CHAMP Manual

2026 Edition

The Lake Champlain Committee
CHamplain Aquatic invasive Monitoring Program (CHAMP)
Resources for surveying and reporting
invasive species in Lake Champlain

This project has been funded in part by the Great Lakes Fishery Commission (GLFC) under an assistance agreement to NEIWPCC in partnership with the Lake Champlain Basin Program.

Table of Contents

Introduction

Champlain Aquatic invasive Monitoring Program (CHAMP)

CHAMP is a aquatic invasive species monitoring program that was piloted in 2023 by the Lake Champlain Committee (LCC). Lake Champlain currently has 51 known aquatic non-native and invasive species (AIS). However, many more are in nearby waterways that are connected to Lake Champlain. The Hudson River has more than twice as many aquatic nonnative and invasive species and the Great Lakes almost four times more. Invasive species are capable of causing extinctions of native plants and animals, reducing biodiversity, competing with native organisms for limited resources, and altering habitats. This can result in huge economic impacts and fundamental disruptions of the lake ecosystem. Humans have the greatest influence on the distribution of aquatic invasive species and therefore can play a key role in detection and spread prevention. While both Vermont and New York have strong volunteer AIS programs, such as the Vermont Invasive Patrollers (VIP) through the Vermont Department of Environmental Conservation (VTDEC) and the Adirondack Park Invasive Plant Program (APIPP) Lake Protectors through the Nature Conservancy, there is a gap for monitoring AIS in Lake Champlain that CHAMP fills.

Information from this manual is adopted from the VTDEC's VIP Training manual, from which LCC used AIS descriptions for most of the species as well as applicable guidance for CHAMP volunteers.

About LCC

LCC works toward clean, accessible water through science-based advocacy, education and collaborative action. With a history of nearly more than 60 years, LCC is the region's only bi-state non-profit organization dedicated to lake health and accessibility. We take a whole-lake approach to issues that affect this natural treasure, which boasts nearly 600 miles of shoreline in New York, Vermont and Quebec. Learn more about us here: https://www.lakechamplaincommittee.org/

Program Goals

CHAMP seeks to address the gap of AIS monitoring on Lake Champlain by recruiting volunteers to monitor sites throughout Lake Champlain's main sections: the Inland Sea, Main Lake Central, Main Lake North, Main Lake South, Mallets Bay, Missisquoi Bay, St. Albans Bay, and the South Lake. Monitoring efforts help improve understanding of the location and spread of AIS in Lake Champlain, enabling management professionals to respond more effectively. These surveys also support early detection efforts.

Responsibilities

CHAMP volunteers are encouraged to:

- Have access to a public or private lakeshore location on Lake Champlain for at least three surveys over the course of the June-October season. *LCC's top priority is monitoring public access sites and active wetland complexes and river deltas, with emphasis on the South Lake and Main Lake North regions of Lake Champlain.*
- Watch a virtual training and attend an in-person session to learn about aquatic species identification and CHAMP survey methods (combined training time is about 3 hours, not including travel to training site).
- Conduct and submit at least three CHAMP surveys per site between June and October. Surveys consist of ten rake tosses between a start and end point and provide documentation of AIS encountered.

LCC staff support the efforts of CHAMP volunteers by:

- Providing a virtual training session presented with AIS professionals to share background on AIS, guidance on species identification, and outline survey and reporting protocols.
- Hosting in-person training sessions where you can see examples of AIS and go through survey methodology
- Supplying a CHAMP Toolkit containing materials needed for surveys: an AIS rake, ID resources, a loupe, white bins for photographing species, sealable plastic bags for sample collection, survey instructions, and forms.
- Being available for ongoing technical support for surveying and reporting throughout the field season.

Aquatic Invasive Species: Biology and Identification

Lake Champlain has over 50 non-native aquatic species, and about a dozen of these are considered invasive.

Often the terms nuisance, exotic, non-native, and invasive are used interchangeably, but these terms are not synonymous. A **nuisance species** has adverse ecological or economic impacts yet may be native to the region. An **exotic or non-native species** has been purposefully or accidentally introduced to an area outside its natural geographic range but may not pose any threat to the natural communities into which it is introduced. An **invasive species** has been introduced to an area outside its natural range, ***and*** causes ecological and / or economic harm – it **is both non-native and nuisance**.

Aquatic invasive species (AIS) share several common characteristics. They **reproduce rapidly** – for example, aquatic invasive plants can often form a whole new plant from just a fragment – and they often **lack natural predators** or other control mechanisms. AIS are typically skilled hitchhikers, spreading by attaching to boats, fishing gear, and other recreational equipment as people travel from one lake to another.

Once established, AIS can **outcompete native species**, disrupting the balance of aquatic ecosystems and decreasing biodiversity. Their pervasive spread can overtake recreational areas and harm local economies. In many cases, unfettered growth of invasives **impairs water chemistry**, which has cascading impacts on the lake as a whole.

Most AIS were transported by humans, through ballast water in ships, dumping from aquariums, or hitchhiking on boat hulls. Outside of their native ecosystem, they find an absence of ecological controls such as disease and predators. This can result in rampant growth and reproduction. Of the non-native species whose origin of introduction to Lake Champlain is known, more than 60 percent entered via canals, particularly the Champlain Canal at the southern end of the lake.

Some surrounding waterways have even more non-native species than Lake Champlain: the Hudson River has 146, and the Great Lakes have 190. These waterbodies are hydrologically connected to Lake Champlain, posing a threat of AIS spread. Some species present in nearby waters are projected to have strong negative impacts on Lake Champlain should they be introduced, and preventing entry is the best way to avoid this. LCC is working on keeping these species out of Lake Champlain by training volunteers to monitor for them and supporting Early Detection and Rapid Response protocols.

Priority Species of Concern

Target AIS already established in Lake Champlain

- Brittle naiad (*Najas minor*)
- Curly-leaf pondweed (*Potamogeton crispus*)
- Eurasian watermilfoil (*Myriophyllum spicatum*)
- European frogbit (*Hydrocharis morsus-ranae*)
- Golden clam *(Corbicula fluminea)*
- Water chestnut (*Trapa natans*)
- Variable-leaf watermilfoil (*Myriophyllum heterophyllum*)
- Zebra mussel (*Dreissena polymorpha*)

AIS Watchlist (*species not detected in Lake Champlain as of 2025*)

- Brazilian waterweed *(Egeria densa)*
- Carolina fanwort *(Cabomba caroliniana)*
- Hydrilla *(Hydrilla verticillata)*
- Parrot feather *(Myriophyllum aquaticum)*
- Starry stonewort *(Nitellopsis obtusa)*
- Water Soldier *(Stratiotes aloides)*
- Round goby *(Neogobius melanostomus)*
- Quaqqa mussel *(Dreissena bugensis)*

Any photos and illustrations of the following species that does not have a photo credit are courtesy of LCBP or VT DEC.

Brittle naiad (*Najas minor*)

There are several naiad species in New York and Vermont, but only one that is invasive. Brittle naiad prefers primarily alkaline waters of streams, ponds, and lakes and is tolerant of eutrophic conditions and high turbidity. The plant stems and parts are very brittle and fragment easily, contributing to its spread. *This plant can be differentiated from its native relatives by its easily visible serrations along the leaf margin.*

Identification

- Submersed annual plant
- Visibly serrated leaf margin, leaves subopposite arranged
- Leaves are often recurved, stiff and bristly
- Leaves are 0.3-0.5 mm wide, finely pointed
- Flowers grow along the leaf axils
- Fragments easily when handled

Distribution & Spread

Brittle naiad is native to South America and spread rapidly throughout eastern North America, including Lake Champlain in 1960. Fragmentation of its brittle leaves is the primary means of spread, but mass seed production contributes to overwintering success.

Native lookalike

Slender naiad (*Najas flexilis*)

- **Paired flaccid leaves with hard-to-see serrations**

Quick ID Guide

- Visibly serrated edges
- Stiff steel wool-type feel

Curly – leaf pondweed

(*Potamogeton crispus*)

Curly-leaf pondweed is a distinctive plant that is easily identified by its noticeably wavy leaf edge that has finely-toothed serrations. It is a submersed perennial plant, found in freshwater lakes, ponds, rivers, streams, and slightly brackish waters. It is tolerant to low light and low temperatures. This species gets a jumpstart on the growing season, growing in the spring and early summer before conditions are favorable for most other species. By mid-July, it begins to die back.

Identification

- Submersed plant, no floating leaves
- Alternate leaf arrangement along stem
- Serrated leaf margin
- Leaf has a wavy curling edge and a blunt tip
- Each leaf is about 0.5” wide and 2-3” long

Distribution & Spread

Curly-leaf pondweed is native to Eurasia, Africa, and Australia and was introduced to Lake Champlain in the early 1900s. It spreads primarily by hard burr-like winter buds called turions—a single plant can produce hundreds of turions that are capable of germinating the following spring.

