

AIS Inquiry Station #1

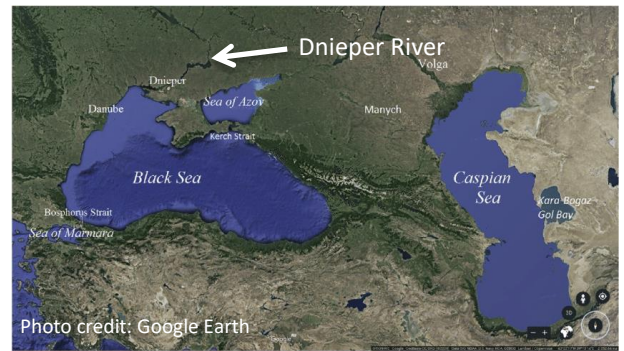
Common Name(s): zebra mussel / quagga mussel

Scientific Name:

Dreissena polymorpha / *Dreissena rostriformis bugensis*

ORIGIN:

Zebra mussels are native to the Black, Caspian, and Azov Seas. Quagga mussels are native to the Dnieper River that flows into the Black Sea.



PATHWAY OF INTRODUCTION:

Zebra and quagga mussels were unintentionally introduced to the United States from contaminated ballast water released from cargo ships. Zebra mussels were first observed in Lake St. Claire in 1986; whereas, quagga mussels were first observed in Lake Erie in 1989.

METHODS OF DISPERSAL:

Once introduced, they spread locally through planktonic larvae (veligers) that travel with water currents. Larvae and adult mussels can be dispersed to new areas with motorized or non-motorized boats, boat trailers, seaplanes, or other equipment like fishing or diving gear.

HABITAT:

Found in lakes, reservoirs, marshes, ponds, and slow-moving areas of rivers. Zebra mussels prefer to attach to hard surfaces in warmer surface waters. Quagga mussels can live on hard or soft surfaces and tolerate colder temperatures.

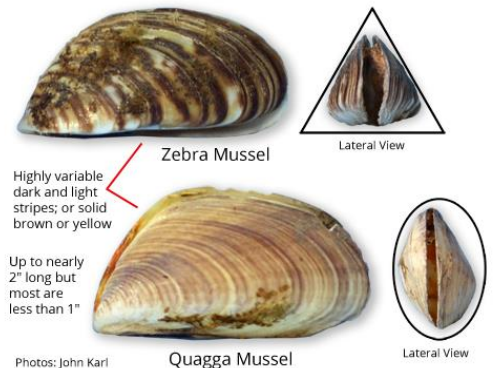
PHYSICAL DESCRIPTION:

Aquatic mussels often found growing on rocks, wood, cement, watercraft, other mussels, or any other hard surface.

- Small (shells typically do not exceed 5 cm)
- Byssal threads grow out of their dorsal surface.
- Zebra mussels have D-shaped shells with thicker brown and light stripes that sit upright when placed on a surface.
- Quagga mussels have D-shaped shells with thinner brown or yellow stripes that do not sit upright when placed on a surface.

ADAPTATIONS:

- Planktonic larvae disperse easily in water and travel great distances.
- Byssal threads allow them to attach to any surface.
- Each adult can filter up to 1 L of water per day.
- Adult females release 40,000 – 1 million eggs/year.
- Both species can survive 3-5 days out of water.
- When both species are present, the quagga mussels typically outcompete the zebra mussels.



IMPACTS:

- Outcompetes native mussels for food.
- Filters phytoplankton out of the water, leaving little food for the rest of the food web.
- Displaces other native invertebrates.
- Often kills native mussels, crayfish, and snails by growing on them.
- Razor sharp mussels grow in dense layers over the natural habitat, which reduces recreational activities, and decreases shoreline property values.
- Clogs intake pipes and greatly increases maintenance costs of water treatment, power plants, and irrigation systems.
- Difficult to remove once established.

