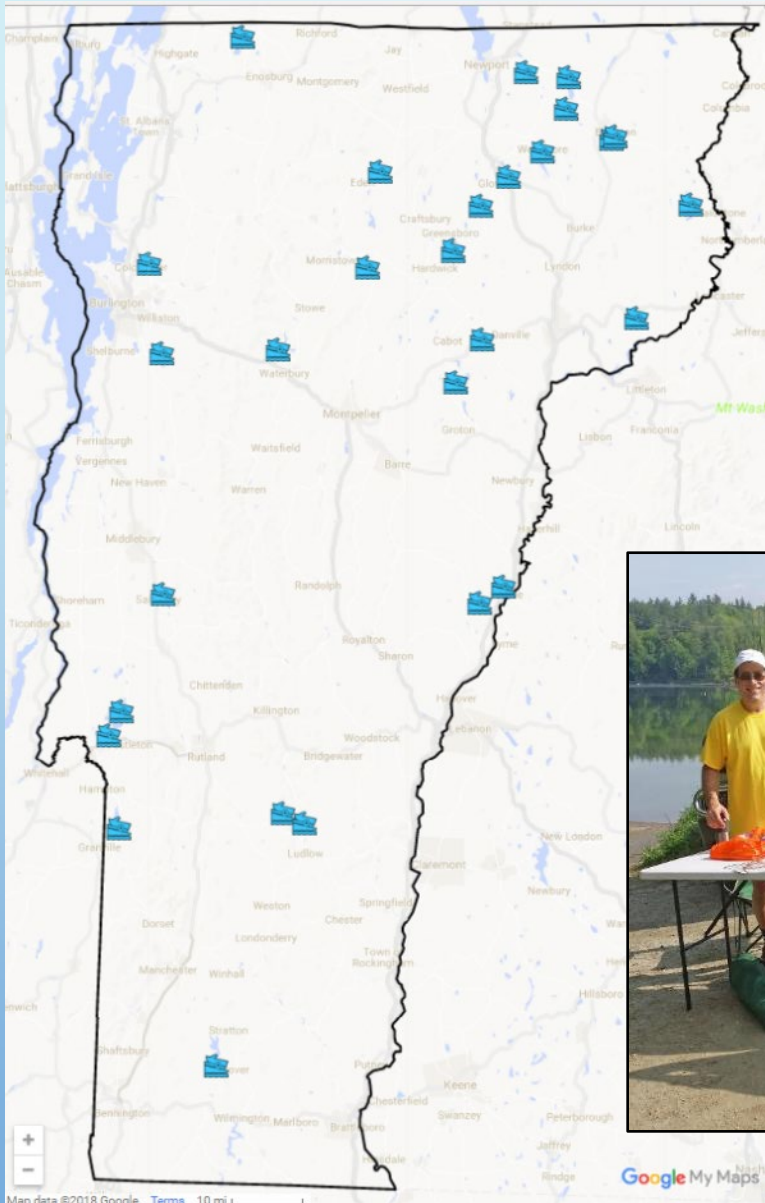


May 2017

For more information, contact (802) 828-1535 or visit dec.vermont.gov



Spread Prevention: Public Access Greeter Program



Aquatic Invasive Species Threatening Vermont

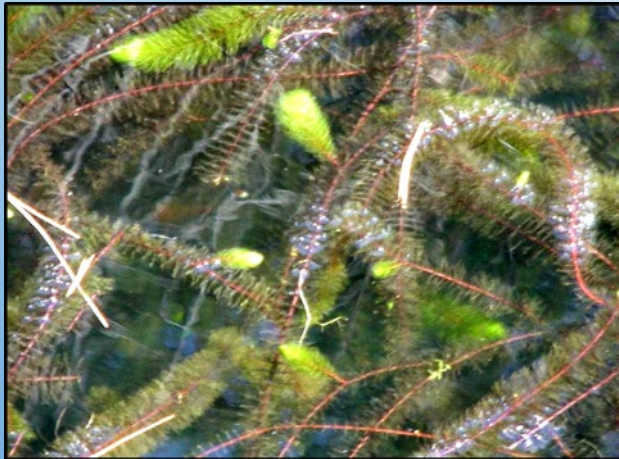
Species	Total Number of Waterbodies
AL - alewife	3
AC - Asian clam	1
BN - brittle naiad	10
CLP - curly-leaf pondweed	37
EF - European frogbit	13
EWM - Eurasian watermilfoil*	99
RC - rusty crayfish	13
SS - Starry Stonewort	2
SWF -spiny water flea	1
VLM - variable-leaved watermilfoil	3
WC - water chestnut	33
ZM - zebra mussel	2

Invasive Plants in Vermont

Brittle naiad



Eurasian watermilfoil



Variable-leaved watermilfoil



Curly-leaf pondweed



Starry stonewort

Eurasian watermilfoil (*Myriophyllum spicatum*)