Native lookalike

Clasping-leaf pondweed

(*Potamogeton perfoliatus*)

- Base of leaves fully engulf stem
- Leaves are wavy, not curly

Quick ID Guide

- Visibly serrated edges
- Narrow, wavy, lasagna-like leaves arranged alternately
- Early season grower

Eurasian watermilfoil

(*Myriophyllum spicatum*)

Eurasian watermilfoil is one of eight watermilfoil species in Vermont; six of these are native and very similar in appearance. Therefore, the best way to identify the species is to observe a segment of a whorled leaf and count the leaf divisions. Its ability to survive throughout cold temperatures provides a quick growth start in spring.

Identification

- Submersed, though often branches near surface
- Whorls of 4-6 finely divided, featherlike leaves
- Each leaf contains 12 - 21 leaflets along the stem
- Bottlebrush appearance underwater
- Grows in up to 20 feet of water

Distribution & Spread

Eurasian watermilfoil is native to Europe and Asia and was first ID-ed in St. Albans Bay in 1962. It reproduces almost exclusively by fragments which can drift, sink, develop roots, and grow into new plants. Wind and waves may break plants loose; and boating activity through dense watermilfoil beds also contributes to fragmentation and spread.

Native lookalike

Northern watermilfoil (*Myriophyllum sibricum*)

- 5-15 leaflets
- Remains stiff out of water

Quick ID Guide

- 12-21 leaflets
- Limp when out of water
- Red-tipped in spring and fall

European frogbit

(*Hydrocharis morsus - ranae*)

This free-floating aquatic plant has a well- developed root system, yet it does not anchor itself in the sediment. It moves around a water body by wind and wave action. As a result, the plant is often found in quiet still waters, such as wetlands and coves. Plants are typically connected together by a runner, creating a dense surface mat.

Identification

- Free-floating perennial; roots are not anchored in the sediment
- Small white flowers with 3 petals.
- Small, round heart-shaped leaf 0.5-2.5” long, green or purplish underside with parallel ladder venation
- Plants are often connected to each other by irregular underwater runners

Distribution & Spread

Frogbit is native to Eurasia and was first discovered in Lake Champlain in 1993. Spread can occur rapidly in a growing season through vegetative reproduction, sometimes forming dense mats. As a free-floating plant, it can become tangled with other plants and spread to other waterbodies.

Native lookalike

Little floating heart

(*Nymphoides cordata*)

- Heart-shaped leaves, slightly more pointed than frogbit.
- One leaf per stem
- White 5-petaled flower
- Roots anchored to lakebed
- Undersides of leaves have palmate venation

Quick ID Guide

- Free-floating kidney-shaped leaves with light green, spongy underside
- Small white 3-petaled flower
- Undersides of leaves have parallel ladder venation

Variable - leaf watermilfoil

(*Myriophyllum heterophyllum*)

Like Eurasian watermilfoil, variable-leaf watermilfoil grows aggressively and rapidly in a wide variety of environmental conditions. It is a rooted plant that can grow in water up to five meters deep. When left on land it develops “terrestrial morphs”, which look like small trees, to allow the plant to survive out of water.

Identification

- Rooted, submersed, perennial aquatic plant
- Underwater leaves are finely divided into segments giving them a feather-like appearance
- Densely packed whorls of four to six leaves with seven to eleven paired leaflets
- On more mature plants, blade-like leaves with serrated edges appear above the water’s surface; flowers develop at the base of these emergent leaves forming a stiff spike

Distribution & Spread

Variable-leaf watermilfoil is native to the Southeast region of the US and was first discovered in Missisquoi Bay and South Bay in Lake Champlain in 2009. It spreads via stem fragments, winter buds, roots, & sometimes seeds, and can hitchhike.

Native lookalike

Northern watermilfoil
(*Myriophyllum sibricum*)

- 5-15 leaflets
- Remains stiff out of water

Quick ID Guide

- Bottle brush appearance
- 4-6 feather-like leaves with 7-11 paired leaflets, in a dense whorl around the stem

Water chestnut (*Trapa natans*)

Water chestnut is one of the few invasive plant species that only reproduces by seed (as opposed to fragmentation). If the plant is harvested before it drops mature seeds, it can be eradicated.
However, if it becomes established in a water body, it rapidly reproduces. It grows on and below the water's surface; the distinct spiky seeds lodge in sediment and anchor it to the lakebed. Thriving at the water's edge, it is often a nuisance at boat launches.

Identification

There are two types of leaves:

- *Submerged leaves* are feather-like and oppositely paired along the stem
- *Floating leaves* on the water's surface collectively form a circular rosette; each surface leaf is triangular in shape and has a serrated margin; the petiole of a floating leaf has a bladder- like swelling filled with air and spongy tissue that provides buoyancy

Plant stems are long and cord-like, sometimes resembling milfoil, and can attain lengths of up to 16 ft.

Distribution & Spread

Water chestnut is native to Europe and Asia. It was initially brought to the United States as an ornamental plant in the late nineteenth century and by the 1940s had spread to Lake Champlain. If left unharvested after maturing, seeds drop to the sediment bottom or are carried to new locations by currents where they remain viable for five or more years, although viability of up to 12 years has been reported. The spiky seeds can also be dispersed as they cling to ropes, to feathers and webbed feet of wildfowl, and to the fur of animals.

Quick ID Guide

- Triangular floating leaves with serrated margins form circular rosette.
- Feathery submersed leaves

Zebra mussel

(*Dreissena polymorpha*)

The zebra mussel is a small freshwater mollusk. Adult zebra mussels attach themselves to firm surfaces with strong hair-like fibers called byssal threads. 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. They attach to shells of native mussels, impeding their movement and threatening their survival; several native mussels are now listed as endangered or threatened in Vermont and New York due to the introduction of zebra mussels.

Identification

- Adult zebra mussels are around one inch in length, and juveniles can be smaller than a pinky nail
- **Shell forms the shape of a "D," with a flat side.** Usually able sit upright on flat side (unlike Quagga mussels)
- Can form dense colonies of up to 700,000 individuals/square meter on firm surfaces.

Distribution & Spread

Zebra mussels are native to southern Russia and the Ukraine. First identified in the United States in 1988 in the Great Lakes, they were confirmed in Lake Champlain in 1993; since then they have been found throughout much of Lake Champlain. 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 boats and trailers.

Golden Clam (*Corbicula fluminea*)

The golden 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. They can also clog water intake pipes and are associated with promoting an abundance of algae growth.

Identification

- Triangular shape
- Prominent concentric rings
- Straw yellow on the outside and white on the inside
- Anterior and posterior lateral teeth have many fine serrations

Distribution & Spread

- Native to temperate and tropical southern Asia, west to the Mediterranean
- Discovered in Lake George 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
- Ability to reproduce rapidly and tolerate a range of temperatures (2-30°C)
- Can reproduce through self-fertilization

Similar Species

European fingernail clam (*Sphaerium corneum*)

- Oval shaped and flatter in comparison
- Less prominent rings, smooth to the touch
- Shells are thin and brittle, easy to fracture

Photo by Francisco Welter Schultes, CC BY-SA 2.5

WATCHLIST

Brazilian Waterweed (*Egeria densa*)

Brazilian waterweed is much larger than native look-alikes. The leaves on the top grow densely around the stem. This submersed aquatic perennial is typically found in slow moving shallow waters that are somewhat acidic and enriched. It can also be found in lakes, ponds, and rivers, where it can grow in waters up to 6.5 meters deep.

Identification

- Leaves arranged in whorls around the stem
- Short internodes give the plant a full appearance
- Typically **four leaves per whorl**, but can range from three to six
- Leaves entire, linear shape, typically under one inch long
- Small white male flowers rise above the water's surface

Distribution & Spread

Brazilian waterweed is native to South America and was first recorded in Long Island, New York in 1893. It has widespread distribution throughout the U.S. but has not been documented in Lake Champlain. As an aquarium species, it is thought that dumping contributes to its movement. Only male flowers have been found in North America, indicating that it spreads only through fragmentation. It overwinters primarily from root crowns.

Native lookalike

Common waterweed (*Elodea canadensis*)

- **Leaves are firmer and stouter; blunt tip, strictly whorls of 3 leaves**

Quick ID Guide

- 4-6 leaves per whorl
- Very finely serrated leaves 1-3 cm long, densely packed with short internodes between whorls

WATCHLIST

Carolina Fanwort (*Cabomba caroliniana*)

Carolina fanwort is a perennial aquatic plant that looks similar to several native species though the double fan-like submersed leaves are an instant identifier. More closely related to Water shield *(Brasenia schreberi)*, it shares the characteristic mucous covering of the Cabombaceae Family.

