

# Vermont Invasive *for* Patrollers Animals





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# Vermont Invasive Patrollers for Animals Program

## Overview

The Vermont Invasive Patrollers for Animals (VIPA) program was established by the Vermont Department of Environmental Conservation (VTDEC) in 2022 to focus on early detection of a group of priority aquatic animals. VIPA stems from the Vermont Invasive Patrollers (VIP) program, which focuses on aquatic invasive plants and has existed for 40 years. Visit our [website](#) to learn more about both programs.

Aquatic nuisance species are defined in the Aquatic Nuisance Control State of Vermont Statutes ([10 V.S.A. § 1452](#)). The aquatic animals outlined in this program are likely to cause harm to the native species and ecosystem and become invasive. By establishing a robust program of VIPAs, we hope to gain a sense of the location of these animals and how they are distributed across the State. Based on the monitoring efforts of VIPAs and mapping of these locations, VTDEC can better understand the breadth, scope, and impacts of these species. Refer to page 38 for further information about the definition and legislation surrounding aquatic nuisance species.

## Program Goals

Through presentations and hands-on workshops, lakeshore residents and lake users will learn what aquatic invasive animal species are, how to identify the species of concern that pose the greatest threats to Vermont lakes and ponds, and how to prevent their spread. Workshop participants are encouraged to survey a body of water regularly and check in with VTDEC. As such, the VIPA program has three primary goals:

1. To increase aquatic invasive species (AIS) knowledge of lakeshore residents and lake users.
2. To create an early detection volunteer network with a primary focus on this group of priority aquatic animals.
3. To increase VTDEC's knowledge of new infestations, the distribution, and spread of aquatic animals in Vermont lakes and ponds.

By enlisting the help of a trained network of volunteers, VTDEC staff are much more likely to learn of new aquatic invasive animal infestations early and as a result, may have more management options at their disposal.



*A map turtle with Zebra mussel settled on shell. Photo by Shawn Good, VT Fish & Wildlife Department.*

# Vermont Invasive Patrollers for Animals Program

## Responsibilities of VIPAs

- Perform surveys of a local waterbody throughout the season by observing presence/absence of VIPA animals and reporting findings on both an online form and iNaturalist.
- Crayfish monitors with a trap: check this trap several times a week and return the empty trap to the DEC at the end of the season (late September.)
- Mussel monitors with a sampler: set up the sampler in June, and mail it back with all colonized mussels to the DEC at the end of the season (late September.)
- Submit surveys through the online form on the website, even if nothing suspicious was found.
- Submit aquatic invasive animal photos to iNaturalist so they can be collected in the iNaturalist VIPA project.
- Email VTDEC for further instruction if needed for identification of an individual.
- Keep up to date on new AIS information by attending a workshop once every three years.

## VTDEC Staff support the efforts of VIPAs by

- Offering regular workshops on AIS biology and identification.
- Accompanying volunteers on AIS surveys of their lake or pond.
- Equipping volunteers with a VIPA kit, which includes all necessary survey resources for in the field, in addition to this manual which includes all identification resources, survey instructions and forms, and sample submission instructions and forms.
- Providing training and support on how to use the iNaturalist program.
- Identifying submitted samples from photos and informing VIPA of species.

## Defining Aquatic Invasive Species

In this manual, we will use the terms non-native, nuisance, and invasive. Often these terms are used interchangeably; however they are not synonymous. A **non-native** species is one that has been purposefully or accidentally introduced to an area outside its natural geographic range, but may or may not pose any threat to the natural communities in which it is introduced. A **nuisance species** is one that may be native or non-native, and may have adverse recreational or economic impacts. An **invasive species** is an organism that is non-native, whose introduction causes or is likely to cause economic or environmental harm or harm to human health. For the purposes of the VIPA project, we will refer to the animals as aquatic invasive animals.

Aquatic invasive species have several common characteristics. They reproduce abundantly and lack natural predators and other control mechanisms. They also tend to be skilled hitchhikers, hitching rides on boats, fishing gear, and other recreational equipment. Once established, they can reduce species diversity, food sources, and suitable habitat. This allows them to outcompete native populations, thereby disrupting the ecosystem balance. They can also have undue economic consequences. For example, zebra mussel veligers can hitchhike via standing water, and once introduced attach to and clog water intake pipes.

## Aquatic Invasive Animal Species in Vermont

The aquatic invasive animal species and their locations below were listed from various public and state maps and databases for the initial launch of the program. As more locations are confirmed the list will be updated annually.

Animal Species	Vermont Waterbody Present in 2023
Alewife	Lake Carmi, Lake Champlain, Lamoille River, Missisquoi River, Lake St. Catherine
Asian clam	Lake Bomoseen
Banded mystery snail	Arrowhead Mountain Lake, Beebe Pond, Burr Pond, Lake Bomoseen, Cedar Lake, Lake Champlain, Lake Dunmore, Lake Elmore, Lake Hortonia, Lake St. Catherine, Lily Pond, Lyford Pond, Lake Memphremagog, Molly's Falls Reservoir, Shadow Lake, Sunrise Lake
Big water crayfish	<u>Green Mountain National Forest, Lilliesville Brook, White River</u>
Chinese mystery snail	Cedar Lake, Lake Champlain, Connecticut River, Cranberry Pool, Lake Fairlee, Halls Lake, Lake Hortonia, Laird Pond, Lewis Creek, Lyndon College Pond, Mirror Lake, Lake Morey, Lake Ninevah, North Hartland Reservoir, Ompompanoosuc River, Ottauquechee River, Sabin Pond, Salem Lake, Seymour Lake, Silver Lake, Stevens Brook, Lake Willoughby
European rudd	Burr Pond, Dewey's Mill Pond, Kent Pond, Lake Bomoseen, Lake Champlain, Lake Champlain-Keeler Bay, Lake Hortonia, Roach Pond
Faucet snail	Arrowhead Lake, Lake Champlain, Lake Memphremagog, Lamoille River, Winooski River
Northern snakehead	Not found in Vermont
Red-eared slider	<u>Connecticut River backwater (Norwich), Dewey's Pond, Gilbrook Nature Area Pond, Maidstone Lake, Malletts Bay, Mirror Lake, Ponds in Barre and Brattleboro, Route 2 between Cub Road and Sandbar State Park (Milton), Sugar Hollow Brook, West Rutland Marsh, Williams River (near to), Zen Garden Pond</u>
Round goby	Not found in Vermont
Rusty crayfish	Black River, Lake Carmi, Connecticut River, Dog River, Lamoille River, Lewis Creek, Missisquoi River, Lake Morey, Ompompanoosuc River, Pike River, Thorpe Brook, Warm Brook, White River, Williams River, Winooski River
Spiny & Fishhook waterflea	Lake Champlain
Quagga mussel	Not found in Vermont
Zebra mussel	Lake Bomoseen, Lake Champlain

## Asian Clam *Corbicula fluminea*

The Asian clam is a freshwater bivalve filter feeder that can be found at the surface of the sediment or slightly buried in sandy areas. They usually dominate the benthic community through dense growth and crowd out native burrowing mussels, resulting in a loss of biodiversity. Their high rates of filtration result in elevated phosphorus and nitrogen levels, promoting an abundance of algae growth.

### Identification

- Triangular shape, though rounder than zebra mussels
- Prominent concentric growth rings on dense, thick shell
- Yellow-brown on the outside and white on the inside
- Anterior and posterior lateral teeth have many fine serrations
- Less than 5 cm (2 inches) in size
- Found at the surface or buried in sandy sediment

### Distribution

- Native to temperate and tropical southern Asia, west to the Mediterranean
- Discovered in Lake George, NY in 2010, which is a part of the Lake Champlain Basin
- In 2016, VTDEC confirmed the arrival of this species in Lake Bomoseen
- Infests many of the major waterways in North America

### Spread

- Able to reproduce rapidly while tolerating a wide range of temperatures (2-30°C)
- Can reproduce through self-fertilization



**Quick ID Guide**

- ✓ Triangular shell
- ✓ Elevated ridges on shell



### Similar Native Species

#### Fingernail Clam *Sphaerium simile*

- ✓ Rounded, asymmetric shell
- ✓ Smooth bands on shell rather than ridges
- ✓ Smaller than Asian clam
- ✓ Shell is thin and brittle





## Asian Clam Survey Directions

The prime time to survey for Asian clams is in August, however, enthusiastic volunteers may try their luck anytime in the summer! We recommend that volunteers survey in teams of two; one VIPA to sieve and one to record data either directly on the VTDEC website form, or on the provided field sheet. Contamination by zebra or quagga mussels is possible during your survey; please let us know in your notes if this occurs!

### MATERIALS

- 2 mm mesh sieve
- Swimsuit, or clothes that can get wet
- Water shoes or rain boots
- Forceps
- Ruler
- Smart phone or camera
- White plastic tray/container

### PROCEDURE

- Wade into the water about 1-5 feet, or whatever the volunteer feels is comfortable depending on the temperature of the water.
- One volunteer takes a sediment sample by scooping the sieve into the sediment 2-3 inches in depth.
- Keeping just the bottom of the sieve submerged in the water, shimmy the sieve for approximately ten seconds, or until all the small material has escaped through the 2 mm sieve holes.
- At this point, the two volunteers should analyze the contents of their sieve and the second volunteer should record the findings.
- Use the forceps to examine all contents: young Asian clams are small, only several mm in length, so be sure they are not overlooked.
- Take sediment samples while walking along the shoreline; approximately one every twenty feet, or about ten steps. Take as many sediment samples as possible, depending on the size of the waterbody and the time available to the volunteers. Twenty samples is a good data size target.
- Take photographs of the Asian clams you capture.
- Fill out the survey on the VT DEC website.
- Upload your photographs to the iNaturalist app so they may be included in the VIPA project.
- See pages 34 and 35 for instructions on how to photograph specimens and how to join the VIPA iNaturalist project.