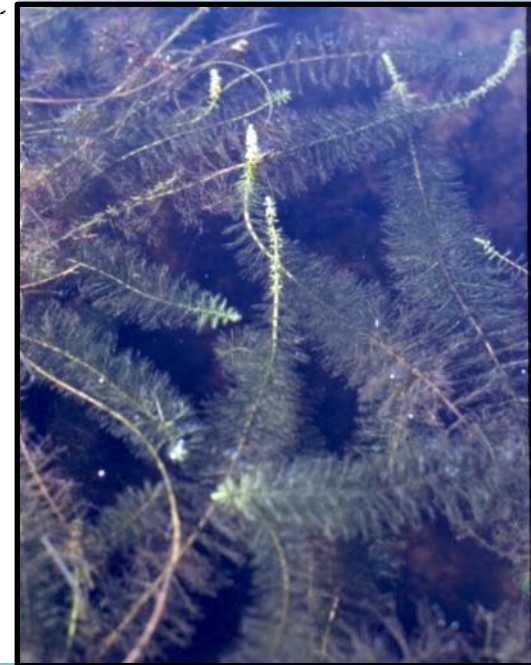
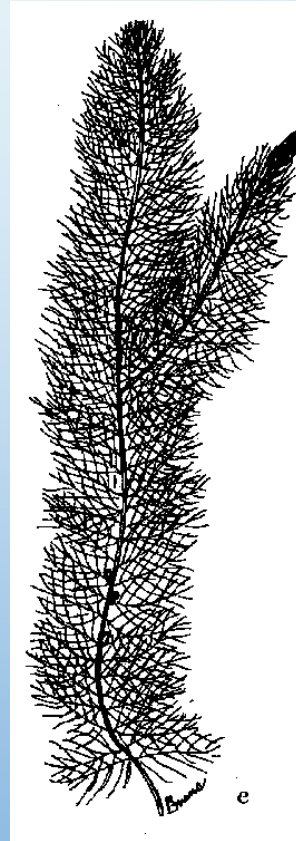
- Rooted, perennial native to Europe/Asia.
- Confirmed: 68 lakes or ponds and 31 other water bodies (one new in 2016 and 2017)



Vermont's Native Watermilfoils

Feather-dissected, Whorled or Alternate leaves

- ☺ Alternate flower watermilfoil
- ☺ Farwell's watermilfoil
- ☺ Low watermilfoil
- ☺ Northern watermilfoil
- ☺ Slender watermilfoil
- ☺ Whorled watermilfoil



Starry stonewort (*Nitellopsis obtusa*)

- Macro algae - perennial, native to Europe
- Confirmed: Lake Memphremagog 2015, Lake Derby 2016



Brittle naiad (*Najas minor*)

- Weakly rooted, annual, native to southeast U.S. and South America.
- Confirmed: Lake Champlain, Sunset Lake, Sunrise Lake, Waterbury Reservoir
- Also confirmed: CT, MA, ME, NH, NY

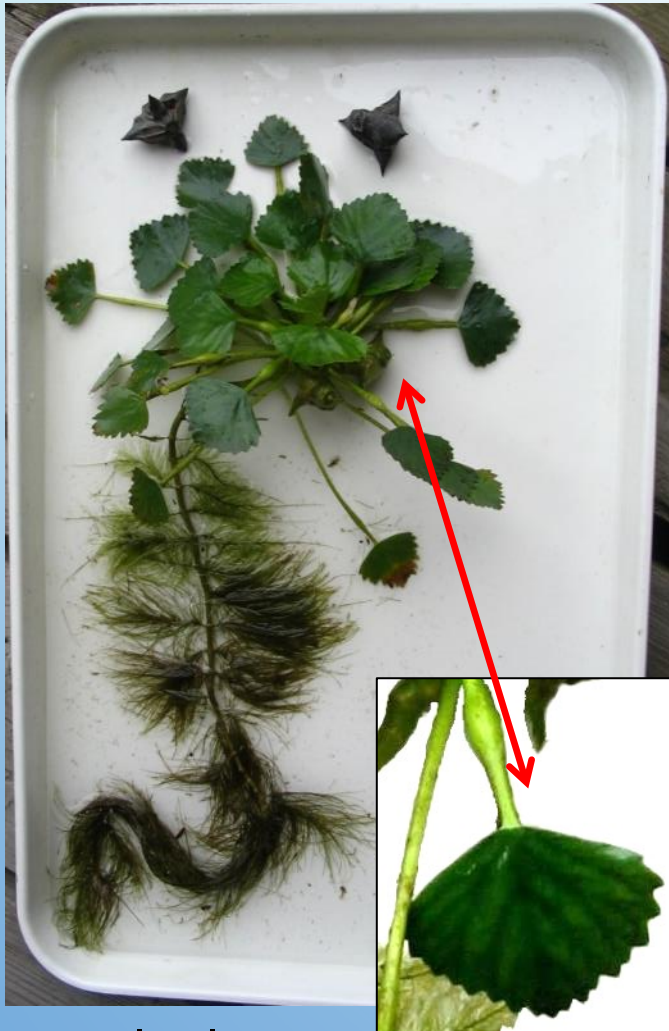


European frogbit (*Hydrocharis morsus-ranae*)