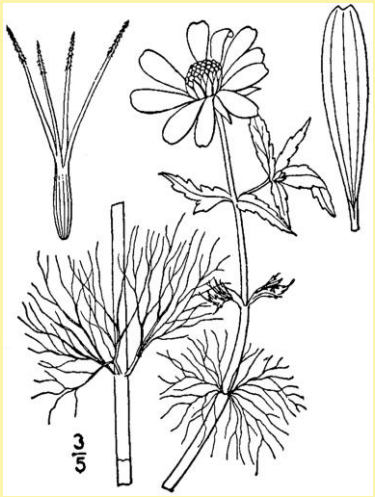
Identification

- Mostly a submersed species, also produces floating leaves
- Underwater leaves are branched divided and opposite along the stem which creates a fan shaped appearance
- Each underwater leaf has a distinct leaf stem (petiole)
- White flower with 6 petals

Distribution & Spread

Carolina fanwort is native to sub-tropic regions of South America and eastern North America. It has been found as an invasive in Massachusetts, Michigan, New Hampshire, New York, Oregon, Pennsylvania, and Washington. It spreads primarily through fragmentation, and sometimes through seeds. As an aquarium species, it is thought that dumping of aquariums contributes to its movement.

Native lookalike



Water marigold (Bidens beckii)

- **Submersed leaves whorled around stem**
- **Leaves have no stalks**
- **Yellow, daisy-like flower**

Quick ID Guide

- Finely divided fan-shaped submersed leaves
- Leaves on short stalks oppositely arranged
- Small white flower

WATCHLIST

Hydrilla (*Hydrilla verticillata*)

One of the most invasive species internationally, hydrilla tolerates a wide range of environmental conditions, including low light, high or low nutrient levels, and temperate or tropical temperatures.

Identification

- Submersed perennial
- Typically five to eight leaves per whorl
- Each strap -like leaf is visibly serrated
- Pointed tip on leaf
- Distinct tubers and turions are produced

Distribution & Spread

Hydrilla is native to Australia, Asia, and central Africa and was released from aquarium trade in Florida in the 1950s. It's invasive in parts of New England and New York. It's not yet found in Lake Champlain—LCBP Boat Stewards prevented a potential entry in 2019. It is primarily spread by stem fragments, and tubers and turions contribute to overwintering.

Native lookalike

Common waterweed (*Elodea canadensis*)

- Leaves are firmer and stouter; blunt tip, strictly **whorls of 3 leaves**

Quick ID Guide

- 5-8 leaves per whorl
- More visibly serrated leaf edges

WATCHLIST

Parrot feather (*Myriophyllum aquaticum*)

Parrot feather is a perennial aquatic plant with both submersed and emergent leaves. When emergent, the plant's growth may appear like small fir trees or club mosses. Stems rarely branch and plants can grow along the banks and shores of water bodies.

Identification

- Four to six leaves per whorl around the stem, each leaf is finely divided
- Submersed leaves are limp and appear decaying
- Emergent leaves are rather stiff with a waxy gray-green color
- Growth along shorelines and in the shallows have stems growing up to a foot above the water level

Distribution & Spread

Native to South America, it is now found on every continent excluding Antarctica from aquarium trade, and populations are established in New York and Southern New England. In North America, it reproduces exclusively from plant fragments.

Native lookalike

Water mermaid
(Proserpinaca palustris)

- **Lance-like emergent leaves arranged alternately**

Quick ID Guide

- 4-6 feather-like leaves whorled around stem
- Short leaflets
- Emergent portion pops up to 1 ft. above water level

WATCHLIST

Starry stonewort (*Nitellopsis obtusa*)

Starry stonewort is a non-native invasive species of large algae in the Characeae or muskgrass family. It is more robust than most members of the family, and can grow to over 2 meters tall. This species is found in alkaline waters of shallow to deep lakes and slow-moving streams. Only male starry stonewort exists in the U.S.

Identification

- Submersed perennial, often encrusted with lime deposits
- Branchlets five to eight per whorl, each with one to two long bracts, giving the branchlet the appearance of being forked
- White, star-shaped bulbils, one to two mm long, produced on colorless rhizoids

Distribution & Spread

Native to Europe and western Asia, it was first introduced in the St. Lawrence River and is found in the Great Lakes, New York, and parts of New England including Vermont. It spreads via fragmentation and the star-shaped bulbils are seed-like in that they are reproductive vegetative material.

Native lookalike

Nitella species

- Smooth, green, semi-translucent branches

Quick ID Guide

- Visibly serrated edges
- Stiff, steel-wool type feel
- White, star-shaped bulbil

WATCHLIST

Water soldier *(Stratiotes aloides)*

Water soldier is a submersed perennial non-native aquatic plant that becomes buoyant in the summer—every fall, it secretes calcium bicarbonate and sinks back down to the bottom of the water to re-emerge in spring. As an invasive species, it can form dense mats and block out light for other aquatic plants. It is the only species in the genus Stratiotes.

Identification

- Submersed plant that floats to the surface in summer
- Leaves are about 15 inches long, sword- shaped, sharply serrated edges, bright green, and form a large rosette
- Produces stolons, or connective vertical stems
- Sometimes produces a small white flower

Distribution & Spread

Native to Europe and northwest Asia, it has been reported in Ontario. It reproduces asexually by way of vegetative offsets and spreads with its stolons.

Quick ID Guide

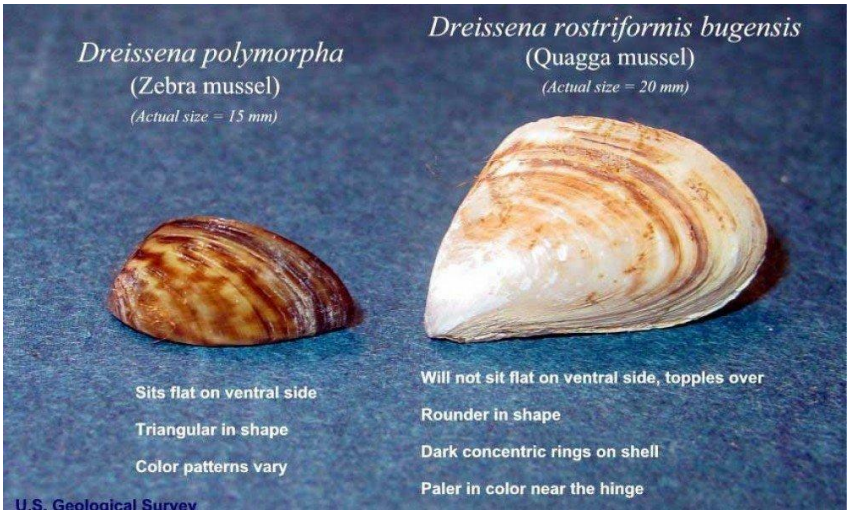
- Long, pointy leaves forming a large rosette
- Sharply serrated leaf edges

WATCHLIST

⚠ Quagga mussel (*Dreissena bugensis*)

The Quagga mussel is a small freshwater mollusk. They are similar to zebra mussels in their impact on aquatic systems as invaders: they consume large portions of microscopic life that forms the base of the food web, alter water chemistry, and grow prolifically on a variety of substrate. Quagga mussels have been found to be able to survive and colonize in areas of soft substrate, such as sandy or silty lake bottoms, which zebra mussels are less apt to do; in North American waterbodies where both zebra mussels and quagga mussels are introduced, Quagga mussels have been observed outcompeting zebra mussels.

Identification



- Adults are 1-1.5 inches long
- Colors range from almost white to tan or brown. Shells may have dark concentric rings and be paler towards the narrow end
- Shells typically are without a ridge, more rounded or fan-shaped and **will fall flat when placed on a hard surface (Zebra mussels will stand upright on its flattened underside)**

Distribution & Spread

Native to Ukraine, quagga mussels can be found in the Great Lakes and the St. Lawrence River and was first introduced in 1989 from ballast water discharge. The microscopic larvae can be carried in live wells or bilge water on boats and in bait buckets, and adults attach themselves to boat hulls and trailers. Quagga mussels also stick to vegetation, which can be transported by boats.