# VIPA Asian Clam Field Sheet



Name \_\_\_\_\_  
 Date \_\_\_\_\_  
 Waterbody Name \_\_\_\_\_  
 Town \_\_\_\_\_

Site Description \_\_\_\_\_  
 Number of Surveyors \_\_\_\_\_  
 Time Spent Surveying \_\_\_\_\_

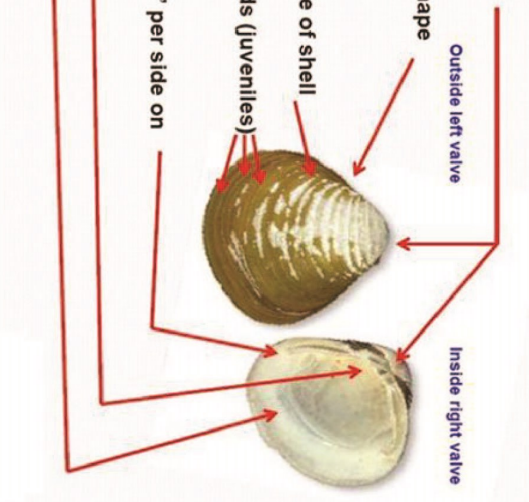
This survey sheet is intended for personal use in the field. After recording your observations, please upload your data to the DEC website form.

Number of sediment samples gathered \_\_\_\_\_ Number of Asian Clams observed \_\_\_\_\_

Prominent sediment type \_\_\_\_\_

Other Notes \_\_\_\_\_

- Centrally located beak or umbo on shell
- Triangular or rounded triangular shell shape
- Many, coarse concentric rings on outside of shell
- 3 brown/purple colored radial colorbands (juveniles)
- 2 pair long, finely serrated lateral "teeth" per side on right valve: 1 pair per side on left valve
- 3 pseudocardinal "teeth" per valve.
- Interior of shell bluish white.
- Most similar to native fingernail clams.



Basic Identification characteristics for Asian clams. Graphic: Center for Biodiversity and Conservation



## Watch List

### Quagga Mussels *Dreissena rostriformis bugensis*

Quagga Mussels are a mollusk that displays many different forms, making identification difficult. Coloration of bands may range from black to cream to white depending on the environmental conditions. This ambiguity can make visual identification challenging, so genetic comparison has been used as a method for accurate identification. Similar to zebra mussels, adults have strong hair-like fibers called byssal threads which allows them to attach to surfaces. They clog water intake pipes and foul boats and equipment, making the quagga mussel an ecological as well as economic threat. Easily confused with the zebra mussel, quaggas are bigger, more tolerant of environmental conditions, and can outcompete zebra mussels, making them a serious nuisance.

#### Identification

- Relatively small; no greater than 4 cm (1.57 inches)
- Alternating dark and light banding on shells
- Rounded angle between the ventral and dorsal surfaces
- Convex ventral side that allows a quagga mussel to topple over when placed on its side, whereas a zebra mussel will not
- Valves appear asymmetrical when viewed from the front or ventral side
- Rounder than zebra mussels

#### Distribution

- Not found in Vermont
- Native to the Dnieper River of Ukraine
- Capable of attaching to both hard and soft substrates
- Present in the Erie Canal and the St. Lawrence River in New York

#### Spread

- Ballast water discharge from Eastern European ships likely brought veliger, (juvenile) and adult quaggas to North America
- Short distance spread between waterways may be due to contaminated recreational boat travel, or live bait containers



#### Quick ID Guide

- ✓ Topples over when placed on ventral side
- ✓ Smaller than 4 cm



#### Similar Native Species

##### Eastern elliptio *Elliptio complanata*

- ✓ Most common fresh water mussel in VT
- ✓ Up to 12.7 cm (5 inches), much larger than the quagga
- ✓ Trapezoidal shape
- ✓ Usually has white markings close to the beak (point of the mussel where the two halves connect)





## Zebra mussels *Dreissena polymorpha*

The zebra mussel is a small freshwater mollusk often found with stripes, which gives them their telltale zebra-like markings. Extremely efficient filter-feeders, they consume large portions of microscopic life that forms the base of the food web. This has the potential to impact populations of species that depend on the same food source. Additionally, they attach their byssal threads to the shells of native mussels, impeding movement, feeding, respiration, thereby threatening the survival of native mussels. Several native mussels are now listed as endangered or threatened in Vermont due to the introduction of zebra mussels.

### Identification

- Adult zebra mussels are about 2.54 cm (1 inch) in length
- Shell forms the shape of a “D,” with a flat side
- Form dense colonies of up to 700,000 individuals/square meter on firm surfaces
- Striped pattern on shell that varies from dark to light (some have no stripes)

### Distribution

- Native to the Black, Caspian, and Azov Seas
- First identified in the United States in 1988 in Lake St. Clair of the Great Lakes region
- They have spread throughout the interconnected waterways in the eastern United States
- Confirmed in Lake Champlain in 1993; now found throughout much of Lake Champlain and the lower reaches of many of the Lake’s tributaries
- In 1998, they were discovered in Lake Bomoseen

### Spread

- Each female mussel can lay up to one million eggs during the summer months when water temperatures rise above 50°F
- Fertilized eggs hatch into microscopic juveniles called veligers, which can travel great distances on water currents or when transported on or in boats, equipment, and trailers



**Quick ID Guide**

- ✓ “D” shaped shell
- ✓ Balances on ventral side



### Similar Native Species

#### Fingernail Clam *Sphaerium simile*

- ✓ Rounded, asymmetric shell
- ✓ Smooth bands on shell
- ✓ Smaller than zebra mussel
- ✓ Shell is thin and brittle





## Mussel Survey Directions

Juvenile and adult quagga and zebra mussels colonize hard substrates using byssal threads (sticky, durable threads used for attachment.) The quagga and zebra mussels can be surveyed by taking advantage of this adaptation.

### MATERIALS

- Sampler
- Dock or buoy (not provided in VIPA kit)
- Padded envelope and disposable bags for mailing in plate
- Smart phone or camera
- White plastic tray/container

### PROCEDURE

#### Choosing Location

- Ideally, choose a shady spot. The shade made by your dock can be an effective location.
- The sampler should stand at least 2 meters deep (6 feet) but 30 cm (1 foot) from the bottom of the water. If it is impossible to install the sampler this deep, simply install it as deep as you can, while maintaining about one foot from the bottom of the lake.

*Note: we acknowledge that inconsistent water levels throughout the summer won't make this a perfect science. Please record the average water level when making the final data submission.*

- Moderate current is optimal for quagga and zebra mussel colonization.
- Safety first! Avoid putting your sampler where it could interfere with the activities of boaters or swimmers.

#### Installing Sampler (Early June)

- Note the date you installed the sampler on the field sheet. This information will eventually be submitted online.
- Secure the sampler by tying the end of your rope to your dock or buoy; we recommend utilizing a sturdy yet easy to untie knot like a bowline.
- Leave the sample alone and allow the mussels to colonize!

#### Removing Sampler (Late September)

- Note the date you removed the sampler.
- Carefully untie the rope, and retrieve the sampler.
- It is a good idea to immediately place the sampler in a bucket, so that small mussels are less likely to fall off and be lost. Pour any mussel residue from the bucket into a plastic bag and store in your freezer, along with the plate, until you're ready to mail in the entire sampler. The freezing temperatures will humanely kill the mussels, and prevent unintentional spread.

### MAILING IN SAMPLER TO DEC

- Place the sampler along with any mussels that fell off during removal, in the provided bag, and place that plastic bag in the provided padded envelope.
- Mail your envelope to the DEC for a complete analysis (mailing address and form on bottom of page 33.)

## VIPA Mussel Field Sheet



Name \_\_\_\_\_  
Date \_\_\_\_\_  
Waterbody Name \_\_\_\_\_  
Town \_\_\_\_\_

Site Description \_\_\_\_\_  
Number of Surveyors \_\_\_\_\_  
Time Spent Surveying \_\_\_\_\_

This survey sheet is intended for personal use in the field. After recording your observations, please upload your data to the DEC website form.

Sampler installation date \_\_\_\_\_ Sampler recovery date \_\_\_\_\_

Distance from PVC sampler to bottom of lake \_\_\_\_\_

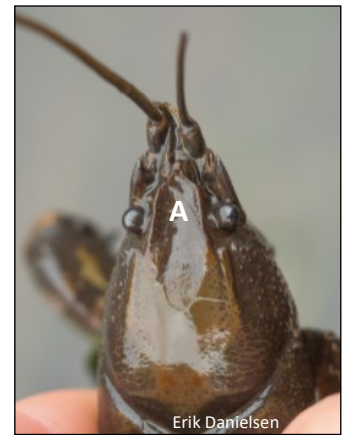
Average depth of PVC sampler throughout summer (We know this will vary with the water level.) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**A  
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S**

**Big Water Crayfish *Cambarus robustus***

The big water crayfish is a non-native species with great potential to become invasive. It was first discovered in Vermont in the White River in Bethel and the Green Mountain National Forest in Rochester. Because of its ability to tolerate acidic and polluted water bodies as well as outcompete native crayfish, it is likely to spread. Males may exhibit different characteristics during the same time of year; i.e. it's possible to see males with and without hooks on their legs simultaneously.



Erik Danielsen

**Identification**

- Very large with a carapace length exceeding 5 cm (2 in)
- Corners of the rostrum (forehead) are rounded (see A)
- Two rows of bumps on the palms of their claws (see B)
- Slight depression on the middle of the claw (see C)
- Greenish brown body

**Quick ID Guide**

- ✓ Rounded rostrum
- ✓ Two rows of bumps on lower claws

**Distribution**

- Native to the Midwest area through the Northeast, up to New York
- Has spread to several waterbodies in Vermont, including the White River, Lilliesville Brook, and the Green Mountain National Forest

**Spread**

- Most likely spread due to bait release
- Waterbodies close to the White River should be on high alert, as this is where the recent spread started

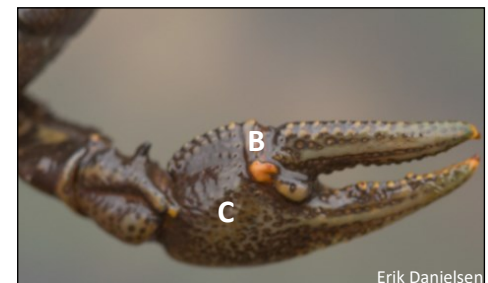


Mary Russ

**Similar Native Species**

**Appalachian Crayfish *Cambarus bartonii***

- ✓ Both have the unique rounded rostrum
- ✓ The Appalachian crayfish only has one row of bumps on the palms of their claws



Erik Danielsen

**Similar Non-Native Species**

**Virile Crayfish *Faxonius viriles***

- ✓ Usually blue, though the color isn't diagnostic
- ✓ Has many disorganized bumps on claws
- ✓ Widespread in Vermont



Erik Danielsen

**A  
I  
S****Rusty Crayfish *Faxonius rusticus***

This crayfish's ability to crossbreed with native northern clearwater crayfish, creating hybrids, may lead to a decrease in biodiversity. They are excessive eaters, consuming 2-3 times more than native crayfish which destroys aquatic plant beds and reduces habitat and food sources for native species. Males exhibit two sex forms depending on the season; Form 1 males (summer) have large claws and hooks on their abdomen for holding females while mating, Form 2 males (spring) lack these characteristics and resemble females.