- Perennial, native to Europe.
- Confirmed: Lake Champlain, 8 other water bodies
- Also confirmed: CT, MA, NH, NY, RI, Quebec



Water chestnut (*Trapa natans*)



triangular leaves



Seeds: Black (dry) – not viable



Green - viable



flower, white



Species of Concern – Not yet in Vermont



Brazilian elodea



Hydrilla



Parrot feather

Fanwort



The transport of ANY aquatic plant is illegal in VT





Vermont water bodies support over 170 different types of aquatic and wetland plants.

Roughly 7% are non-native and considered invasive.



Vermont's Aquatic Invasive Animals



Emily DeBolt NGA

Zebra and Quagga Mussels

Basic Biology and ID

- ❖ Small, freshwater mollusks native to Caspian and Black Seas
- ❖ Variable color patterns
- ❖ Both species D-shaped
 - ❖ Zebra – triangular
 - ❖ Quagga – rounded
- ❖ Live 2-5 years, depending on conditions



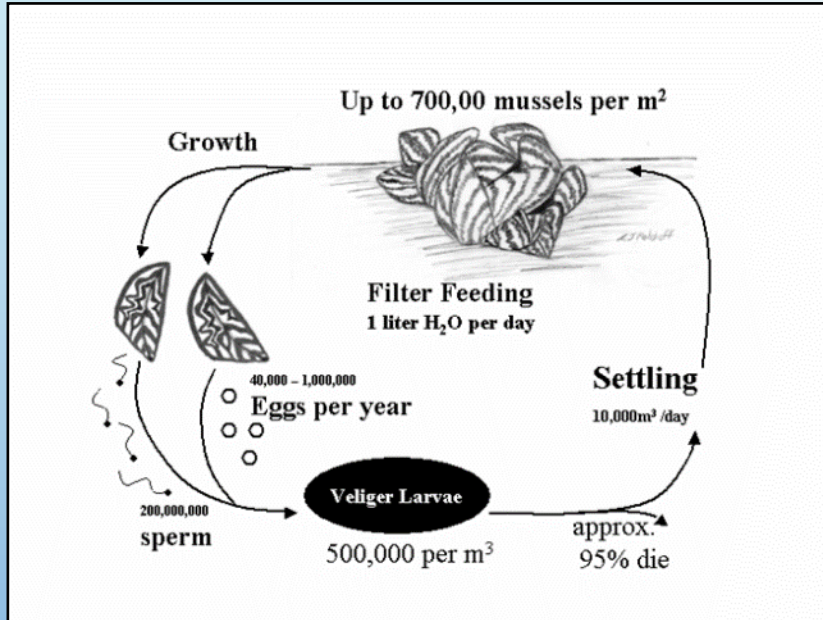
Dreissena polymorpha



Dreissena rostriformis bugensis

Zebra and Quagga Mussels

Life Cycle



- Eggs laid when temp > 50°F
- Eggs → juveniles (veligers)
- Veligers are free-floating before settling on hard and semi-soft surfaces, then grow rapidly
 - Can remain viable up to a month in standing water
- After settlement, can reach 700,000 per m²
- Settled adults and juveniles can survive up to 30 days out of water in ideal conditions

