

# LAKE CHAMPLAIN BASIN PROGRAM

Fact Sheet Series



Number 1

## ZEBRA MUSSEL

### INTRODUCTION:

***Zebra mussels are thumbnail-sized mollusks with D-shaped shells that are often striped with alternating light and dark bands like a zebra. The recent introduction of zebra mussels into Lake Champlain poses both ecological and economic threats to the region. The Lake Champlain basin community must face the challenge to slow the spread of this invasive species.***

**Z**ebra mussels are native to fresh surface waters of southeast Europe. They were first identified in North America in 1988 in Lake St. Clair, Michigan, near Detroit. Since that time, zebra mussels have spread quickly through the interconnected waterways of North America to the Mississippi and Ohio river systems.

**A** young angler discovered zebra mussels in the southern portion of Lake Champlain in July, 1993. Since then, the mussel's population has steadily increased and they are now found throughout most portions of the Lake. In many areas, nearly all suitable habitat is covered by zebra mussels. Biologists continue to monitor the mussels' spread within Lake Champlain.

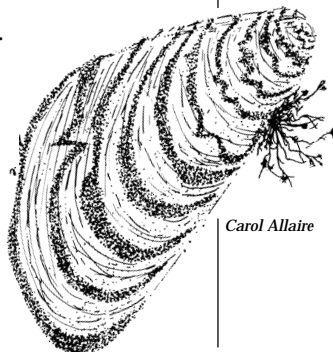
## ZEBRA MUSSEL IMPACTS

It is believed that zebra mussels were unknowingly transported to the Great Lakes Region in the ballast waters of transatlantic freighters around 1986. Millions of dollars have since been spent to address problems caused by the mussels and in developing and implementing plans to reduce future problems.

### Economic Impacts

*Zebra mussels attach to solid, submerged surfaces and may rapidly form dense colonies:*

- clogging water intake or outflow pipes.
- disrupting sensitive water-dependent systems
  - boat motors
  - municipal water facilities
  - industrial facilities
- harming tourism
  - mussel covered beaches: sharp shells and decay odor
  - mussel covered historical artifacts: shipwrecks, etc.



Carol Allaire

All of the impacts of zebra mussels in Lake Champlain are not yet known. However, because zebra mussels are *nonindigenous* and grow and reproduce quickly, they are likely to grow out of balance within the Lake ecosystem. Zebra mussels are causing severe negative impacts to Lake Champlain's native mussel populations.

### Ecological Impacts

*Zebra Mussels filter-feed on phytoplankton and detritus, main elements of the aquatic food chain. If zebra mussels are present in large numbers, they could:*

- alter established food chains such that the survival of some species is threatened.
- harm or kill fish and wildlife who consume zebra mussels containing high concentrations of toxic materials.
- starve or suffocate native mussels.

## GLOSSARY

**byssal fibers:** *thread-like strands adult zebra mussels produce to attach to firm objects.*

**detritus:** *bits of vegetation, animal remains or waste, and other organic material that form the base of food chains in many ecosystems.*

**drainage basin:** *a region including land and water which drains to a particular point; also called a watershed.*

**ecosystem:** *a system of interrelated organisms together with their physical and chemical environment.*

**food chain:** *the sequential transfer of food energy from one species to another. Higher species in the chain consume lower species in the chain.*