**Identification**

- Entire body up to 15 cm (6in) including claws
- Adult crayfish have a rusty colored splotch on either side of their body
- Large claws showing a gap even when closed
- Claws are more robust than those of native crayfish species
- Thumbs, or inner claw, may appear "S" shaped
- Red and black bands on the tips of their claws
- Pointed rostrum (forehead) with pointed corners

**Distribution**

- Native to the Ohio River basin including waterbodies in Ohio, Indiana, Kentucky, and Tennessee
- Has spread rapidly throughout the eastern half of North America
- Most well-established throughout the White River, where they have been a species of great concern. Also reported in 15 other waterbodies across Vermont, including Lake Champlain

**Spread**

- The primary cause of spread is likely bait bucket emptying by anglers
- Another contributor is intentional release by humans

**Similar Native Species****Northern Clearwater Crayfish *Faxonius propinquus***

- ✓ Orange tipped claws lacking the black bands
- ✓ Have a uniquely prominent keel on their rostrum
- ✓ Much smaller than the rusty-carapace, averaging 2.5 cm (1 in)

**Quick ID Guide**

- ✓ Red spot on either side of torso
- ✓ Red and black bands on claws



All *Orconectes rusticus* images credited to Bob McNamara



## Crayfish Survey Directions

The rusty and big water crayfish can be surveyed in one of two ways: **Trapping** or **Hand Collection**

### Trapping

#### MATERIALS

- Minnow trap
- Rope
- Crayfish bait (small can of wet cat food)
- Ruler
- Smart phone or camera
- White plastic tray/container



#### PROCEDURE

- The best trapping season is late summer, (August). However, there's no harm in trying to trap earlier; though the water should be at least 60°F.
- Bait your trap by peeling the lid off the cat food, and placing the entire can in the trap.
- Secure your trap in a shallow area by attaching a rope to the clasp of the trap and tying the other end to a nearby tree or rock. It is a good idea to also place a heavy rock inside the trap to prevent it from being washed away.
- The opening to the trap must be submerged, and placed along the shoreline.
- Find an area with good flow and a variety of substrate, i.e. different sized rocks and sunken logs.
- Check your trap daily and expect to catch more than just crayfish. Bycatch should be released.
- Take photographs of the crayfish you capture (see safe handling directions on following page.)
- Fill out the survey on the DEC website.
- Upload your photographs to the iNaturalist app so they may be included in the VIPA project.
- See pages 32 and 33 for instructions on how to photograph specimens and how to join the VIPA iNaturalist project.
- If you are unable to identify a crayfish, but think it may be a big water, rusty, or hybrid crayfish, please email your photographs directly to the DEC.
- Please release all crayfish you capture.
- If you don't catch anything in two days, move your trap to another site.

*Note: The density you record may overestimate abundance of rusty and big water crayfish because they are more likely to explore and be trapped than the more timid, native crayfish.*





## Crayfish Survey Directions

The rusty and big water crayfish can be surveyed in one of two ways: **Trapping** or **Hand Collection**

### Hand Collection

#### MATERIALS

- Hand net
- Clothes that can get wet (waders are ideal)
- Sturdy shoes for walking on uneven surfaces
- Ruler
- Smart phone or camera
- White plastic tray/container

#### PROCEDURE

- Look under rocks and logs along the shoreline.
- Crayfish will try to run away backwards, so be prepared for their attempted escape.
- Take photographs of the crayfish you capture (see safe handling directions below.)
- Fill out the survey on the VTDEC website.
- Upload your photographs to the iNaturalist app so they may be included in the VIPA project.
- See pages 32 and 33 for instructions on how to photograph specimens and how to join the VIPA iNaturalist project.
- Hand collection is especially effective with the rusty crayfish, as they are active during the day and tend to hold their ground and snap their claws when approached by a predator.
- If you are unable to identify a crayfish, but think it may be a big water, rusty, or hybrid crayfish, please email your photographs directly to the VTDEC.
- Please release all crayfish you capture.

#### SAFE HANDLING

The rusty and big water crayfish have pinching claws that can hurt Community Scientists if they're not trained properly!

How to handle the crayfish to avoid harming yourself and the crayfish:

- With your thumb and forefinger, hold the crayfish just below its forearms. It will likely wave its claws around at first.
- Be particularly careful if the crayfish is soft; this means it has just molted and is especially vulnerable.

# VIPA Crayfish Field Sheet



Name \_\_\_\_\_  
 Date \_\_\_\_\_  
 Waterbody Name \_\_\_\_\_  
 Town \_\_\_\_\_

Site Description \_\_\_\_\_  
 Number of Surveyors \_\_\_\_\_  
 Time Spent Surveying \_\_\_\_\_

This survey sheet is intended for personal use in the field. After recording your observations, please upload your data to the DEC website form.

Rostrum/ Forehead	Chaele/ Claws	Carapace/ Body	Carapace Length	Sex	If Trapping	Proposed Crayfish ID
Rounded Corners? Sharp Corners? Sharp Corners w/keel? Big Water INVASIVE Rusty/White Crayfish Invasive/radix Northern Cleanwater NATIVE	Two rows of bumps on inner palms? Orange tips with black bands? Big Water Rusty Northern Cleanwater	Greenish brown body lacking reddish spots? Red spots on either side of carapace? Big Water or Northern Cleanwater Rusty	Large? (≈5cm) Small? (≈2cm) Big Water or Rusty Northern Cleanwater	Large Chaele? Hooks on one pair of legs? Male Lack these characteristics? Female	Report the relative abundance of each identifiable species. % % % %	Include predicted species and sex % % %

# AI S

## Banded Mystery Snail *Viviparus georgianus*

The banded mystery snail is a freshwater snail species usually found in slow-moving waters. These snails exist in rocky, silty or sandy bottom areas. The banded mystery snail can impact survivability of bass eggs and act as a host to trematodes which can spread parasites to fish and birds. They closely resemble the non-native Chinese mystery snail (see next page), however they are smaller with more dramatic stripes.



### Identification

- Thin and smooth shell
- Yellow-green in color
- Average 1.5-3 cm (.6-1.2 inches), depending on age
- Right-handed snail (shells coil clockwise when pointing up)
- 3-5 whorls separated by deep indents
- Populations found in high densities



### Quick ID Guide

- ✓ Dramatic stripe pattern
- ✓ 3-5 whorls

### Distribution

- Native to southeastern and midwestern United States
- First found in Vermont in Lake Bomoseen in 1962. Now widely distributed throughout the state
- Infests many of the major waterways in North America



### Spread

- Can breed multiple times throughout their lifespans
- Females typically birth 10 young
- Very adaptable and can tolerate different habitats
- Spread is due by contaminated fishing gear and equipment



### Similar Native Species

#### Pointed campeloma *Campeloma decisum*

- ✓ 2-4 cm (.75-1.5 inches)
- ✓ Males will exhibit a right tentacle shorter than the left tentacle





## Chinese Mystery Snail *Cipangopaludina chinensis*

The Chinese mystery snail can clog water intake pipes and outcompete native snails, and in doing so are considered a high risk species that should be monitored. The species is also a host to parasites that may spread infection. The name is derived from the way they give birth to young fully developed snails which “mysteriously” appear.



### Identification

- Large globose shells, up to 7.6 cm (3 inches) with 6-7 whorls
- Concentrically marked white to blue colored opercula
- Width to height ratio of 0.74-0.82
- Often found in high density; 40 snails/m<sup>2</sup>
- Found partly buried in sandy substrate
- May be seen with operculum closed and floating
- After death, their shells turn olive green and they may wash up on shore



### Quick ID Guide

- ✓ Golf ball sized globose shells
- ✓ Brown shells often with dark vertical ridges near the openings

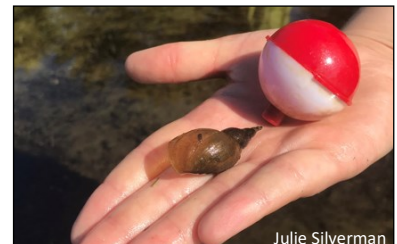
### Distribution

- Native range from Southeast Asia to Japan and eastern Russia
- Has been found in the United States along the Northeast and upper Midwest
- First discovered in two Vermont water bodies in 1965, the Ottauquechee River and Lake Fairlee; now widely distributed throughout the state



### Spread

- Their operculum allows them to open and close their shells, enabling them to survive long periods of air exposure. This makes transport from trailered boats likely.
- They prefer quiet and shallow environments in soft, sandy or muddy bottoms.
- They have a 40% greater survival rate of young than that of native snails.



### Similar Native Species

- ✓ Because of the Chinese mystery snail’s distinctly large size, it is unlikely to confuse them for another species. However, when they are young they resemble the pointed campeloma.

### Don’t be fooled!

Chinese mystery snail (left) vs. smaller banded mystery snail (right)



## Faucet Snail *Bithynia tentaculata*

Faucet snails are small, shiny shelled non-native snails that have become established in Vermont. They are host for a parasites that can infect and even kill waterfowl including ducks and coots. They also compete with native snails, foul swimming areas, and clog water intake pipes. They're both filter feeders and "scrapers," capable of eating algae on substrates. Where present in Lake Champlain, they outcompete other snails.