Zebra and Quagga Mussels



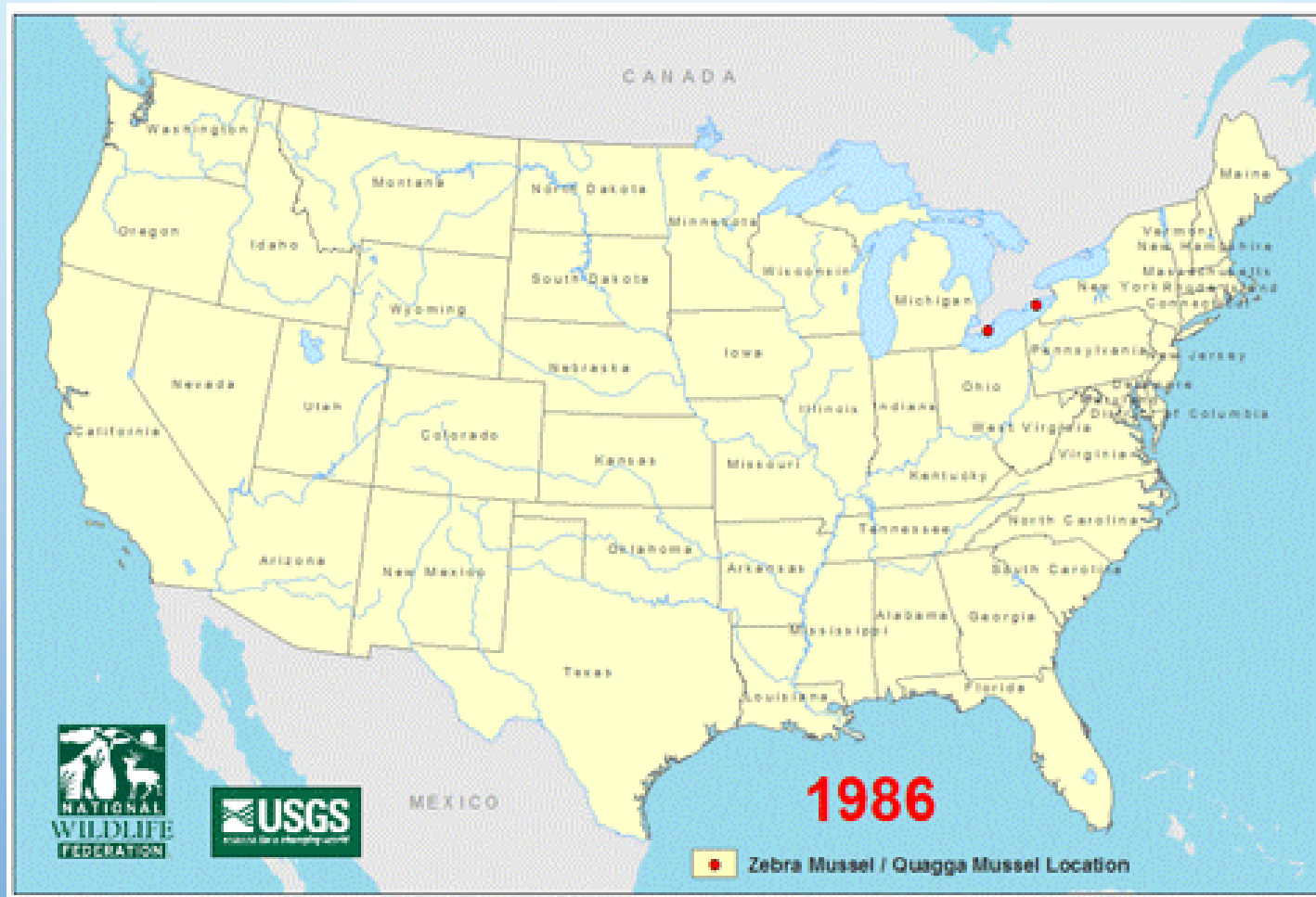
- Byssal Threads
 - Enables attachment to most surfaces
 - Allows clogging of infrastructure



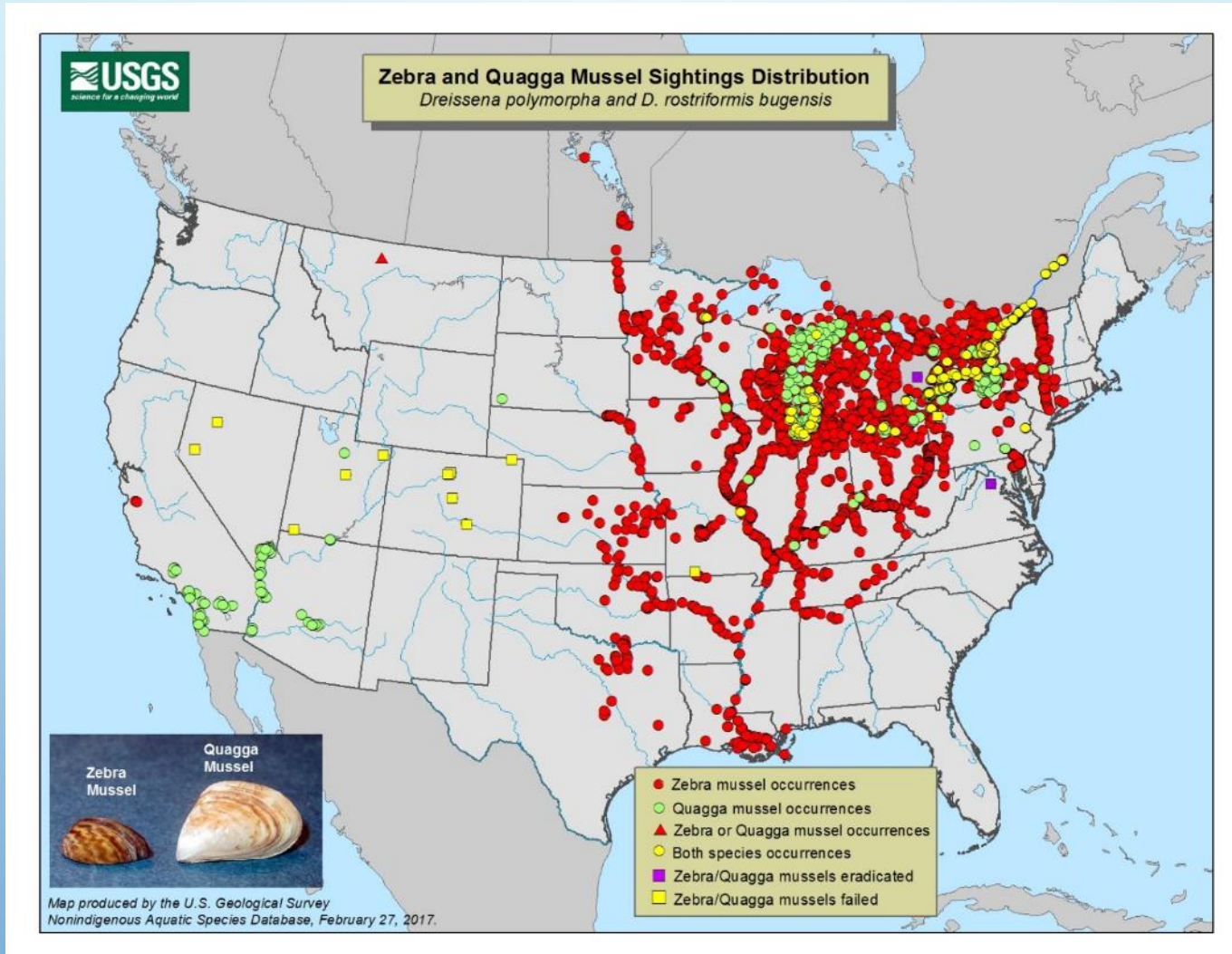
- Smother benthic organisms
- Fouls watercraft equipment