**mollusk:** *a soft-bodied aquatic animal, typically protected by a hard shell, such as a snail, clam, or mussel.*

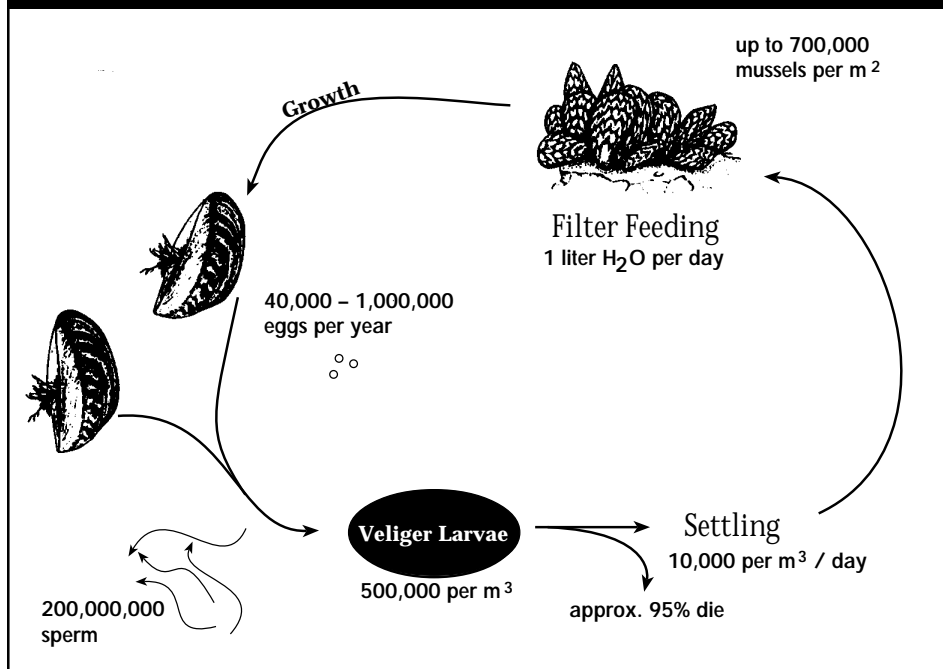
**nonindigenous:** *not naturally originating in a particular area; nonnative.*

**plankton:** *small, usually microscopic, plants and animals that float in the water.*

**predator:** *an animal species that captures and eats other animals, its prey.*

**veliger:** *microscopic juvenile stage of the zebra mussel.*

## GENERAL ZEBRA MUSSEL LIFE CYCLE



## ZEBRA MUSSEL LIFE CYCLE

On average, zebra mussels live 2-5 years and can reproduce by their second year. Each year, a mature female zebra mussel may release up to one million eggs while the male may release more than two hundred million sperm into the water where fertilization takes place. In approximately two days, the fertilized eggs develop into free-swimming larvae called *veligers* which can be transported over long distances by water currents. Within 2-3 weeks, the veligers begin to "settle out" in the water under the weight of their forming shells and attach to firm, submerged surfaces.

Zebra mussels cling to surfaces by using thread-like strands called *byssal fibers* tipped with a strong, sticky substance. As many as seven hundred thousand mussels can occupy a square meter area. Once attached, they generally stay in one place, but can detach and crawl to a new location if environmental conditions change.

In addition to water currents, zebra mussels can be transported by hitch-hiking on boats, boat trailers, barges, sea planes, and other

aquatic equipment. They may also be transported by fish and aquatic birds, although it has not been documented in the wild. Adult zebra mussels feed by filtering large amounts of plankton and *detritus* from the water. Each mature zebra mussel can filter one liter of water a day.

## ZEBRA MUSSEL HABITAT

Zebra mussels thrive in nutrient-rich water which supports healthy populations of *plankton*. Substantial levels of calcium are required for shell production as are firm substrates to which the mussels can attach. They prefer slightly alkaline water with temperatures between 68°F and 77°F, but can survive in more extreme ranges.

Water intake pipes provide an ideal habitat for zebra mussels because they afford protection from predators and severe weather, and the flow of water through the pipes provides a constant supply of food and removes waste. Once zebra mussels are attached to a surface in an ideal environment, they multiply rapidly and form densely packed colonies.

# SPREAD THE WORD, NOT THE MUSSELS

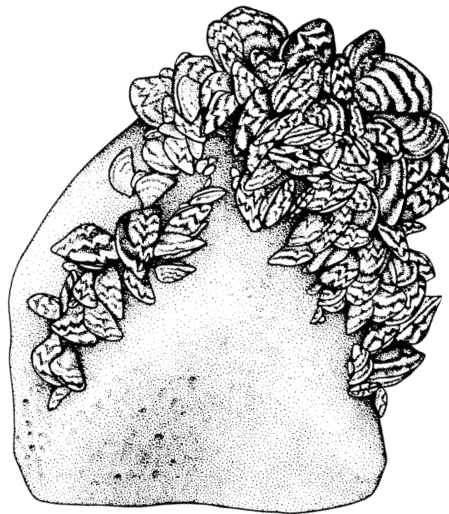
**Public assistance in passing the word about zebra mussels and in reporting new sightings at locations is essential to help prevent the spread of zebra mussels to inland waterbodies and to reduce their negative impacts.**

## WHAT YOU CAN DO

The more you know about the possible effects of zebra mussels in the Lake Champlain basin, the better prepared you will be to help prevent their spread.