WATCHLIST

⚠ Round goby (*Neogobius melanostomus*)

Native to Eurasia, the round goby (*Neogobius melanostomus*) is considered one of the greatest invasive species threats to the Lake Champlain ecosystem. The goby is gray, four to ten inches in length, and is physically similar to other species native to U.S. waters, including the slimy sculpin. They area bottom-dwelling fish that outcompete native species like sculpin for food and habitat and prey on eggs and juveniles of other fish like largemouth bass. They thrive in poor water conditions and spawn multiple times each season. They eat zebra mussels—seemingly a benefit to the Lake—but in the process, ingest toxic substances like PCBs that bioaccumulate in predators like bass and walleye, posing a threat to other fish and potentially humans. *(Lake Champlain Basin Program).*

Identification

- four to ten inches long, cylindrical body, rounded snout
- Juveniles are solid slate grey while older fish are blotched with black and brown and have a white to greenish dorsal fin with a black spot at the posterior base
- Similar to native sculpins but can be distinguished by the presence of **fused pelvic fins**

Distribution & Spread

Native to the Black and Caspian Seas, round goby are invasive in waterbodies throughout the Northeastern US and have been reported south of the Champlain Canal and north of the Richelieu River in Quebec. They spread by hitchhiking in bait buckets and water-holding compartments of boats, and by swimming through rivers and canals.

Helpful Resources

Aquatic Invasive Species Keys and Guides

A Key to Common Vermont Aquatic Plant Species: https://dec.vermont.gov/sites/dec/files/wsm/lakes/AIS/GreeterPage/Key%20to%20Vermont%20Aquatic%20Species%202021.pdf

The Lake Champlain Basin Aquatic Invasive Species Guide: https://lcbp.wpenginepowered.com/wp-content/uploads/2023/02/6-9-2022-Invasive-Species-Guide- HR.pdf

Borman, Susan, and Robert Korth, and Jo Temte. 2014. *Through the Looking Glass: A Field Guide to Aquatic Plants.* 2nd ed. Wisconsin Lakes Partnership. University of Wisconsin- Extension Lakes, College of Natural Resources, Stevens Point, Wisconsin. Reindl Printing Inc., Merrill, WI.

Online resources on AIS

- Cornell University Cooperative Extension and New York Sea Grant – NYS Invasive Clearinghouse https://nyis.info
- Lake Stewards of Maine Field Guide to Invasive Aquatic Plants: https://www.lakestewardsofmaine.org/wp-content/uploads/2019/02/LSM-FieldGuide-2018.pdf
- New York Department of Environmental Conservation Invasives – Speaker Series (YouTube channel): https://www.youtube.com/@NYinvasives/videos
- USGS Nonindigenous Aquatic Species: https://nas.er.usgs.gov/
- Vermont Department of Environmental Conservation Aquatic Invasives Species: https://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives
- Vermont Invasives Gallery of AIS: https://www.vtinvasives.org/gallery-of-aquatic-invasives

AIS Spread Prevention

Contacts for CHAMP

Lake Champlain Committee – Contact for all general CHAMP inquiries

- Eileen Fitzgerald – Education & Outreach Associate; CHAMP Coordinator
  - eileenf@lakechamplaincommittee.org
  - (802) 658-1461

- Lindsey Cookson – Science & Water Program Coordinator; CHAMP Manager
  - lindseyc@lakechamplaincommittee.org
  - (802) 200-3560

Lake Champlain Basin Program – Contact for AIS Support

- Meg Modley - Healthy Ecosystems & AIS Management Coordinator
  - MModley@lcbp.org

CHAMP Survey Guidance

Recommended materials

- Aquatic species rake
- Phone or other device - for filling in your survey and taking photos
- Plastic gallon freezer bags – for collecting a QA Sample and/or potential Watchlist AIS specimens
- Frisbee or white bin – for photographing specimens
- Identification resources

Optional materials

- Boat, paddle(s), and PFD (if surveying from a boat)
- Printed survey data sheets
- Cooler for storing samples
- Loupe
- View scope
- Sunscreen, polarized sunglasses, other sun protection measures
- Pocket knife

Choosing a CHAMP Site

You can choose your own survey site or work with LCC to find a site to survey near you. CHAMP prioritizes:

- high-traffic, public-access sites such as boat launches, marinas, and beaches
- wetlands and river/stream outlets
- sites at the southern and northern terminuses of the lake.

If possible, we encourage volunteers to survey multiple sites throughout the season.

Survey areas should be less than 0.25 miles long along the shoreline; however, every site is different so report the start and end points of the area that works best for you to survey.

The start and endpoints in the survey refer to the length of shoreline you surveyed within.

- **If surveying from the *shore*,** the survey should extend roughly **25 feet from the shore into the water** (the length of the rope on the provided AIS rake). If you survey from a dock, part of your survey will run perpendicular into the water – note this in the Survey Area Description line of your survey sheet.
- **If surveying from a *boat*,** the survey should extend to the **end of the littoral zone** (where plant growth is inhibited by a lack of sunlight reaching through deeper water and plants are no longer visible underwater). This is a subjective parameter and should be applied as is reasonable. Many bays in Lake Champlain are shallow enough for plants to grow for hundreds of meters past the shoreline. In these cases, survey what is reasonable to cover in 10 rake tosses and report an estimated distance from shore in the survey data sheet. Littoral zone distance from shore varies throughout Lake Champlain—if your site is shallow for a long distance, keep the distance from shore within approximately 1,000 feet. The distance from shore you survey will vary depending on site. **Please estimate the distance from shore you surveyed out to and record it in the Survey Area Description.**

Tips on rake tosses

- Wrap the end of the rope around your non-dominant hand and firmly grasp it.
- With your dominant hand, toss the rake the length of the 25-foot rope or as far as you can throw it within that range while still holding the other end of the rope. Let the rake sink to the lakebed.
- Pull the rake back toward you at a slow to moderate consistent pace, allowing the rake to collect biomass as it is pulled.
- When you've pulled the rake back to you, use the white frisbee or bin provided with your CHAMP Toolkit with some water to examine individually what you collect from each rake toss. *Be thorough—small clams and mussels can attach to plants.*

Tips on photographing specimens

At least one clear photo of each reported AIS is required for each CHAMP survey. The photo should be taken with the specimen on a **white background floating in water**—you can use the white frisbee or bin provided in your CHAMP Toolkit. The white background makes it easier to see specimen features, and floating the specimen in water allows plants with fine or feathery leaves to flare out, making them easier to see. If you take just one photo of each reported AIS, make sure they follow these guidelines. It is encouraged to take multiple photos of each reported AIS—feel free to also submit photos of the specimen at different angles, as well as photos of the population in the water as it looks at your site.

Quality Assurance Sample Collection

For at least one of your surveys over the course of the season, you must collect a Quality Assurance (QA) Sample for review by LCC and LCBP personnel. To do this:

1. Label a plastic, sealable, gallon-sized freezer bag (provided by LCC) using a permanent marker with full name, the date, the name of the survey site, and “QA SAMPLE”.
2. During the survey, bag the entire biomass (or what fits in the bag) of a single rake toss that is representative of the AIS reported in the survey (if Eurasian watermilfoil and zebra mussels are reported in the survey, the rake toss used for the QA Sample should contain both).
3. Seal the bag and store the QA Sample in a cooler or refrigerator until sample exchange.
4. Coordinate QA Sample exchange, options including:
    a. Dropping off or mailing to LCC’s office;
    b. Dropping off with a LCBP Boat Launch Steward, who will deliver the sample to LCBP Project Officer;
    c. Coordinating a pickup time and location with LCC personnel.

CHAMP Survey Directions *from shore*

1. Fill in the Background section on Survey123 or on your survey data sheet. Leave the Survey End Time and Survey End Point blank to go back to after you finish surveying. *See p. 31-34 for guidance.*
2. At the starting point, do the first rake toss. *See p. 27 for more guidance*.
3. Do another eight rake tosses spread out as evenly as possible over the survey area. Using the white bin or frisbee provided in your CHAMP Toolkit, photograph at least one example of each AIS you report. If you're filling in the Survey123 form from your device in the field, you can take and upload photos for each AIS in the form. *See p. 28 for tips on taking photos and p. 36 for tips on uploading photos.*
    - Make sure to also observe the water from shore between your rake tosses and include AIS you find from these visual observations. Pay attention to AIS density and distribution, as you will include this information in your species inventory and survey notes. You can take notes in the *Survey Notes* section as you go.
4. The tenth and final rake toss should be done at the endpoint of the survey area. Fill in the Target and Watchlist AIS Survey sections on Survey123 or on your survey data sheet. Check to make sure you have at least one representative photo for each reported AIS.
5. Fill in the Quality Assurance (QA) Sample section on Survey123 or your survey data sheet. You should collect and submit at least one QA Sample over the course of the season. *See p. 28 for more guidance.*
6. Still standing at the end point, record your Survey End Point and Survey End Time in the Background section on Survey123 or your survey data sheet. Add in any relevant survey notes.
7. Review your survey to ensure completion and accuracy. You can either submit the survey directly from the field (if you have cell service) or go back to the survey to submit it when you have cell service. If you are filling in a paper survey data sheet, transcribe your data from the sheet into Survey123 from your browser. Make sure the data you enter when transcribing reflects what is on your data sheet.