Zebra and Quagga Mussels – Spread

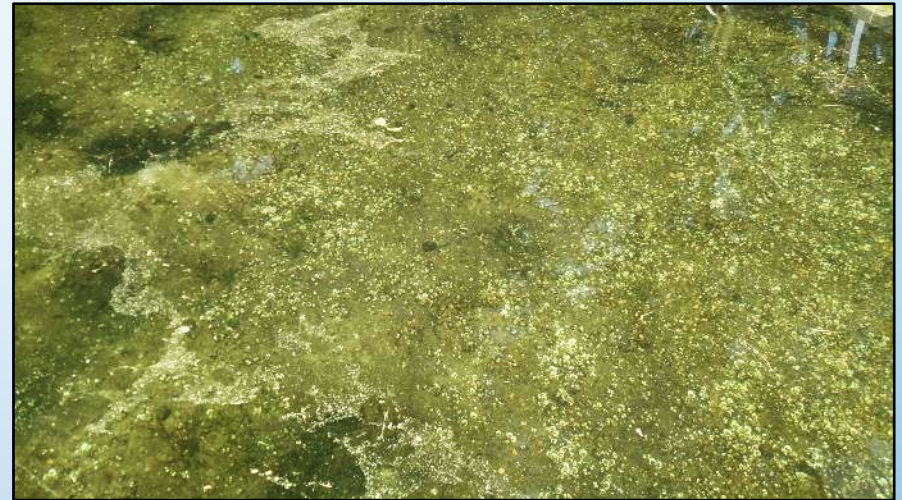


Zebra and Quagga Mussels – Current Range

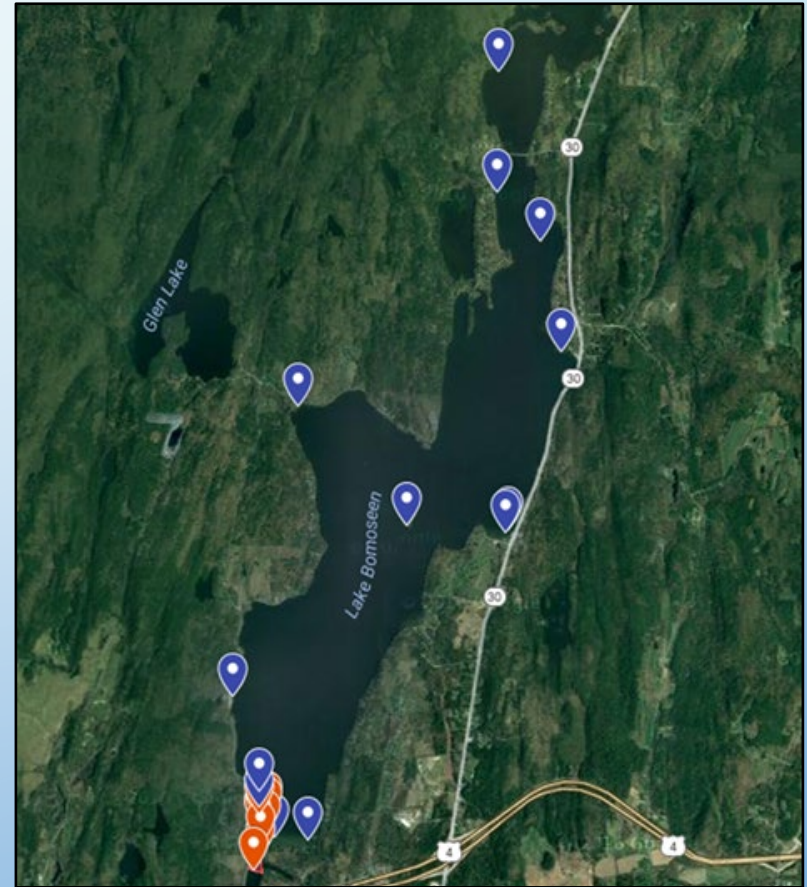
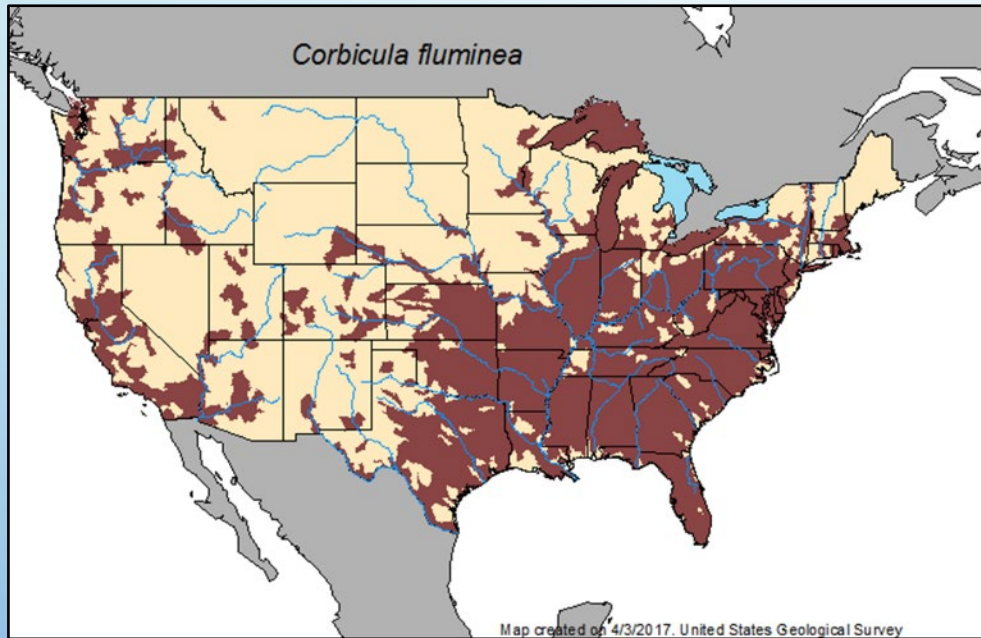


Asian Clam (*Corbicula fluminea*)