### Identification

- Up to 1.3 cm (0.5 inches) long
- Smooth, shiny pale brown oval shell that tapers to a point
- Longer than they are wide
- Operculum has rings resembling a bullseye
- Shell has 5-6 somewhat flattened whorls

### Distribution

- Native to Europe, from Scandinavia to Greece
- Present in 13 states, first arrived in Vermont in 1882, present throughout Lake Champlain as well as Arrowhead Lake and Lake Memphremagog

### Spread

- Unintentionally introduced to the Great Lake Basin through solid ballast in timber ships and spread from this location
- People spread faucet snails primarily through the movement of water-related equipment such as boats, swim rafts, boat lifts, anchors, and scuba, fishing, and hunting gear



### Quick ID Guide

- ✓ Pointed shell
- ✓ Very small



Mgreilhuber inaturalist



Mgreilhuber inaturalist

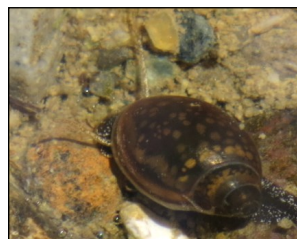


LCBP

### Similar Native Species

#### Acute Bladder Snail *Physella acuta*

- ✓ Similar size to faucet snail, averaging 1.27 cm (0.5 inches)
- ✓ Left handed snail (shells coil counter-clockwise when pointing up—very unique)
- ✓ No operculum





## Snail Survey Directions

The Chinese mystery snail, banded mystery snail, and faucet snail do not require active survey techniques. The best method to locate these species is to designate a block of time walking along the shoreline or wading in the shallow water with a trained eye and your smartphone or data sheet to recording your findings.

### MATERIALS

- Sturdy walking shoes
- Ruler
- Smartphone or camera
- White plastic tray/container

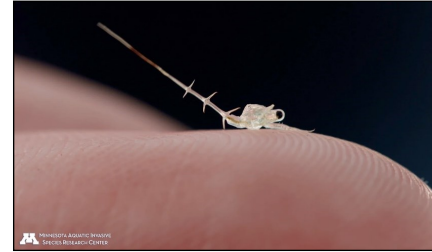
### PROCEDURE

- Walk along the shoreline, or shallow areas of your local waterbody.
- Routinely look under stones and logs, as this is a common hiding space for snails.
- Take photographs of the snails you find.
- Fill out the survey on the VTDEC website.
- Upload your photographs to the iNaturalist app so they may be included in the VIPA project.
- See pages 32 and 33 for instructions on how to photograph specimens and how to join the VIPA iNaturalist project.



**Fishhook waterflea** *Cercopagis pengoi*  
**Spiny waterflea** *Bythotrephes longimanus*

These small crustaceans aren't fleas but their erratic, jerking movements while swimming provide their common name. Waterfleas can cause major changes to the aquatic community by abundantly preying upon other zooplankton. As a result, waterflea directly compete with small fish, and have the potential to alter the overall structure of the ecosystem. Anglers are likely to encounter these zooplankton when masses of individuals become entangled in fishing lines and downrigger cables.



**Identification**

- Between 0.63-1.27 cm (0.25-0.5 inches) at maturity, barely visible when on the tip of the finger, often requiring magnification to identify
- Long barbed tail accounts for 75% of their total body length
- Both have 1-4 pairs of barbs on their tails, however the fishhook waterflea has a distinctively angled tail with a loop on the end, and the spiny waterflea has a straight tail.
- The spiny waterflea has two black eyes, whereas the fishhook waterflea has a single large black eye.

**Quick ID Guide**

- ✓ Large black eye spot
- ✓ Long barbed tail

**Distribution**

- Fishhook waterflea are native to eastern Europe and southwest Asia
- Spiny waterflea are native to northern Europe and Asia
- Spiny and fishhook waterflea were discovered in Lake Champlain in 2014 and 2017 respectively; now they are established throughout the Lake
- Infests all of the Great Lakes and many inland lakes in that region



**Spread**

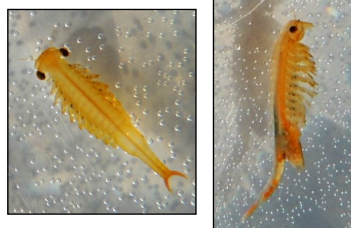
- Most likely arrived to the Great Lakes through ballast water



**Similar Native Species**

**Fairy Shrimp** *Branchinecta lynchi*

- ✓ Less than one inch in size
- ✓ Found in vernal pools, not in open lake waters





## Alewife *Alosa pseudoharengus*

Alewives live in the ocean, but as adults they migrate annually into freshwater rivers to reproduce. Landlocked populations can adapt to complete their lifecycle entirely within freshwater. Alewives are aggressive feeders and can outcompete native fish for food, which is primarily zooplankton and larval fish. This gives them the potential to impact native fish such as walleye, salmon and trout.

### Identification

- 12.7-20.3 cm (5-8 inches) long
- Silvery with dark blue-green luster on back with a lighter belly, sometimes has dark horizontal stripes
- Eyes are large with transparent eyelids
- Large black spot behind gill cover
- Lower jaw protrudes past upper jaw
- Deeply forked tail
- Serrated edge on the belly where scales overlap

### Distribution

- Landlocked alewife populations have been present in the Great Lakes since the 1930s, gaining access after the construction of canal and lock systems, and they've been widely introduced into inland lakes in a number of eastern United States
- First detected in Vermont in Lake St. Catherine (Rutland County) in 1997, and in Lake Champlain in 2004. Confirmed populations in Lake Carmi in 2017, as well as most Champlain tributaries.

### Spread

- The origin of alewife in Lake Champlain is unknown, although they may have entered through the Hudson or Richelieu Rivers
- The population in Lake St. Catherine and Lake Carmi was most likely established from a bait bucket release
- Alewives also spread naturally through connected waters by use of rivers and canal systems



Sean Good, VT Department of Fish and Wildlife, Bugwood.org



U.S. Fish and Wildlife



### Quick ID Guide

- ✓ Dark spot behind gills
- ✓ Light pearly belly



### Similar Native Species

**Lake chub** *Couesius plumbeus*

- ✓ Breeding males have reddish spots near pectoral fins
- ✓ A developed barbel on either corner of mouth



Konrad P. Schmidt

Konrad P. Schmidt, Bugwood.org





## European Rudd *Scardinius erythrophthalmus*

This large adaptable minnow prefers lakes, ponds and slow-moving waters in rivers. Rudd are omnivores, eating a wide variety of plant and animal material including aquatic and terrestrial insects, algae and rooted plants. Rudd outcompete invertebrate food sources with native fishes, and they can shift their diet to plants, unlike most native fishes. Because rudd are hardy, they will fare better than many native fishes in waters that are eutrophic or polluted.

### Identification

- 30-45 cm (12-18 inches) long
- Stout, deep-bodied fish with a forked tail and large scales
- Lower lip is sharply angled with a protruding lower jaw
- Back is dark olive brown and body coloration is variable
- Pectoral (side), pelvic (lower front) and anal (lower rear) fins are a vivid reddish orange
- Dorsal (back) and caudal (tail) fins are reddish brown
- Keel-like belly has 6-9 scales, unlike naked belly of the golden shiner
- Young rudd often resemble golden shiners, but adults reach larger size than golden shiner

### Distribution

- Native to Europe and east Asia
- Introduced into at least 13 northeastern states
- First reported in Keeler Bay, Lake Champlain (1996) now throughout Lake Champlain
- Reported in Burr Pond, Lake Hortonia, Lake Bomoseen, Roach Pond, Kent Pond, and Dewey's Mill Pond

### Spread

- First introduced in the United States in 1916-1925 by Europeans for food and game
- Recent spread in the United States from fish farming by the southern baitfish trade
- Sale of rudd as bait is illegal in Vermont



© Noel M. Burkhead



Shawn Good, VT Fish and Wildlife

### Quick ID Guide

- ✓ Red spot on iris of eye
- ✓ Bright red fins
- ✓ Scaled keel



### Similar Native Species

#### Golden shiner *Notemigonus crysoleucas*

- ✓ Fleishy scaleless keel along belly extending from the pelvic to anal fins
- ✓ Yellow-green fins





## Watch List

### Round Goby *Neogobius melanostomus*

Round gobies often perch on rocks at the bottom of shallow areas. They have an enhanced ability to detect water movement, allowing them to feed in complete darkness, thus giving them an advantage over fish in the same habitat. Round gobies are aggressive and effective foragers that succeed in rocky areas that provide hiding places for prey such as mussels, clams, snails, soft-shelled crayfish, small fishes and fish eggs, negatively impacting native species populations.

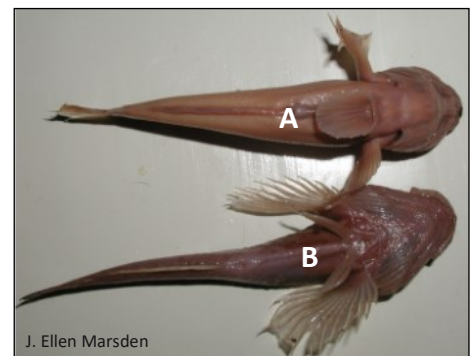


#### Quick ID Guide

- ✓ Single round pelvic fin
- ✓ Greyish with spots

#### Identification

- 10-23 cm (4-9 inches) long
- Often confused with sculpins. Round gobies have a single, round pelvic fin that forms a suction disk that allows them to anchor to the bottom (see A), instead of a slender pair (see B)
- Typically grey with brown or black spots covering them; young gobies lack these spots
- In the spring, may be black with yellow spots and fin margins
- Forward back (dorsal) fin has a black spot on it and sometimes bears green tints



#### Distribution

- Native to Eurasia including the Black, Caspian, and Azov seas
- Present in the Great Lakes, St. Lawrence River, Hudson River, Richelieu River (near Montreal), and the Erie Canal, expanding inland further into New York, Illinois and Wisconsin
- Not found in Vermont, although could enter Lake Champlain through the Champlain Canal from the Hudson or the Chambly Canal from the Richelieu



#### Spread

- Introduced into the Great Lakes (1990) from the Black Sea via freighter ballast water discharge
- Spread to Lake Superior (1995) by ships operating within the Great Lakes
- As an abundant food source, the zebra mussel may have facilitated the invasion of the round goby

#### Similar Native Species

**Mottled sculpin** *Cottus bairdii* or **Slimy sculpin** *Cottus cognatus*

- ✓ *Mottled* - Short patch of teeth on roof of mouth.
- ✓ *Slimy* - Lacks teeth
- ✓ All sculpin are mottled whereas goby bodies tend to be tan or black with spots on the back

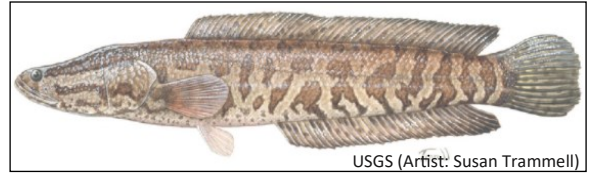




## Watch List

### Northern Snakehead *Channa argus*

Preferring to live in stagnant shallow ponds, swamps and slow muddy streams, they also live in canals, reservoirs, lakes, and rivers. Snakeheads can survive in poorly oxygenated waters, even breathing out of the water for up to four days. Adults are voracious feeders, eating crayfish, frogs, insects and fish up to 33% of their body length. Surviving in a broad range of environments, flexible diet, competitive predatory nature and parenting investment make them able to thrive once introduced.