CHAMP Survey Directions *from a boat*

1. Fill in the Background section on Survey123 or on your survey data sheet. Leave the Survey End Time and Survey End Point blank to go back to after you finish surveying. *See p. 31-34 for guidance.*
2. With PFD and other safety measures, enter the water. Starting as close to where you marked your starting point within boat draft limitations, take your first rake toss. *See p. 27 for more guidance.*
3. After your first toss, meander from the shallows to the end of the littoral zone (generally a point where the lake bottom is no longer visible). Navigate in a snake-formation back and forth from shallower to deeper water. Intersperse another eight rake tosses as you go. Try to evenly space out rake tosses within the survey area—that means some tosses close to shore, some closer to the edge of the littoral zone, and plenty in-between as you paddle between the start and end points.
    - Make sure to also observe the water from shore between your rake tosses and include AIS you find from these visual observations. Pay attention to AIS density and distribution, as you will include this information in your species inventory and survey notes. You can take notes as you go.
4. The tenth and final rake toss should be done at the endpoint of the survey area. Fill in the Target and Watchlist AIS Survey sections with an inventory and distribution for each species on Survey123 or on your survey data sheet. If you do not observe any Watchlist AIS, you can leave that part blank. Check to make sure you have at least one representative photo for each reported AIS.
5. Fill in the Quality Assurance (QA) Sample section on Survey123 or your survey data sheet. You should collect and submit at least one QA Sample over the course of the season. *See p. 28 for more guidance.*
6. Still standing at the end point, record your Survey End Point and Survey End Time in the Background section on Survey123 or your survey data sheet. Add in any relevant survey notes.
7. Review your survey to ensure completion and accuracy. You can either submit the survey directly from the field (if you have cell service) or go back to the survey to submit it when you have cell service.

If you are filling in a paper survey data sheet, transcribe your data from the sheet into Survey123 from your browser. Make sure the data you enter when transcribing reflects what is on your data sheet.

Submitting Data with Survey123

CHAMP Surveys are collected through ArcGIS Survey123, which is a software for data collection and analysis created by ESRI. You can fill in your CHAMP Survey on Survey123 directly onto your smart phone or tablet while in the field (recommended) or fill in a paper data form and transcribe your data onto Survey123 on a desktop. There is a Survey123 app for Androids and for iOS; however, you do not need an account or the app to fill in your survey—you can use your device's or your desktop's browser.

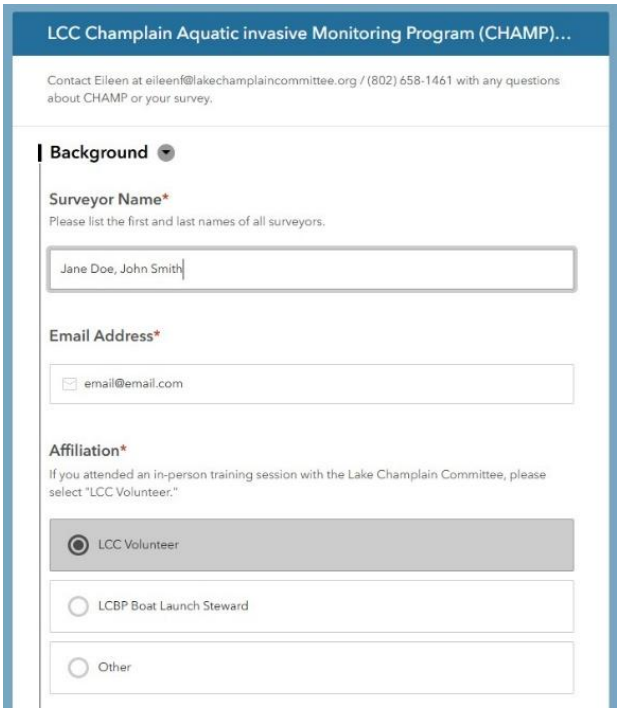
Scan for the CHAMP Survey Form on Survey123

https://arcg.is/0n4H8H0

If you have any technical issues using Survey123 – contact Eileen at eileenf@lakechamplaincommittee.org and transcribe your survey data onto LCC's webform: https://www.lakechamplaincommittee.org/get-involved/volunteers/ais-work/champ-survey-data-submission-form

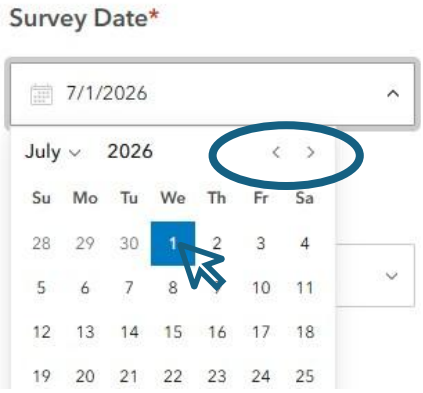
1. Navigate to the **CHAMP Survey Form: https://arcg.is/0n4H8H0**
2. Unless you have the Survey123 app, select ***Open in browser***

3. Background section



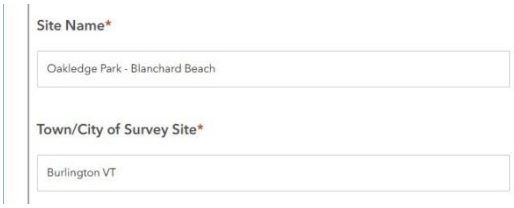
a) Fill in **Surveyor Name(s);** an **Email Address** to contact if follow-up is needed, and surveyor **Affiliation**.
Note that fields marked with a **red asterisk* are required** – you will not be able to submit the survey without filling in that information.

b) Fill in the **Survey Date** by selecting the box, navigating to the month of your survey using the arrows in the top-right of the calendar, and selecting the correct date.



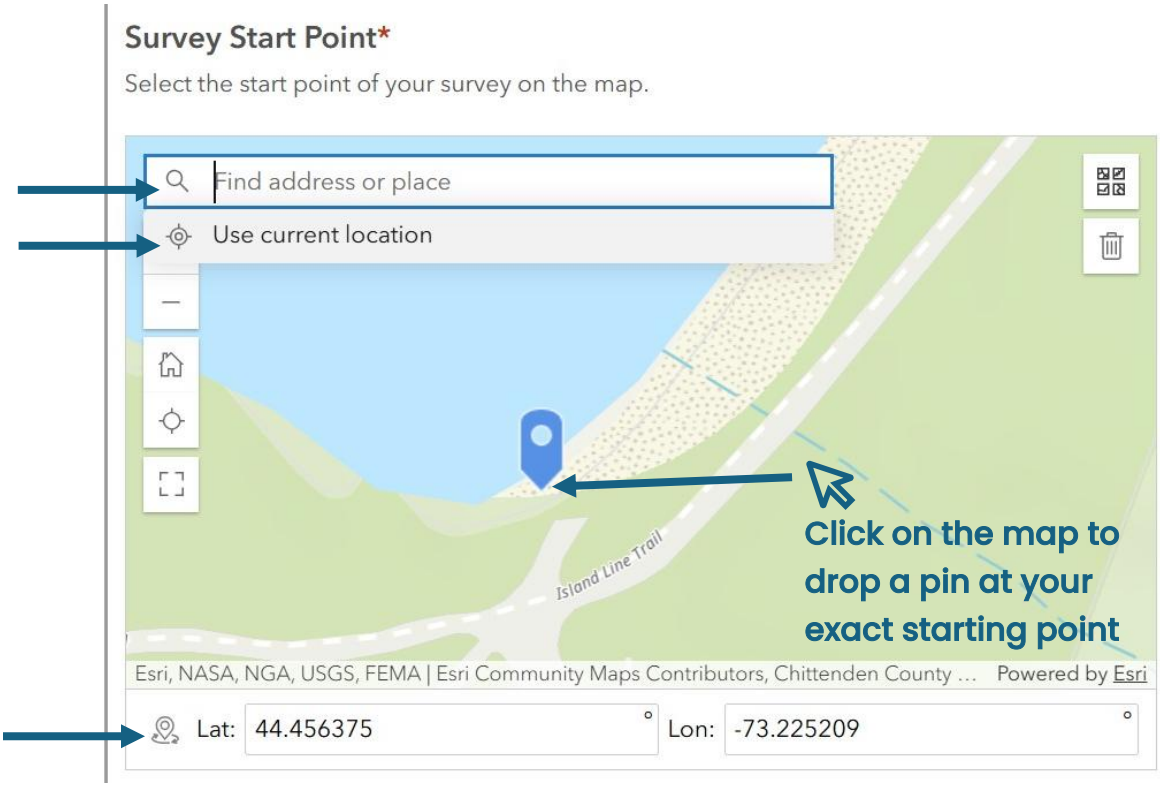
c) Fill in the **Survey Start Time** by selecting the box and scrolling to the time in which you began your CHAMP survey using the arrows on the pop-up box. Make sure you have the correct AM or PM selection.