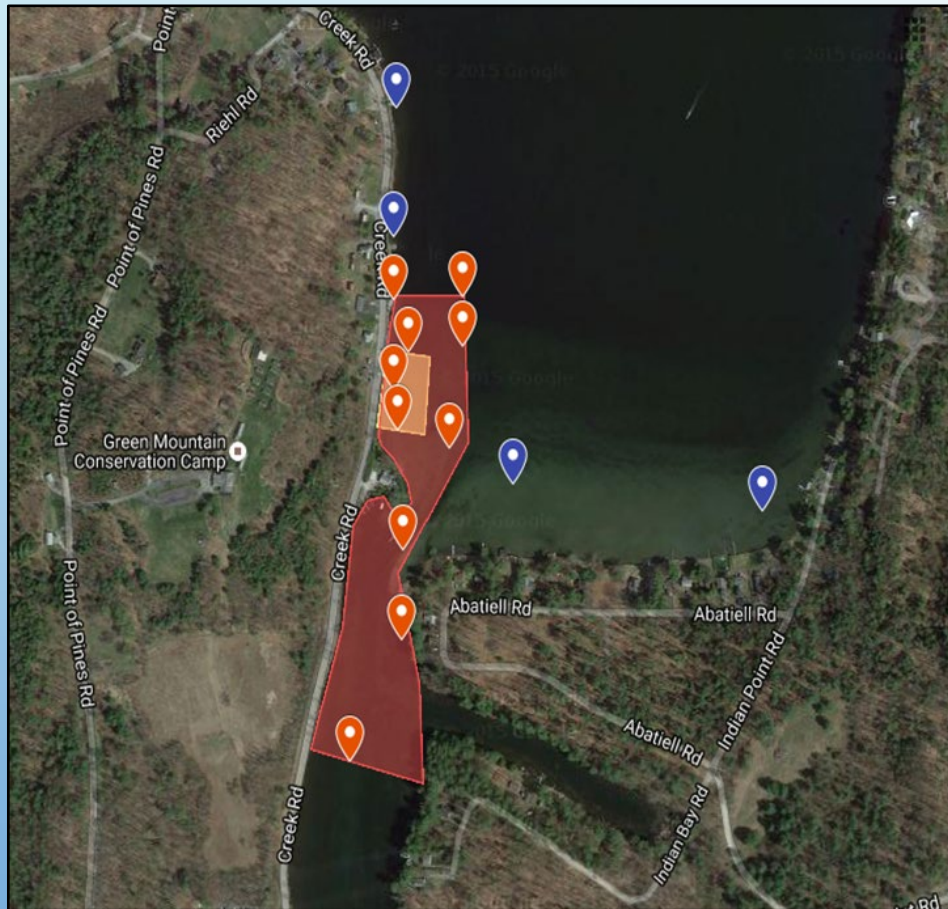
- Small, freshwater clam native to Asia and Africa
- Light-colored shell with concentric ridges
- Live in sandy substrates
- Hermaphroditic; one can produce up to 4,000 eggs annually