USGS (Artist: Susan Trammell)



Ryan Hagerty, U.S. Fish and Wildlife Service

#### Quick ID Guide

- ✓ Anal fin extends close to tail
- ✓ Irregular brown blotches covering body

#### Identification

- Up to 84 cm (33 inches) long
- Somewhat flattened head with sharp teeth, like a pike
- Pelvic (lower front) fins are close to the pectoral (side front) fins and gills
- Anal (lower towards tail) fins extend from the middle of the body almost to the tail (see bottom right)
- Light brown with dark brown patches covering body



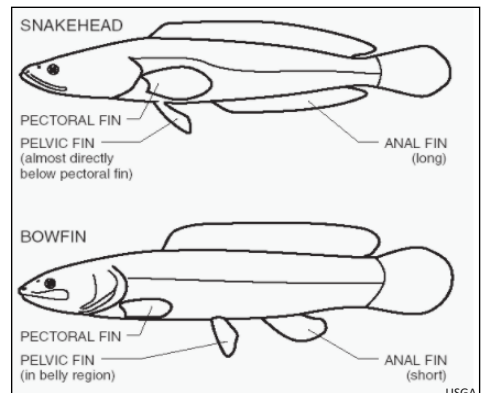
USGS, US Geological Survey, Bugwood.org

#### Distribution

- Native to China, Russia and Korea
- Present in 16 states, mostly on the east coast, including New York and Massachusetts
- Not yet found in Vermont

#### Spread

- Imported for the live food fish market, popular in ethnic markets and restaurants
- Unauthorized intentional releases from the food trade has put United States and Canadian watersheds at risk



#### Similar Native Species

##### Bowfin *Amia calva*

- ✓ Also called the dog fish
- ✓ Important native fish species, provides a critical ecological role in the aquatic community. Considered a “primitive fish” that hasn’t changed in 150,000 years



Sam Stukel, U.S. Fish and Wildlife Service

##### Burbot *Lota lota*

- ✓ Single barbel on chin

## Fish Survey Directions

Whether fishing from a boat, shore, dock, or the ice, knowing what’s at the other end of the line is critical for monitoring the potential spread of invasive fish species. When fishing, please keep a sharp look-out for new species or species you are unfamiliar with because you may be the first to identify a new invader in a Vermont lake, pond, reservoir or stream.

**NOTE:** A Vermont fishing license is required for everyone older than 15. No fishing license is needed under age 15. [License Information | VT Fish & Wildlife](#)

**All anglers must adhere to the following:**

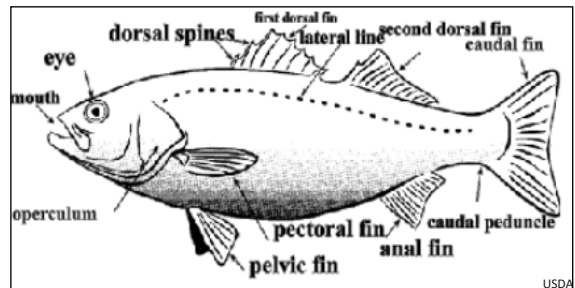
[10 V.S.A. App. § 121. Rule establishing a list for prohibited, restricted and unrestricted fish species](#)

**Under no circumstance should a suspected invasive fish be transported to another location.**

### Catch and Release or Catch and Harvest

#### MATERIALS

- Fishing equipment
- Ruler or measuring tape in inches and centimeters
- Fish scale
- Ruler
- Smart phone or camera
- White plastic tray/container



#### PROCEDURE

- Go fishing in a lake, pond, reservoir or other body of water.
- When you catch a fish, identify the species. Is it an invasive species?
- If the fish is a species of concern included in the VIPA program (Alewife, European Rudd, Round Goby, or Northern Snakehead) collect and record fish measurements, waterbody data and photos of the fish in question.
- If the fish is not an AIS species of concern, release or harvest depending on your interest and the Vermont State fishing regulations.
- *Note: Do not kill a fish if you are unsure of its identity because it could be a regulated species. Instead, take a photo and submit it to the VTDEC.*

### Fishhook & Spiny waterflea Survey Directions

- Waterflea are most likely to be found on anglers’ fishing lines, anchors, and other boating equipment. The most effective survey method will be to have a trained eye when fishing.
- If you suspect spiny or fishhook waterflea on your fishing gear, fill out the appropriate online form, and be sure to submit your photos to iNaturalist.
- Waterflea can be killed by drying in the sun for five days or rinsing with 140 ° F water.
- Always clean, drain, and dry your boat and equipment whenever it may have come in contact with invasives, or when moving to a new waterbody.



## Red-eared Slider *Trachemys scripta elegans*

Red-eared Sliders are a subspecies of Pond Slider that has colonized many areas outside their native range. They are a popular pet turtle that is often released. They compete with native species for food, nesting areas, and basking spots. They may also transmit parasites and diseases to native turtles. AK, NH, and VT are the only states that do not currently have breeding populations. However, as a result of climate change, they now may become established in VT. They spend much of their time basking in the sun on rocks, logs, and shorelines; however, they are also capable of moving over land. They prefer still, warm, and shallow water with a mucky bottom, and lots of emergent vegetation.



### Quick ID Guide

- ✓ Red stripe behind eye
- ✓ Very large with a weak keel down the middle of its shell

### Identification

- Yellow or cream-colored stripes on their neck and legs resembling two of Vermont’s native turtles; however, they also have a wide red stripe behind the eye
- Can grow up to 28 cm (11 inches) long; much larger than our common Painted Turtle.
- Rear edge of the carapace (back shell) is weakly serrated (toothed) and greenish-gray to brown in color.
- Carapace is oval, and slightly domed with a weak keel.

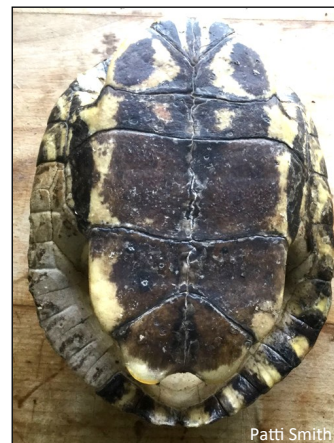


### Distribution

- Native to southeastern and midwestern United States
- Invasive in sixty-four countries, including the United States
- Breeding populations now in every state in the US except Alaska, New Hampshire, and Vermont

### Spread

- Spread by people releasing unwanted pet turtles



Patti Smith

All other turtle photos courtesy of Jim Andrews (vtherpatlas)

### Similar Native Species

#### Painted Turtle *Chrysemys picta*

- ✓ Red stripes at the base of its neck, tail, and legs and red on its marginal scutes, but it **does not have a red stripe behind its eye**
- ✓ Edges of shell very smooth all the way around



#### Northern Map Turtle *Graptemys geographica*

- ✓ Strong central keel, a strongly toothed posterior margin of its carapace, but it **does not have a red stripe behind its eye.**





## Turtle Survey Directions

Red-eared Sliders spend much of their time basking in the sun on rocks, logs, banks, and floating vegetation; however, they are also capable of moving a few miles over land. They could be found in or near any still water, but they prefer warm, shallow, water with a mucky bottom, and lots of emergent vegetation.

This turtle could be seen while fishing, paddling in a canoe or kayak, or practically any activity near warm, still, shallow water. Most often they would be seen while basking out of the water, but they may also be seen swimming at the water's surface, or on land near water while laying eggs, or moving between water bodies. Binoculars or a zoom camera are often helpful to see the "red-ears" but if you can get close enough, you may be able to see their markings with your naked eye.

### MATERIALS

- A boat to quietly explore shallow bays
- Binoculars to get a close look at the head and neck of turtle
- Smartphone or camera

### PROCEDURE

- With a boat, quietly and slowly explore shallow bays with basking logs or rocks, mucky bottoms, and emergent vegetation. In some situations you could walk the shoreline.
- When you see basking turtles look with binoculars or a zoom camera to see if any have "red-ears". Since basking turtles will drop into the water and disappear when scared, you need to look carefully before you get too close. If need be, you can approach quietly and slowly until you can see well enough to identify them.
- Take photos of any suspected Red-eared Sliders. In addition to uploading the photographs to the VIPA iNaturalist project, send the photos along with a report of the turtle's exact location, the date, and your contact information, to the [Vermont Reptile and Amphibian Atlas](http://VermontReptileandAmphibianAtlas.org) (VTHerpAtlas.org).
- Fill out the survey on the VTDEC website.
- Upload your photographs to the iNaturalist app so they may be included in the VIPA project.
- If you can't get a good photo, but you are fairly confident of seeing Red-eared Sliders, just describe them carefully when you report them.
- If you are unsure of the species, but you get photos, send your photos, and the staff at the Vermont Reptile and Amphibian Atlas may be able to identify your turtles.
- Please do not capture and relocate any turtles.



## Stop the spread of aquatic invasive species! **Clean. Drain. Dry.**

- Clean** off mud, all plant material, and any animals from your kayak, including the rudder, hull, cockpit, and hatches, and associated gear. Dispose of it on dry land. If possible, wash kayak and gear with pressurized water.
- Drain** your hatches and cockpit away from water.
- Dry** anything that comes into contact with water.