d) Enter your **Site Name** and **Town/City of Survey Site**



e) Survey start and end points show the area within which you surveyed. On the map, select your **Survey Start Point** using one of these methods:

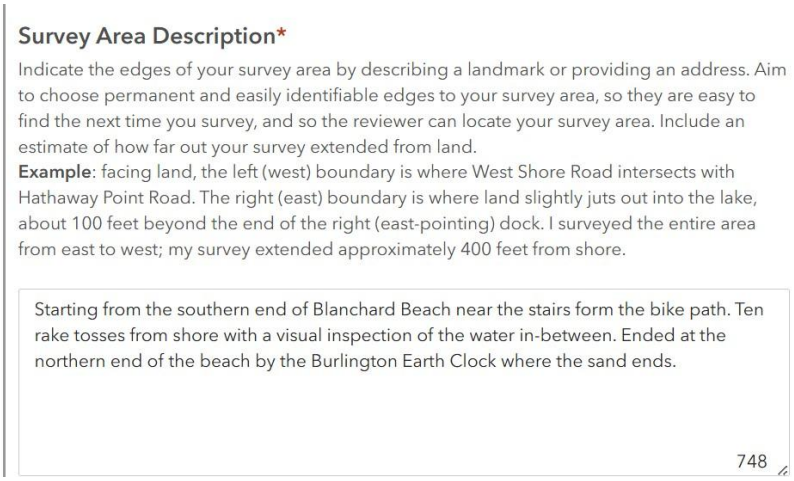
- enter the address of your site in *Find address or place,*
- select *Use current location* if GPS services are on and you're at the start point,
- enter the GPS coordinates in the *Lat* and *Lon* boxes,
- zooming in and scrolling on the map to navigate to your site.



Click on the map and move the blue pin to your **exact** start point as needed. If filling in the Survey123 form from your device in the field – leave **Survey End Point** for the end.

f) Enter the **Survey Area Description.**

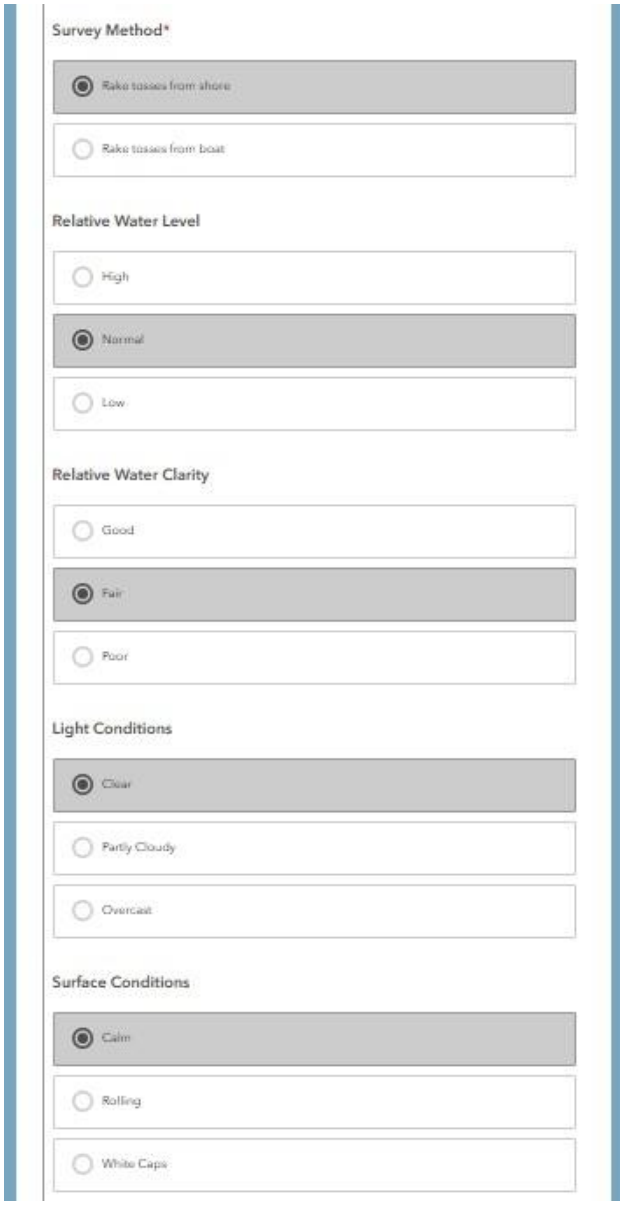
Survey sites should be within the *littoral zone,* which is defined by where sunlight reaches the lake bottom sediments and enables aquatic plants to grow. If surveying from a boat, Include an estimate of how far out your survey extended from land.



g) Select your **Survey Method.**

h) Select the **Relative Water Level** and **Relative Water Clarity.** These are relative to normal conditions at your site given the time of year. If you do not know, give your best estimate.

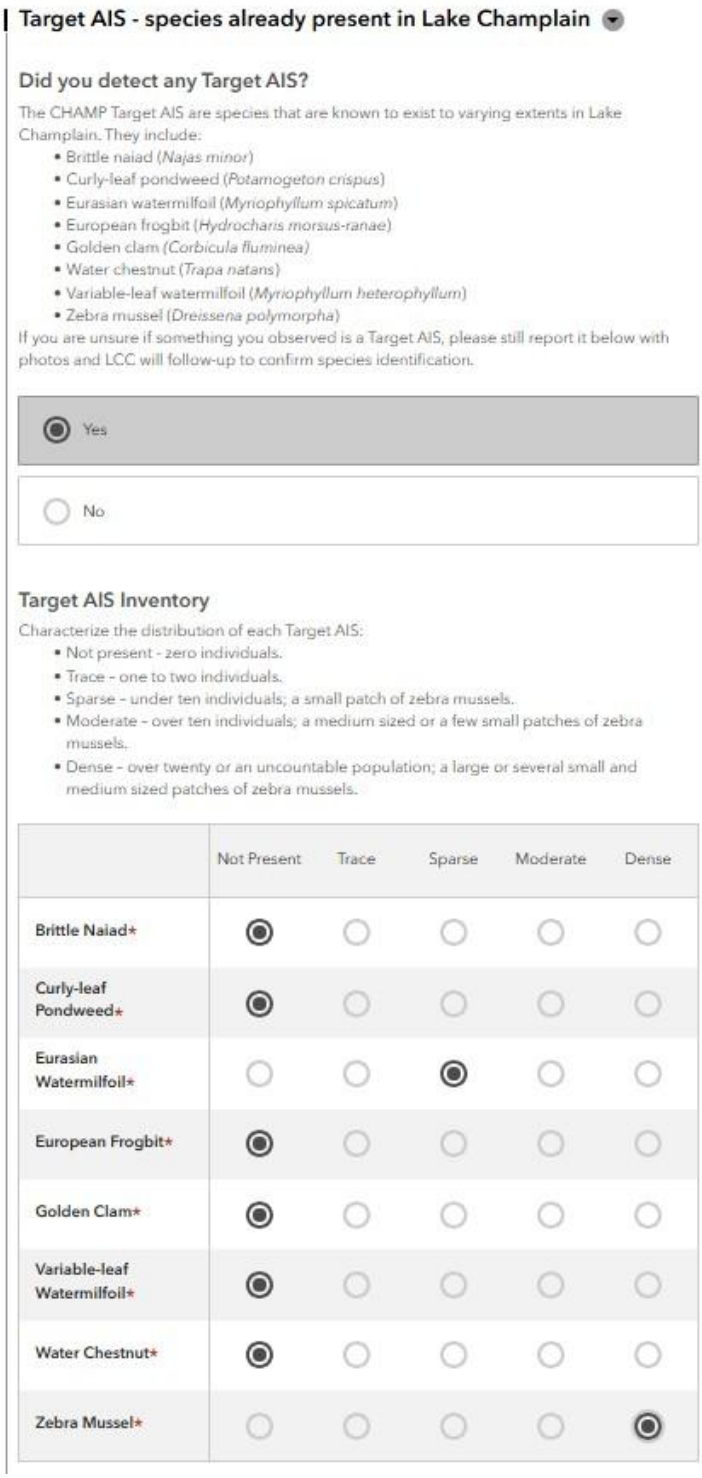
i) Select the **Light Conditions** that best describe the weather during your survey and the **Surface Conditions** that best describes wave action in the water.