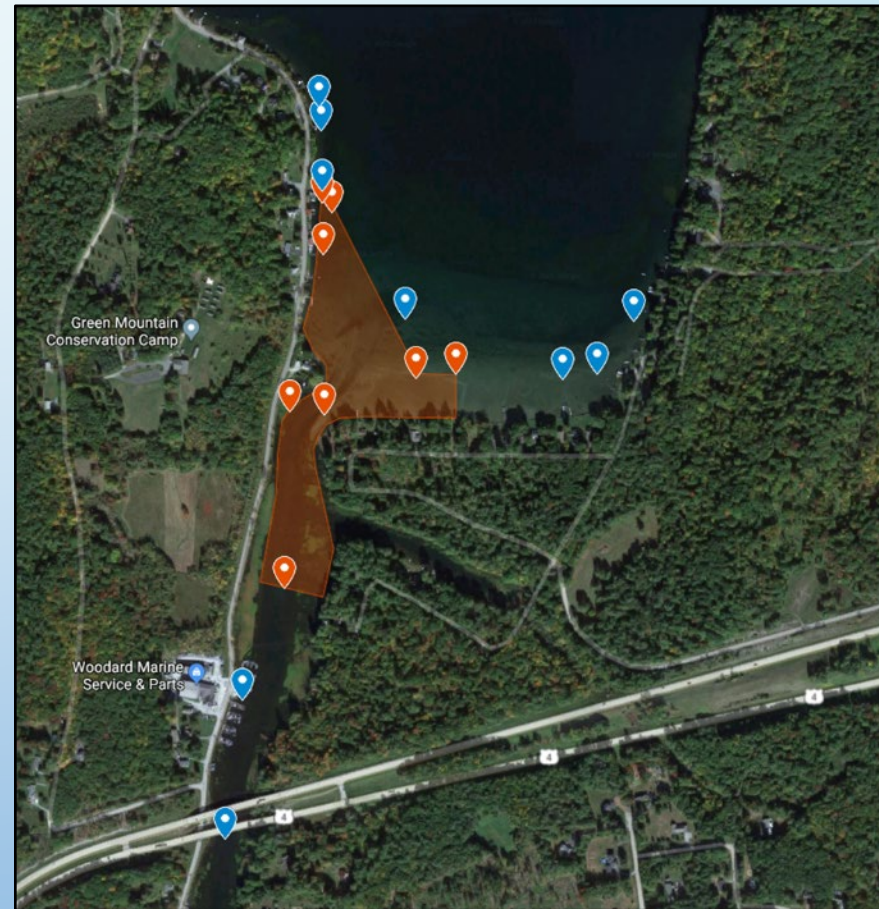
Asian Clam Range and Vermont Presence



Asian Clam Range and Vermont Presence



2016

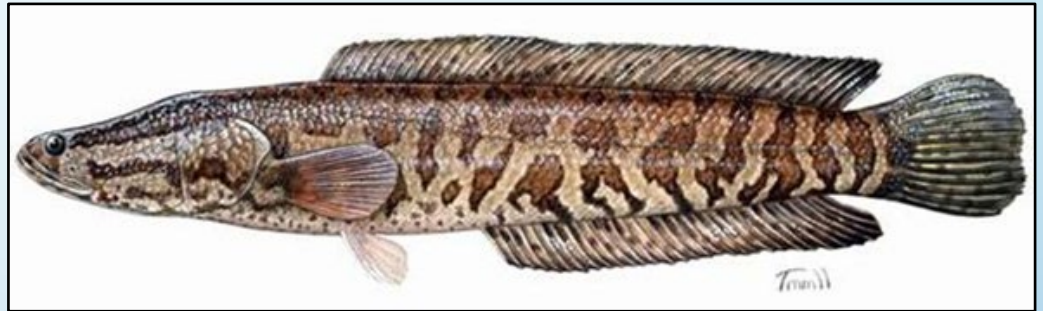


2017

Species of Concern – Not yet in Vermont



New Zealand Mudsnail



Northern Snakehead



Round Goby



Asian Carp

Species of Concern – Not yet in Vermont



Online Resources

VERMONT OFFICIAL STATE WEBSITE

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

AIR AND CLIMATE LAND WASTE WATER LEARN MORE, DO MORE

Home
About DEC
Commissioner's Office
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Drinking Water and Groundwater
Environmental Assistance
Environmental Enforcement
Facilities Engineering
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Waste Management and Prevention
Watershed Management
Business and Operations
Vermont Clean Water Initiative
Lakes and Ponds
Data and Maps
Monitoring
Permitting
Aquatic Invasive Species
Science of Waters
Species Protection
Monitoring and AIS data
Control
Laws and Regulations
Grants and Funding Opportunities
Activities
Lake Cleanup
Endangered and Sensitive Wetlands
Private Lands
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Rivers
Stormwater
Wetlands
Publications and Resources
Funding Opportunities
What's New
Volunteering, Education and Training
Laws, Regulations and Rules
Permits and Certifications
Contacts
Public Notices
Watershed Management Division Public Notices
Permits and Certifications
Funding Opportunities

AQUATIC INVASIVE SPECIES













Report an aquatic invasive species sighting in Vermont at 802-828-1535

Aquatic invasive species are nonnative species whose introduction can cause harm to the environment, economy, and even human health. They can sometimes be confused with nuisance species. While nuisance species can have similar impacts, they are native. The Vermont Aquatic Invasive Species Program coordinates management activities associated with both aquatic invasive and nuisance species. View program highlights in the [2019 Aquatic Invasive Species Annual Update](#). AIS population information, management actions, and spread prevention efforts can also be viewed geographically on the [AIS Map](#).

Follow the links below for more information:

[Gallery of Invasives](#) [Funding Opportunities](#)
[Spread Prevention](#) [Laws and Regulations](#)
[Monitoring](#) [Grants Programs](#)
[Control](#) [Vermont Invasive Patrols \(VIPs\)](#)

Below is a list of our high-priority invasive and nuisance species. Click on an image for more information. The complete list of aquatic invaders threatening Vermont can be found in our [Gallery of Invasives](#).

What is being done in Vermont?

- Vermont DEC provides educational materials including pamphlets and newsletters, slide shows, identification posters, public access signage, and provides technical assistance to towns, waterbody associations, and other interested parties.