Participate in the **Zebra Mussel Citizen Action Program (ZMCAP)**, a citizen-based program through which volunteer task forces are trained to help with educating the public about zebra mussels, lake access patrolling, and zebra mussel monitoring.

- ▲ *Sponsor a ZMCAP training workshop for your community or organization.*
- ▲ *Organize a volunteer task force in your community.*
- ▲ *Distribute and maintain zebra mussel literature at public facilities.*
- ▲ *Post and maintain "Attention Boater and Angler" signs at all public water accesses.*
- ▲ *Patrol water accesses and inform boaters and anglers about proper spread prevention techniques.*
- ▲ *Conduct community zebra mussel informational presentations.*
- ▲ *Learn to identify zebra mussels and monitor for their presence.*
- ▲ *Report any new zebra mussel sightings to the Lake Champlain Basin Program at 1-800-468-LCBP, or the Vermont Department of Environmental Conservation at 802-241-3777.*



Margaret VanBolt

## WATER USERS BEWARE

Anglers, boaters, SCUBA divers, and other water users may accidentally transport zebra mussels from infested waterbodies such as Lake Champlain to noninfested inland waterbodies. Juvenile and adult zebra mussels can attach to boat hulls, engines, anchors, and other submerged equipment, as well as to plant material that may get caught on boats and trailers. Veligers can be carried in boat bilge water, live wells, bait buckets, engine cooling systems, and SCUBA gear, including wetsuits.

*It is illegal to transport zebra mussels in many states including Vermont and New York.*

Camp and home owners and businesses who draw water directly from a zebra mussel infested waterbody will also need to protect their system from infestation.



**Help prevent the spread of zebra mussels by taking a few precautionary steps after boating or fishing:**

- ✓ **Inspect your boat and trailer carefully for mussels and aquatic vegetation. Remove any mussels or vegetation and discard in the trash.**
- ✓ **Drain all water from the boat, including the bilge, live well, and engine cooling system.**
- ✓ **Dry the boat and trailer in the sun for at least 5 days or if you use your boat sooner, rinse off the boat, trailer, anchor, anchor line, bumpers, engine, etc. with hot water or at a car wash.**
- ✓ **Leave live aquatic bait behind – either give it to someone using the same waterbody, or discard it in the trash.**

## POSSIBLE CONTROL MEASURES

Currently, controls exist only for protecting vulnerable mechanical water supply systems. There are no known, environmentally-sound methods for eliminating zebra mussels from a waterbody once they have become established. Therefore, it is essential to prevent the spread of zebra mussels to other waterbodies.

Control methods for water supply systems fall into two general categories:

**1) exclusion and 2) removal** with proper disposal. Exclusion methods typically involve the use of a filtering device to prevent zebra mussels from entering a system. Removal involves getting rid of the mussels after they have entered a system or have become established. Removal methods include scraping, pigging (pushing a full-bore ramrod through a pipe), back flushing, and depriving them of oxygen. Zebra mussels that are physically removed should be collected and disposed of in an area away from waterbodies to prevent reattachment and/or spread. Although chemical exclusion and removal methods exist, they are generally not recommended for use on small residential water supply systems. Each particular situation will dictate which method, or combination of methods, will be most practical and effective.



Eva McCauley

## AVAILABLE RESOURCES

- Zebra mussel identification card
- Zebra mussel information videos
- Zebra mussel slide show
- Report of the Lake Champlain Zebra Mussel Monitoring Program
- Information for boaters
- Information on protecting private residential water supply systems
- Other zebra mussel literature

## CONTACTS

Lake Champlain Basin Program (LCBP)  
P.O. Box 204  
54 West Shore Road  
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1-800-468-5227

Vermont Department of Environmental  
Conservation  
Water Quality Division  
103 South Main Street, 10 North  
Waterbury, VT 05671-0408  
802-241-3777

New York Zebra Mussel Clearinghouse  
New York Sea Grant  
250 Hartwell Hall  
SUNY College at Brockport  
Brockport, NY 14420-2928  
716-395-2928

## LCBP Goals

The Lake Champlain Basin Program has developed a plan to insure that the Lake and its drainage basin will be restored, protected and maintained so that current and future generations will enjoy its full benefits. If you would like to learn more about the program or become involved with associated projects, contact: Colleen Hickey at 1-800-468-LCBP

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## THE LAKE CHAMPLAIN BASIN