4. Target AIS – species already present in Lake Champlain

a. Indicate if you have detected any of the Target AIS in your survey. If you're filling in the Survey123 form from your device in the field – fill this in after you cover your survey area. If you select *No,* the inventory table and photo upload sections will not appear.

b. If you select *Yes*, select the **distribution** (Not present, Trace, Sparse, Moderate, or Dense) that describes each of the eight Target AIS in the CHAMP survey on the inventory table.



- Not Present – zero individuals detected.
- Trace – one to two individuals detected.
- Sparse – under ten individuals; a small patch of zebra mussels.
- Moderate – over ten individuals; a medium sized or a few small patches of mussels.
- Dense – well over twenty or an uncountable population; a large or several small and medium sized patches of mussels.

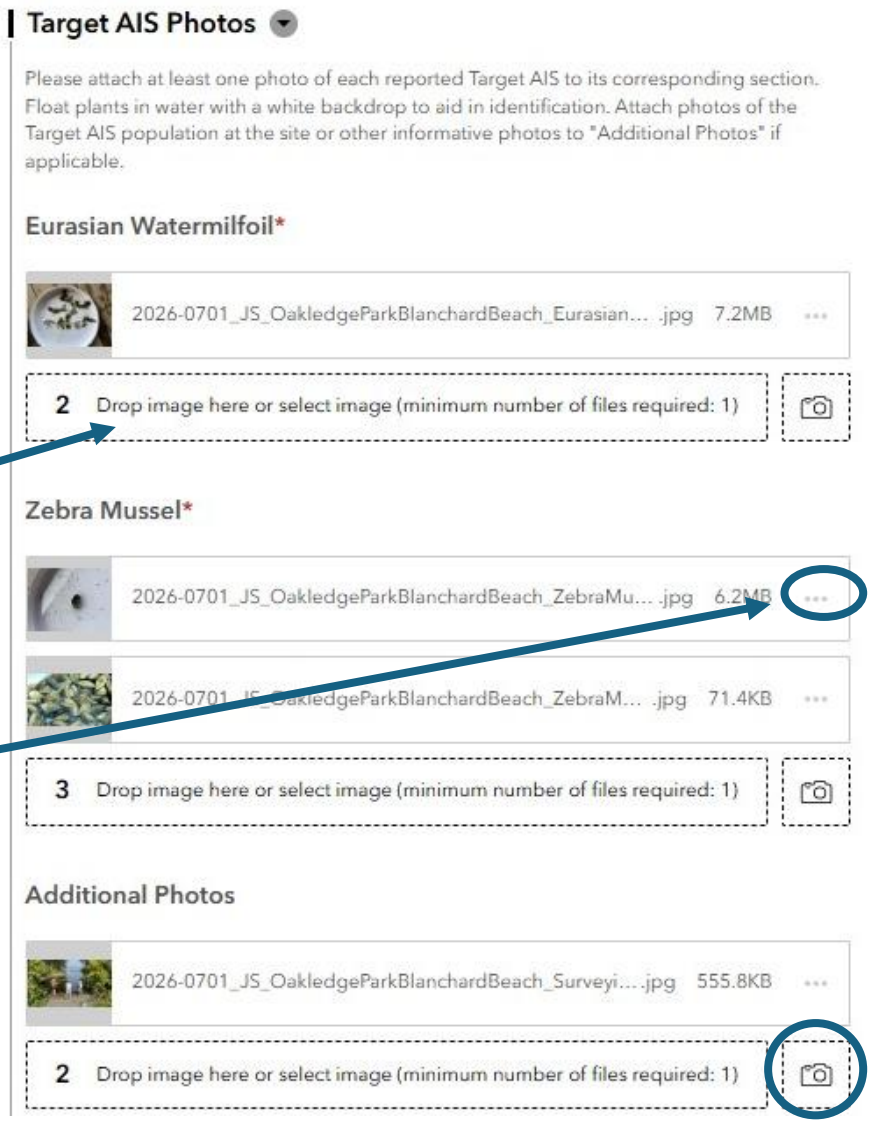
If you detect golden clam in your survey, collect a sample and contact Eileen at LCC with details.

c. Target AIS Photos

For each AIS reported, attach at least one photo showing an example of the AIS from your survey (see p. 28 for tips on photographing specimens).

Select *Drop image here or select image* to upload a photo from your device or desktop.

Select the three horizontal dots to the right of an uploaded photo to rename, download, or delete the photo. If filling in the Survey123 form in the field, you can take and attach photos without exiting the form by selecting the camera icon.



You can attach multiple photos for each reported species. We also welcome photos of your site and photos of the surveying process, which you can attach under the *Additional Photos* section.

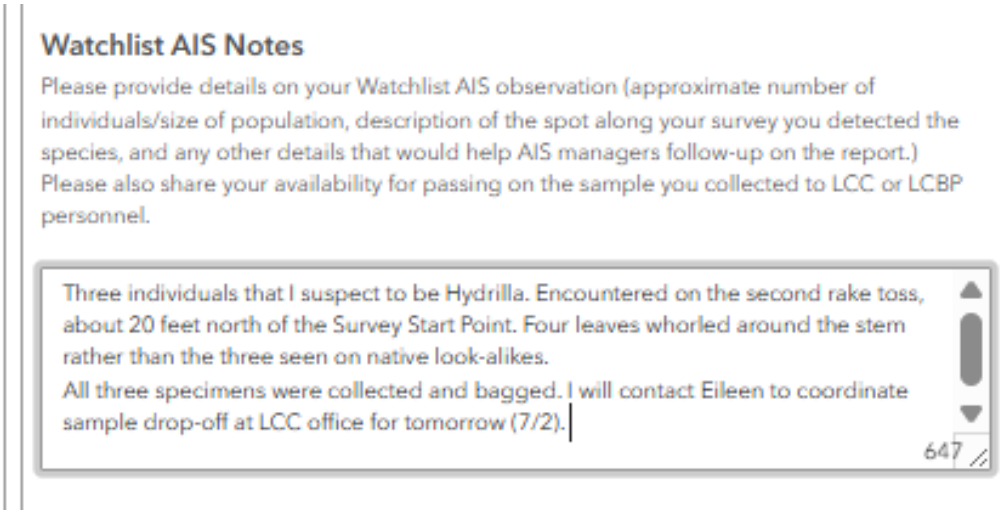
5. Watchlist AIS- species not yet detected in Lake Champlain

a. Indicate if you have detected any of the Watchlist AIS in your survey.

If you select *No,* the inventory table and photo upload sections will not appear; If you select *Yes,* they will appear.

b. If you **do** detect a potential Watchlist AIS:

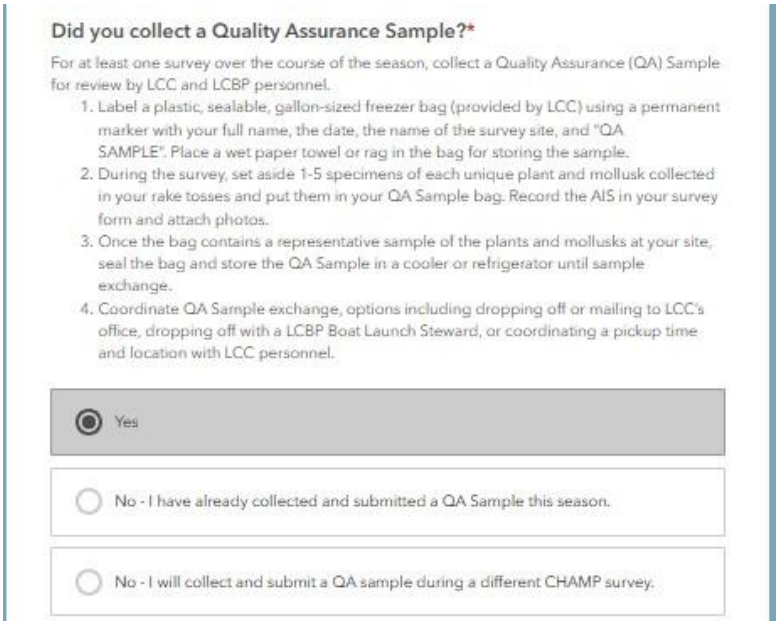
- Fill in the inventory table and the photo upload sections following the same guidance provided for Target AIS in Step 4 (p. 35 & 36).
- **Collect a sample of the potential Watchlist AIS**: carefully wrap one or a few individuals in a wet rag or paper towel and seal in one of the gallon bags provided in your CHAMP Toolkit.
- Provide details on your observation in the *Watchlist AIS Notes* section and contact LCC to coordinate sample exchange.