For more information visit:  
[https://dec.vermont.gov/watershed/  
lakes-ponds/aquatic-invasives/spread-  
prevention](https://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives/spread-prevention)



## VIPA General Survey Data Sheet



Waterbody: \_\_\_\_\_ Town: \_\_\_\_\_  
 Area Surveyed: \_\_\_\_\_  
 Latitude/Longitude (If possible): \_\_\_\_\_ Map with Location? \_\_\_\_\_  
 Survey Date: \_\_\_\_\_ Total Survey Hours: \_\_\_\_\_ # Surveyors: \_\_\_\_\_  
 Name: \_\_\_\_\_  
 Street Address: \_\_\_\_\_ Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Email: \_\_\_\_\_  
 Additional Surveyor Names: \_\_\_\_\_

### Water Conditions:

Relative Water Level (Check one)	Water Clarity (Check one)	Light Conditions (Check all that apply)	Surface Conditions (Check all that apply)
<input type="checkbox"/> High	<input type="checkbox"/> Good	<input type="checkbox"/> Clear	<input type="checkbox"/> Calm
<input type="checkbox"/> Normal	<input type="checkbox"/> Fair	<input type="checkbox"/> Partly Cloudy	<input type="checkbox"/> Rippled
<input type="checkbox"/> Low	<input type="checkbox"/> Poor	<input type="checkbox"/> Overcast	<input type="checkbox"/> Choppy

### Survey of Aquatic Nuisance Animals:

Please check the box for the species that were observed during each survey, and then upload your findings to the VTDEC website. In addition, please upload your photos to the VIPA iNaturalist project.



*Species in **red and bold** are not currently found in Vermont. If you suspect one of those species, please email your report directly to the VTDEC.*

Kimberly.Jensen@vermont.gov

Bivalva	Crustacea	Gastropoda	Fish	Reptiles
<input type="checkbox"/> Asian clam	<input type="checkbox"/> Big watercrayfish	<input type="checkbox"/> Banded mystery snail	<input type="checkbox"/> Alewife	<input type="checkbox"/> <b>Red-eared slider</b>
<input type="checkbox"/> <b>Quagga mussel</b>	<input type="checkbox"/> Rusty crayfish	<input type="checkbox"/> Chinese mystery snail	<input type="checkbox"/> European rudd	
<input type="checkbox"/> Zebra mussel	<input type="checkbox"/> Spiny waterflea	<input type="checkbox"/> Faucet snail	<input type="checkbox"/> <b>Round goby</b>	
	<input type="checkbox"/> Fishhook waterflea		<input type="checkbox"/> <b>Northern snakehead</b>	

### Notes or Comments:

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*Please do not collect or transport any suspected aquatic invasive animal*



## VIPA General Survey Data Sheet Directions

- Complete the top portion of the data sheet, including your name and contact information, the total number of hours spent surveying, the number of surveyors, and their names.
- *Latitude/Longitude or Map*: if a map was used as a reference to indicate plant locations, please copy and send with this form. If plants were identified in particular locations (Lat/Long) note these on the map or on the form.
- *Relative Water Level*: Indicate the current water level relative to normal. Vegetation and scour marks on the bank can be good indicators.
- *Water Clarity*: Use the following estimates for the depth of water through which plants are visible – Good (>5 meters), Fair (3 – 5 meters), Poor (<3 meters)
- *Light Conditions*: Given that light conditions (cloud cover) can change in a short period of time, check all conditions that would apply during the time the survey is conducted.
- *Surface Conditions*: Given that surface conditions can change readily, check all conditions that would apply during the time the survey is conducted.
- *Aquatic Invasive Species Survey (Mandatory)*: Please survey for the invasive species listed. Note the letter code (e.g. Asian clam = AC) of any suspicious species observed, along with the location, approximate size of the population (if applicable), and any additional comments on a map of the water body.
- If a photograph is submitted for review, check the appropriate box regarding the photo submission, and list the letter code in the name if applicable.
- If a new native species is observed (a species not on the lake's current animal inventory), list the name, and submit a photo to VTDEC. VTDEC staff will confirm the specimen identity, if possible, and if it is new to the lake, update the lake's inventory to reflect this finding.

## Mussel Sampler Submission Form

Keep the sample in a cool place until it is mailed, then follow the directions below to mail this completed form with the sample (Monday – Wednesday only) at the address below. Questions? Call (802) 828-1115.

ATTN: Animal Sample, VTDEC – Watershed Management Division  
1 National Life Drive, Davis 3, Montpelier, VT 05620-3522.

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Email Address: \_\_\_\_\_

Waterbody: \_\_\_\_\_ Town: \_\_\_\_\_

Suspected Species ID:  Quagga Mussel  Zebra Mussel  Other \_\_\_\_\_

Date Collected: \_\_\_\_\_

Have you contacted VTDEC?  Yes  No If **yes**, with whom did you speak: \_\_\_\_\_

### Plate Packaging Directions:

- Please insert the sampler, along with any bagged mussels that fell off, inside the padded envelope.
- Add extra bubble wrap if there are a lot of mussels or if the padding in the envelope seems insufficient.
- Include the above completed form inside the padded envelope.
- Securely tape the below mailing address to the outside of the envelope.
- Mail in the sampler even if no mussels were found and note this on the "Other" line.

-----  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### ATTN: Aquatic Specimen

VTDEC – Watershed Management Division

1 National Life Drive, Davis 3

Montpelier, VT 05620-3522

Are you a:  VIPA  VIP  Greeter  Other

## Photographing an Aquatic Specimen

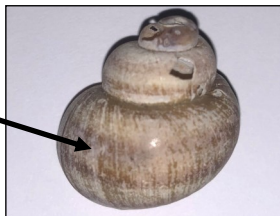
Macro photography is closeup photography of small, living organisms. The technique usually involves the creation of an image that is life-sized or larger than the specimen. Knowing how to take high quality photographs of your specimen is imperative to the validity of your report and the success of our program. Refer to the “Quick ID guide” located on each animals’ fact page, for which key features are important to highlight in your photograph.

1. First take a photo of the specimen in its natural environment to provide a sense of its habitat.
2. Pick up the specimen and place it in the white tray provided in your VIPA kit. This will serve as a backdrop. Be careful not to harm yourself or the animal. *Remember; if handling a crayfish, pick it up by pinching with your thumb and forefinger just below the forearms.*
3. If possible, include a ruler in your photo next to the animal for a sense of scale.
4. If using a smart phone, tapping on the screen will cause the camera to refocus on where you tapped.
5. On an iPhone, you can press and hold on the camera screen to turn on auto exposure and auto focus. The AE/AF lock will automatically adjust the brightness and sharpness of the image.
6. Take several close up photographs. Try getting about three inches from the subject.
7. Experiment with and without flash depending on the natural lighting.

### Good Animal Photography

- Clear background
- Highlights identifiable features
- Specimen is in high resolution

Stripes and whorls are clearly visible



Distinguishable rusty spot is highlighted



### Poor Animal Photography

- Neither on a white background nor in its natural habitat
- Missing key features
- Blurry



## Reporting your Findings to iNaturalist

iNaturalist is an online platform where community scientists and experts collaborate in learning more about the natural world. iNaturalist generates scientifically valuable biodiversity data from personal encounters, though the primary goal is to **connect people to nature**.



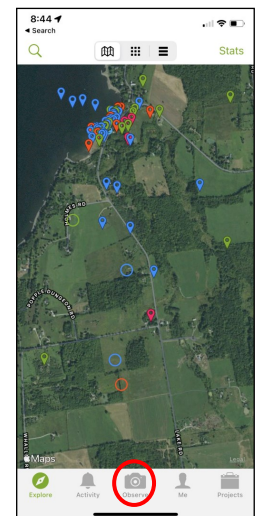
### Creating an account

iNaturalist is easily accessible on your smart phone or computer

1. Go to [www.inaturalist.org](http://www.inaturalist.org), or download the iNaturalist app.
2. Create an account by entering your email and choosing a password and username; this is how your name will be displayed.

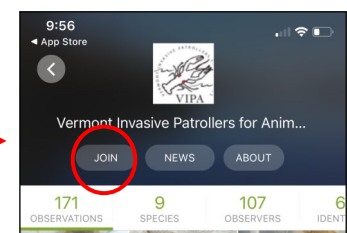
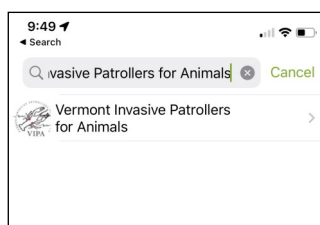
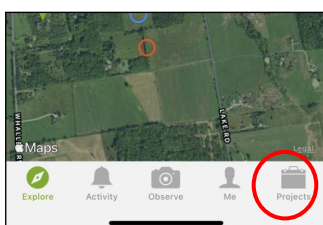
### Upload your photographs

1. If using the computer, click on the green “upload” arrow icon located at the top right of the screen. From there you may drag your photographs onto the screen or browse for your photographs. If using the app, click on the “observe” button located in the bottom center of your screen. You will be prompted to upload a pre-existing photo from your photo library, or to open your camera if you intend to take the photograph at that moment.
2. We recommend adding several photographs for a single animal, as this will make it easier for others to verify your observation. Three is a good target for a single observation, though if you only have one still upload it! The science community values your observations.



### Join the VIPA Project

1. Once a member of the iNaturalist community, you can join projects to engage further in your areas of interest
2. Join the VIPA project by typing “Vermont Invasive Patrollers for Animals” in the search bar.
3. There you can view all the observations of our fourteen VIPA animals in Vermont, and see the activity of other VIPAs.
4. Whenever an observation of one of the fourteen VIPA animals is made in Vermont, it will automatically be pulled into the project.
5. Visit the [iNaturalist help page](#) for more specific questions, as well as tips and tricks to make the most out of your iNaturalist experience. Happy Observing!