- Monitoring efforts** designed to detect new populations of invasive plants and animals are ongoing by governmental entities and by the [Vermont Invasive Patrols \(VIP\) Program](#), which is a citizen-based early detection program. VIPs are volunteers who are trained to search water bodies for new infestations.
- Funding for aquatic invasive species management projects** is available from Vermont DEC and from outside sources.
- Various **control efforts for invasive species** have been implemented and are continuing across Vermont.
- Spread prevention projects** designed at containing further AIS spread are ongoing. [The Vermont Public Access Closure Program](#) helps to educate boaters and provide courtesy watercraft inspections to prevent invasive plants and animals from spreading from one waterbody to another.
- There are multiple [Vermont state laws that restrict invasive species transport](#) and are aimed to stop new introductions.

Clean Boats Clean Waters

Reduce Launching AIS Risk by Leaving

Clean up your boat, gear, and trailer before launching. Wash your boat, gear, and trailer. Remove any plants, animals, or equipment that may be on your boat. Dispose of any trash or debris. Use proper disposal methods for any waste.

Clean Boats Clean Waters

Reduce Launching AIS Risk by Leaving

Clean up your boat, gear, and trailer before launching. Wash your boat, gear, and trailer. Remove any plants, animals, or equipment that may be on your boat. Dispose of any trash or debris. Use proper disposal methods for any waste.

USGS
science for a changing world


USGS Home
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NAS - Nonindigenous Aquatic Species


NAS Home Alert System Database & Queries Taxa Information Report a Sighting

Welcome to the Nonindigenous Aquatic Species (NAS) information resource for the United States Geological Survey. Located at Gainesville, Florida, this site has been established as a central repository for spatially referenced biogeographic accounts of introduced aquatic species. The program provides scientific reports, online/realtime queries, spatial data sets, distribution maps, and general information. The data are made available for use by biologists, interagency groups, and the general public. The geographical coverage is the United States.

Invertebrates

			
Bryozoans	Coelelenterates	Crustaceans	Mollusks

Vertebrates

			
Amphibians	Fishes	Mammals	Reptiles

Plants


Plants

USGS NAS website www.nas.er.usgs.gov

Lakes AIS website

www.dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives

Defense Against Invasive Species

Spread prevention is the most effective protection against aquatic invasive species