6. Quality Assurance Sample

a. Indicate if you collected a QA Sample.

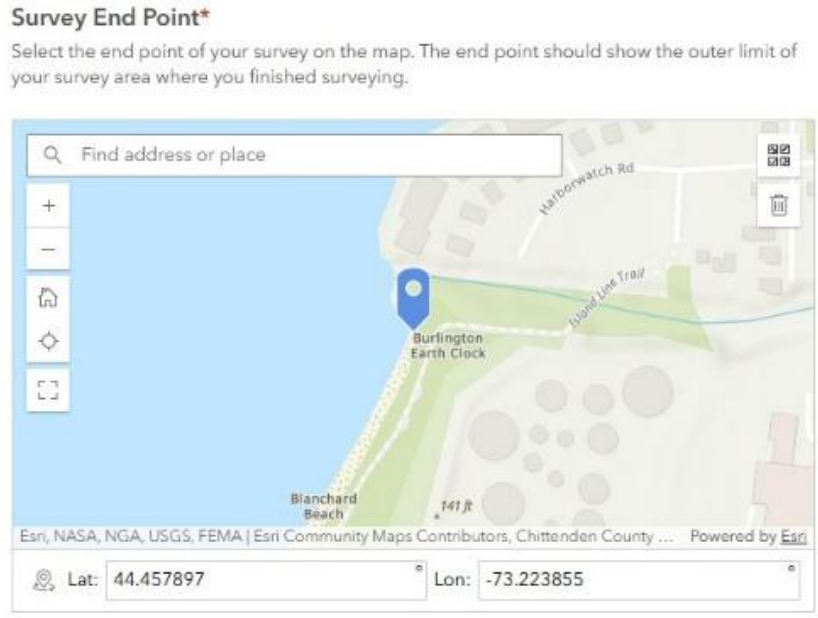
b. If you select Yes and have a QA Sample ready to submit, indicate your plan for submitting the QA Sample to LCC or LCBP personnel.



7. Survey Notes, End Point and Time, and Form Submittal

a. Provide any relevant details about your site, survey conditions, survey process, native species, questions about CHAMP, or any contextual information you see fit to the **CHAMP Survey Notes** section.

b. Fill in the **Survey End Point** indicating where you finished your survey. The start and end point should show the space between which you surveyed. Fill in the **Survey End Time** last.



c. Scroll through the entire survey form to check that you've accurately filled in all the sections. Once you've confirmed your survey is complete and accurate, select **Submit**. You should get a confirmation pop-up that your survey was successfully submitted.

References

- Adirondack Park Invasive Patroller Program (APIPP) – Volunteer Manual (2022).
- Aquatec, Inc. 1990. Florida Prohibited Aquatic Plants. Florida Department of Natural Resources.
- Aquatic Plant Control Research Program. U.S. Army Corps of Engineers Waterways Experiment Station. Vol. A-96-2.
- Couch, Richard, and E. Nelson. 1985. Myriophyllum spicatum in North America. In: Proceedings of the First International Symposium on Watermilfoil and Related Haloragaceae Species. Vancouver, British Columbia, Canada.
- Countryman, W.D. 1978. Nuisance Aquatic Plants of Lake Champlain. Lake Champlain Basin Study.
- Crow, G.E. and C.B. Hellquist. Aquatic and Wetland Plants of Northeastern North America. Madison, WI: University of Wisconsin Press, 2000.
- Crow, C.E. and Hellquist C.B. 1982. Aquatic Vascular Plants of New England: Part 4. Juncaginaceae, Scheuchzeriaceae, Butomaceae, Hydrocharitaceae. University of New Hampshire, Durham, New Hampshire. Agricultural Experiment. Station Bulletin 520.
- Crow, G.E. and C.B. Hellquist. 1983. Aquatic Vascular Plants of New England: Part 6. Trapaceae, Haloragaceae, Hippuridaceae. New Hampshire Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire. Station Bulletin 524.
- Crow, G.E. and C.B. Hellquist. 1984. Aquatic Vascular Plants of New England: Part 7. Cabombacaeae, Nymphaeaceae, Nelumbonaceae, and Ceratophyllaceae. New Hampshire Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire. Station Bulletin 527.

- Crow, G.E. and C.B. Hellquist. 2000. Aquatic & Wetland Plants of Northeast North America. University of Wisconsin Press.

- Gleason, Henry A. and Arthur Cronquist.1963. Manual of Vascular Plants of Northeastern United States and Canada. The New York Botanical Garden.

- Hanlon, Chuck. 1990. A Florida Native - Cabomba (Fanwort). Aquatics. Vol. 12, No. 4.Written Findings of the Washington State Noxious Weed Control Board. February, 1996.

- Hellquist,C.B. and G.E. Crow. 1980. Aquatic Vascular Plants of New England: Part 1. Zosteraceae, Potamogetonaceae, Zannichelliaceae, Najadaceae. New Hampshire Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire Station Bulletin 515.

- Hellquist, C.B. Aquatic Weed Species for Possible Legislation. Department of Biology. North Adams State College, North Adams, MA.

- Langeland, K.A. 1990. Hydrilla: A Continuing Problem in Florida Waters. Cooperative Extension Service/ Institute of Food and Agricultural Sciences. University of Florida, Gainesville. Circular No. 884.

- Madsen, John D. 1990. Water chestnut (Trapa natans L.) Research in Watervliet Reservoir – 1989 Report. Rensselaer Fresh Water Institute. FWI Report #90-8.

- Madsen, John D. and C.S. Owens 1996. Phenological Studies to Improve Hydrilla Management.

- McCann, James A., Lori N. Arkin, and James D. Williams. 1996. Nonindigenous Aquatic and Selected Terrestrial Species of Florida: Status, Pathway and Time of Introduction, Present Distribution and Significant Ecological and Economic Effects.

- National Biological Service. Written Findings of the Washington State Noxious Weed Control Board. February, 1996.

Champlain Aquatic invasive Monitoring Program (CHAMP) Survey Data Sheet

Surveyor Name(s): _____ **Email**

Address_____

Phone Number: _____ **Site Name:**_____ **Survey Method** (*circle one*: shoreline / boat)

Survey Start Point (GPS Coordinates): _____ **Survey Start Time:** _____

Survey End Point (GPS Coordinates): _____ **Survey End Time:** _____

Relative Water Level (*circle one:* high / normal / low) **Water Clarity** (*circle one:* good / fair / poor)

Light Conditions (*circle one*: clear, partly cloudy, overcast) **Surface Conditions** (*circle one:* calm, rolling, white caps)

Survey Area Description:_____

_____

_____

Target Species (species already reported in Lake Champlain as of 2026)

Species Name *check if present*	AIS Distribution *trace, sparse, moderate, or dense*	Photo taken?	Notes
☐ **Brittle naiad** (*Najas minor*)			
☐ **Curly-leaf pondweed** (*Potamogeton crispus*)			
☐ **Eurasian watermilfoil** (*Myriophyllum spicatum*)			
☐ **European frogbit** (*Hydrocharis morsus-ranae*)			
☐ **Golden clam** (*Corbicula fluminea*)			
☐ **Water chestnut** (*Trapa natans*)			
☐ **Variable-leaf watermilfoil** (*Myriophyllum heterophyllum*)			
☐ **Zebra mussel** (*Dreissena polymorpha*)			

Watchlist Species (species not reported in Lake Champlain as of 2026)

Species Name *check if present*	**AIS Distribution** *(trace, sparse, moderate, or dense)*	**Photo taken?**	**Sample collected?**	**Notes**
☐ **Brazilian waterweed** (*Egaria densa*)				
☐ **Carolina fanwort** (*Cabomba caroliniana*)				
☐ **Hydrilla** (*Hydrilla verticillata*)				
☐ **Parrot feather** (*Myriophyllum aquaticum*)				
☐ **Starry stonewort** (*Nitellopsis obtusa*)				
☐ **Water Soldier** (*Stratiotes aloides*)				
☐ **Round goby** (*Neogobius melanostomus*)				
☐ **Quagga mussel** (*Dreissena bugensis*)				

Quality Assurance Sample Collected? (Yes / No)

Notes: ____

Survey Notes:____

____

____

For more information on CHAMP surveys, including instructions, definitions, and species ID resources, refer to the ***CHAMP Manual.***

Transcribe this data sheet and *include photos of each reported AIS* on LCC's Survey123 Form

https://arcg.is/0n4H8H0

Contact Eileen at eileenf@lakechamplaincommittee.org
and Lindsey at lindseyc@lakechamplainommittee.org
with any questions about CHAMP or your survey!