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Jim Deschler, Steve Fiske, Jim Kellogg, and Michelle Graziosi (Vermont DEC) for their guidance in taxonomy and samples; Lori Fisher (Lake Champlain Committee) for her expertise in Asian clam surveying and identification; Jennifer Guarino, Dan Ruddell, and Mary Russ (White River Partnership) for sharing their experience with trapping crayfish and survey methods; Meg Modley (Lake Champlain Basin Program) for providing resources and knowledge; Jim Andrews (Director of the Vermont Reptile and Amphibian Atlas) for his expertise in the Red-eared slider; Shawn Good (Vermont Fish & Wildlife) and J. Ellen Marsden (University of Vermont) for sharing their resources and breadth of knowledge about Vermont's fish. Sincere thanks to Carly Alpert (ECO AmeriCorps) for launching the VIPA manual and program with assistance by Kimberly Jensen (Vermont DEC).

## Quick Reference to Vermont Laws for Aquatic Invasive Species

### 10 V.S.A. § 1452. DEFINITIONS

(2) "Aquatic nuisance" means undesirable or excessive substances or populations that interfere with the recreational potential or aquatic habitat of a body of water, including rooted aquatic plants and animal and algal populations. Aquatic nuisances include zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), Asian clam (*Corbicula fluminea*), fishhook waterflea (*Cercopagis pengoi*), rusty crayfish (*Faxonius rusticus*), spiny waterflea (*Bythotrephes longimanus*), or other species identified by the Secretary by rule.

### 10 V.S.A. § 1453. AQUATIC NUISANCE CONTROL PROGRAM

(a) The Agency of Natural Resources shall establish and maintain an aquatic nuisance control program.

(b) The aquatic nuisance control program shall perform the following services:

- (1) receive and respond to aquatic nuisance complaints;
- (2) work with municipalities, local interest organizations, private individuals, and agencies of the state to develop long-range programs regarding aquatic nuisance controls;
- (3) work with federal, state, and local governments to obtain funding for aquatic nuisance control programs;
- (4) implement an aquatic species rapid response program under this chapter;
- (5) administer a grant-in-aid program under section 1458 of this title;
- (6) place a sign at least two feet by two feet in size that states that the water is infected with an aquatic nuisance and that a person transporting the nuisance in violation of section 1454 of this title may be subject to a penalty of up to \$1,000.00 pursuant to 23 V.S.A. § 3317, so that the sign is easily visible from a ramp used to launch vessels at any fish and wildlife access area on a body of water infected with an aquatic nuisance;
- (7) provide the Commissioner of Fish and Wildlife and the Commissioner of Motor Vehicles with written educational information about aquatic nuisances that can be included in an envelope containing a boat registration and in a Department of Fish and Wildlife publication pertaining to fishing and boating. (Added 2009, No. 46, § 1, eff. July 1, 2010.)

### 10 V.S.A. § 1454. TRANSPORT OF AQUATIC PLANTS AND AQUATIC NUISANCE SPECIES

No person shall transport an aquatic plant or aquatic plant part, zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), or other aquatic nuisance species identified by the secretary by rule to or from any Vermont waters on the outside of a vehicle, boat, personal watercraft, trailer, or other equipment. This section shall not restrict proper harvesting or other control activities undertaken for the purpose of eliminating or controlling the growth or propagation of aquatic plants, zebra mussels, quagga mussels, or other aquatic nuisance species.

### TRANSPORT OF LIVE FISH AND USE OF BAITFISH – SUMMARY OF KEY RULES

#### Personal Baitfish Harvest:

- Personally harvested baitfish may be used only on the same water body from which they were collected.
- Personally harvested baitfish shall not be transported by motorized vehicle away from the water body from which they were collected.

#### Commercially Purchased Baitfish:

- A person purchasing baitfish shall retain a transportation receipt issued by a state approved commercial bait dealer, authorizing transportation of baitfish overland by motorized vehicle. Greeters do not have the power to demand proof of the transportation receipt - only a law enforcement official may do so.
- A transportation receipt shall be valid for 96 hours from time and date of sale.
- Anglers shall not transport baitfish away from state waters by motorized vehicle. Unwanted baitfish shall be discarded dead in the water, on the ice, or safely disposed of in the trash.
- Anglers may purchase baitfish from a New York bait shop for use on Lake Champlain only, provided the bait shop is Vermont-licensed, and the baitfish is accompanied by a Vermont-issued baitfish transportation receipt. Likewise, anglers may purchase baitfish from a New Hampshire bait shop for use on the Connecticut River and its setbacks only, provided the bait shop is Vermont-licensed, and the baitfish are accompanied by a Vermont-issued baitfish transportation receipt.

List of Vermont waterbodies with a confirmed presence of an aquatic invasive species  October, 2021	Aquatic Invasive Species Key:													
	AL - alewife						RC - rusty crayfish							
	AC - Asian clam						SS - starry stonewort							
	BN - brittle naiad						SWF - spiny waterflea (FWF - fishhook waterflea)							
	CLP - curly-leaf pondweed						VLM - variable-leaved watermilfoil							
	EF - European frogbit						WC - water chestnut							
	EWM - Eurasian watermilfoil						ZM - zebra mussel							
	<i>These species are considered the most problematic in Vermont.</i>													
	Waterbody	Town	AL	AC	BN	CLP	EF	EWM	RC	SS	SWF	VLM	WC	ZM
	Arrowhead Mountain Lake	Milton				X		X						
Austin Pond	Hubbardton						X							
Baker Pond	Brookfield						X							
Beaver Pond	Proctor						X							
Beaver Wetland	Mendon						X							
Beebe Pond	Hubbardton				X		X							
Berlin Pond	Berlin						X							
Big Marsh Slough	Highgate					X	X				X	X		
Black Creek Marsh	St.Albans				X							X		
Black Pond	Hubbardton				X		X							
Black River	Springfield						X	X						
Blissville Wetland Pond	Blissville											X		
Bomoseen, Lake	Castleton		X	X	X	X	X					X	X	
Broad Brook	Vernon						X							
Brookside Pond	Orwell					X						X		
Brownington Pond	Brownington						X							
Bullis Pond	Franklin				X							X		
Burr Pond	Sudbury				X		X							
Cabot Clark Marsh	Highgate											X		
Carmi, Lake	Franklin	X			X		X							
Castleton River	Castleton						X							
Cedar Lake	Monkton						X							
Champlain, Lake - Burlington Bay		X			X		X			X			X	
Champlain, Lake - Isle LaMotte		X			X	X	X			X			X	
Champlain, Lake - Main Lake		X			X	X	X			X/FWF		X	X	
Champlain, Lake - Mallets Bay		X			X		X			X			X	
Champlain, Lake - Missisquoi Bay		X			X	X	X				X	X	X	
Champlain, Lake - Northeast Arm		X			X		X			X			X	
Champlain, Lake - Otter Creek		X			X	X	X			X		X	X	
Champlain, Lake - Port Henry		X			X	X	X			X		X	X	
Champlain, Lake - Sandbar WMA												X		
Champlain, Lake - Shelburne Bay		X			X	X	X			X			X	
Champlain, Lake - South Lake		X		X	X	X	X			X	X	X	X	
Champlain, Lake - St. Albans Bay		X			X	X	X			X		X	X	
Chipman Pond	Tinmouth						X							
Clay Brook	Warren						X							
Clyde Pond	Derby						X							
Coggman Creek												X		
Coggman Pond	West Haven				X		X					X		
Connecticut River	Brattleboro			X				X				X		
Connecticut River, Herricks Cove	Rockingham						X					X		
Connecticut River, Hoyts Landing	Springfield				X		X							
Connecticut River, TransCanada launch	Concord						X							
Connecticut River, Wilder Dam	Hartford						X							
Cranberry Pool	Highgate				X	X						X		
Crystal Lake	Barton						X							
Daniels Pond	Glover				X									
Dead Creek	Ferrisburgh											X		

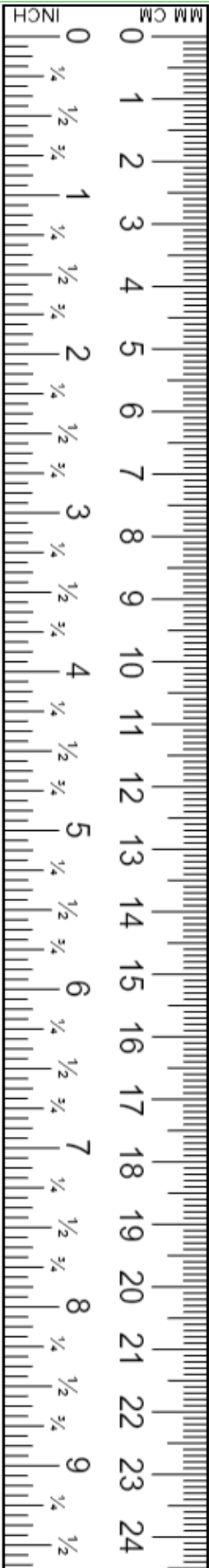


Waterbody	Town	AL	AC	BN	CLP	EF	EWM	RC	SS	SWF	VLM	WC	ZM
Dead Creek	Highgate						X					X	
Derby Lake	Derby						X		X				
Deweys Mill Pond	Hartford						X						
Dog River	Berlin							X					
Dunmore, Lake	Salisbury						X						X
East Creek	Orwell											X	
Echo Lake	Hubbardton						X						
Eligo, Lake	Greensboro						X						
Elmore, Lake	Elmore						X						
Fairfield Pond	Fairfield				X		X						
Fairfield Swamp Pond	Fairfield						X						
Fairlee, Lake	Thetford						X						
Fern Lake	Leicester			X	X		X						
Forest Lake	Calais				X								
Frog Pond	Orwell						X						
Gale Meadows Pond	Londonderry						X						
Glen Lake	Castleton				X		X						
Great Hosmer Pond	Craftsbury						X						
Half Moon Pond	Hubbardton				X								
Halls Lake	Newbury						X				X		
Hinkum Pond	Sudbury						X						
Horton Pond	Benson			X	X							X	
Hortonia, Lake	Hubbardton			X	X	X	X						
Hough Pond	Sudbury				X		X						
Indian Brook Reservoir	Essex						X						
Iroquois, Lake	Hinesburg				X		X						
Kent Pond	Killington						X						
Lamoille River	Milton						X	X					
LaPlatte River	Shelburne				X	X	X						
Leicester River	Salisbury						X						
Lemon Fair River	Orwell											X	
Lewis Creek	Ferrisburgh						X	X					
Lily Pond	Poultney				X		X					X	
Line Pond	Barnard						X						
Little Pond	Wells				X		X					X	
Long Pond	Eden						X						
Lower Pond	Hinesburg					X	X						
McCabes Brook	Shelburne						X						
Metcalf Pond	Fletcher						X						
Memphremagog, Lake	Newport Town				X		X		X				CANADA
Mill Pond	Windsor						X						
Mill Pond (Parson's Mill)	Benson						X					X	
Mill River	St. Albans					X							
Missisquoi River	Highgate						X	X					
Morey outlet brook	Fairlee						X						
Morey, Lake	Fairlee						X	X					
North Hartland Reservoir	Hartland						X						
North Montpelier Pond	East Montpelier						X						
North Springfield Reservoir	Springfield						X					X	
Old Marsh	Fair Haven				X								
Ompompanoosuc River	Norwich						X	X					
Otter Creek	Ferrisburgh						X					X	
Paran, Lake	Bennington				X		X					X	
Pauline, Lake	Ludlow						?						
Pelkeys Swamp	Benson					X	X					X	
Phillips	Benson			X	X							X	
Pike River	Berkshire							X					

Waterbody	Town	AL	AC	BN	CLP	EF	EWM	RC	SS	SWF	VLM	WC	ZM
Pinneo, Lake	Hartford						X						
Porter Lake	Ferrisburgh				X		X					X	
Poultney River	Poultney						X						
private pond	Arlington						X						
private pond	Hinesburg						X						
private pond	St. Albans						X						
Rescue, Lake	Ludlow						X						
Richville Pond	Shoreham				X	X	X					X	
Rock River	Highgate					X	X					X	
Root Pond	Benson				X							X	
Round Pond	Newbury						X						
Rutland City Reservoir	Rutland Town						X						
Sadawga Pond	Whitingham				X		X						
Salem Lake	Derby						X						
Shadow Lake	Glover						X						
Shaftsbury	Shaftsbury											X	
Shelburne Pond	Shelburne				X	X	X						
Singing Wetland	Bennington				X		X					X	
Spectacle Pond	Brighton			X									
St. Catherine, Lake	Wells	X			X		X					X	
Star Lake	Mount Holly						X						
Stevens Brook	Maidstone						X						
Stoughton Pond	Weathersfield						X						
Sunrise Lake	Benson						X						
Sunset Lake	Benson			X	X		X						
Ticklenaked Pond	Ryegate						X						
Thorp Brook	Charlotte							X					
Vergennes Watershed (Norton Brook)	Bristol						X						
Waterbury Reservoir	Waterbury			X									
West River	Brattleboro						X						
White River, various locations								X					
Whitney Creek	Addison						X					X	
Williams River	Rockingham						X	X					
Willoughby, Lake	Westmore						X						
Winona, Lake	Bristol			X		X	X						
Winooski River	Colchester						X	X					

Species	Total Number of Waterbodies
AL - alewife	3
AC - Asian clam	1
BN - brittle naiad	11
CLP - curly-leaf pondweed	37
EF - European frogbit	14
EWM - Eurasian watermilfoil*	100
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	3

# Notes



A series of 24 horizontal lines, each corresponding to a centimeter on the ruler, providing space for notes.

# Aquatic Invasive Species Management

1 National Life Drive, Davis 3 Montpelier VT 05620-3522

<https://dec.vermont.gov/watershed/lakes-ponds>



## Aquatic Specimen Submission Procedures

### Aquatic Plant Material

1. Prior to sending, use the guidance materials provided by the State of Vermont to identify the plant. These include [The Key to Common Vermont Aquatic Plant Species](#), the [Vermont Invasive Patroller Manual](#), and the [Gallery of Invaders](#) webpage.
2. If you determine or suspect that the plant is invasive (e.g., Eurasian watermilfoil), carefully check the material that the plant was found on, whether on watercraft, trailer or equipment, and remove all the material that was found.
3. If you determine or suspect that the plant is an aquatic invasive species, cross reference it with the list of Vermont waterbodies known to have aquatic invasive species. If the plant came from a location where its establishment is known, record the incident, but no further action is required. If the plant is not on the list, continue to Step 4.
4. If you identified a plant species that is not on the list of waterbodies known to have aquatic invasive species or are unsure of the identification, either:

- a. Take several clear photographs of the plant. Include a view of one entire plant (not a mass of plants) as well as a close-up of the leaves or other relevant information. Please include a ruler, or a common object within the photo to demonstrate the scale of the specimen (see photos on right).
- b. Email these photographs to [kimberly.jensen@vermont.gov](mailto:kimberly.jensen@vermont.gov) or text to (802) 490-6120. In your message, include the suspected identification and the name of the waterbody it came from. Press or freeze the plant in the event its identity needs to be confirmed at a later date if the plant cannot be identified from the photographs. Or,
- c. Mail the plant. Wrap the plant specimen in a wet paper towel and place it into a sealable plastic bag. If there is more than one species, wrap each individual plant. Collect 8 -12 inches of a plant specimen, including any flowers or fruit (if possible).

If mailing specimen, please contact/text Kim Jensen at (802) 490-6120 or [kimberly.jensen@vermont.gov](mailto:kimberly.jensen@vermont.gov) prior to mailing to get the proper address for mailing, Monday through Wednesday only. Keep the specimen in a cool place until mailing can occur. Fill out the Aquatic Specimen Submission Form and follow the mailing directions on the form.



View of the entire plant with a common object or ruler



Close-up of a cross section of a plant stem with leaves

## Aquatic Animal Material

1. Prior to sending, use the guidance materials provided by the State of Vermont to identify the animal. These include the [Vermont Invasive Patroller for Animals Manual](#) and the [Gallery of Invaders webpage](#).
2. If you determine or suspect that the animal is invasive (e.g., zebra mussel), carefully check the material that the animal was found on, whether watercraft, trailer or equipment, and remove all the material that was found. If the organism was found on a natural substrate or in the water, if possible, photograph the location of the specimen where it was found.
3. If you determine or suspect that the animal is an aquatic invasive species, cross reference it with the list of Vermont waterbodies known to have aquatic invasive species. If the specimen came from a location where its establishment is known, record the incident, but no further action is required. If the animal is not on the list, continue to Step 4.
4. If you identified an animal species that is not on the list of waterbodies known to have aquatic invasive species or are unsure of the identification, either:
  - a. Take several clear photographs of the animal. Include a view of one entire animal (not a mass of animals) as well as a close-up of the animal or other relevant information. Please include a ruler, or a common object within the photo to demonstrate the scale of the specimen (see photos at bottom of the page).
  - b. Email these photographs to [kimberly.jensen@vermont.gov](mailto:kimberly.jensen@vermont.gov) or text to (802) 490-6120. In your message, include the suspected identification and the name of the waterbody it came from. Freeze the animal in the event its identity needs to be confirmed at a later date if the animal cannot be identified from the photographs. Or,
  - c. Mail the specimen. Wrap the specimen in a wet paper towel or container and place it into a sealable plastic bag. If there is more than one species, wrap them individually. Fill out the Aquatic Specimen Submission Form and follow the mailing directions on the form.

If mailing specimen, please contact/text Kim Jensen at (802) 490-6120 or [kimberly.jensen@vermont.gov](mailto:kimberly.jensen@vermont.gov) prior to mailing to get the proper address for mailing, Monday through Wednesday only. Keep the specimen in a cool place until mailing can occur.



Organism photographed in found location (above & below)



Variety of specimen photographed with common object or ruler.



Identifiable features of one specimen. (Not the same species identified above, used for demonstration purposes only.)

## Aquatic Specimen Submission Form

Keep the specimen in a cool place until it is mailed, then follow the directions below to mail this completed form with the specimen (Monday - Wednesday only). Please contact please contact/text Kim Jensen at (802) 490-6120 or [kimberly.jensen@vermont.gov](mailto:kimberly.jensen@vermont.gov) prior to mailing, to get the proper address. Questions? Call (802) 828-1115.

**ATTN: Aquatic Specimen VTDEC- Watershed Management Division  
1 National Life Drive, Davis 3, Montpelier, VT 05620-3522**

Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Waterbody: \_\_\_\_\_ Town: \_\_\_\_\_

**Are you a:**     Vermont Invasive Patroller     Public Access Greeter     Other

If a Greeter, was this specimen collected during a boat inspection?     Yes     No

If **yes**, name of previously visited water body: \_\_\_\_\_

If no, description of the location of collection: \_\_\_\_\_

#1 Suspected/Potential Species Identification: \_\_\_\_\_ Date Collected: \_\_\_\_\_

#2 Suspected/Potential Species Identification: \_\_\_\_\_ Date Collected: \_\_\_\_\_

Additional Suspected/Potential Species Identification: \_\_\_\_\_ Date Collected: \_\_\_\_\_

Did you contact VTDEC?     Yes     No    If **yes**, with whom did you speak: \_\_\_\_\_

**Specimen Packaging Directions:**

- Please wrap a representative piece in a wet paper towel and place it into a sealable plastic bag.
- If there is more than one species obtained per waterbody, individually wrap them.
- If there are specimens from more than one waterbody, divide these into separate plastic bags and clearly mark the different locations on the bags.
- Place the plastic bags in a manila envelope and mail the specimen to the address above or use the mailing label below.

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**ATTN: Aquatic Specimen/ Kim Jensen  
VTDEC - Watershed Management Division  
1 National Life Drive, Davis 3  
Montpelier, VT 05620-3522**

**Are you a:**     VIP     Greeter     Other

Aquatic Invasive Species Management  
Lakes and Ponds Management and Protection Section  
Department of Environmental Conservation  
Watershed Management Division  
1 National Life Drive, Main 2, Montpelier, VT 05620-3522  
Phone: (802) 828-1115  
[dec.vermont.gov/watershed/lakes-ponds](http://dec.vermont.gov/watershed/lakes-ponds)

The Vermont Department of Environmental Conservation is an equal opportunity agency and offers all persons the benefits of participation in each of its programs and competing in all areas of employment regardless of race, color, religion, sex, national origin, age, disability, sexual preference, or other non-merit factors.

This document is available upon request in large print, Braille, or audio cassette.

VT Relay Service for the Hearing Impaired 1-800-253-0191 TDD>Voice – 1-800-253-0195 Voice>TDD