AIS Inquiry Station #2

Common Name(s): Eurasian watermilfoil, spiked watermilfoil

Scientific Name:

Myriophyllum spicatum

ORIGIN:

Eurasian watermilfoil is native to Europe, Asia, and northern Africa.

PATHWAY OF INTRODUCTION:

It is thought that Eurasian watermilfoil was unintentionally introduced through the dumping of aquarium contents into waterways. Eurasian watermilfoil was first discovered in the United States in the early 1900s.

METHODS OF DISPERSAL:

Once introduced, they spread locally through wind, waterfowl, water currents, motorboats, boat trailers, or other equipment like fishing or diving gear. Motorboat traffic greatly contributes to plant fragmentation and dispersal.

HABITAT:

They can be found living in freshwater lakes, ponds, slow moving areas of rivers and streams, and can tolerate somewhat salty waters. Typically rooted in water 3-13 feet deep. It tolerates a wide range of sediment types. Growth is limited by light availability.

PHYSICAL DESCRIPTION:

A submerged, perennial aquatic plant that grows in dense patches in shallow waters.

- Green feather-like leaves with four leaves per section.
- Each leaf has 12 or more leaflet pairs.
- Brownish-red to light green stems.
- Pink flowers produced in late July to early August.

ADAPTATIONS:

- Flower spikes rise above the surface for pollination.
- Spring growth occurs earlier than native plants and rapidly grows to the surface, effectively shading the native plants before they can get started.
- The plant can easily fragment or break into smaller pieces. Each fragment can grow into a new plant.

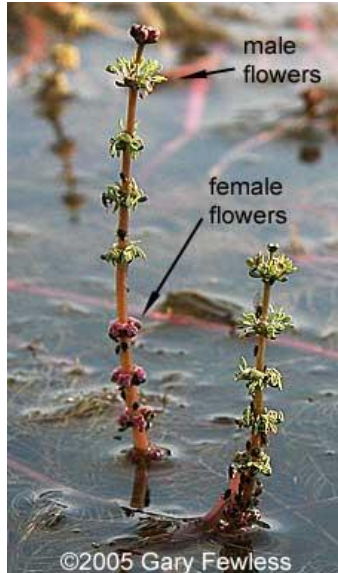


Photo credit: Gary Fewless (2005) University of Wisconsin in



Photo credit: Alison Fox, University of Florida,

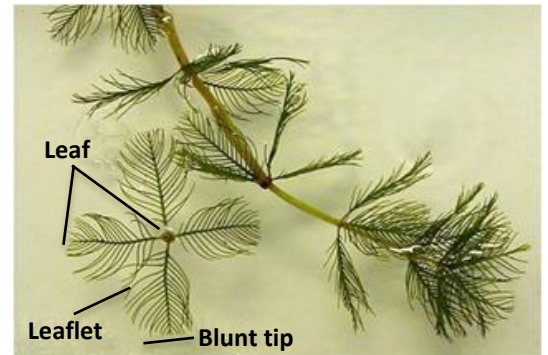


Photo credit: John Halpop, Montana State University

IMPACTS:

- Aggressively outcompete native aquatic plants for space and sunlight.
- Forms dense layers of plant material that shades the underlying water.
- Restricts swimming, fishing, boating, and other recreational activities.
- Clogs water intake systems
- Late-summer die-offs produce decaying mats that line shorelines.
- Decaying plant material leads to low oxygen conditions that impact fish and benthic invertebrates.
- Difficult to remove once established.

AIS Inquiry Station #3

Lesson Material (3 of 4)

Common Name(s): North American bullfrog

Scientific Name: *Rana catesbeiana*

ORIGIN:

North American bullfrogs are native to the Eastern United States.

PATHWAY OF INTRODUCTION:

North American bullfrogs were accidentally introduced to the Western United States through fish stocking events. They can also be unintentionally introduced when they escape from aquaculture farms and ornamental ponds, or intentionally introduced when they are released from aquariums.



Photo credit: Jarek Tuszynski (CC BY-SA 3.0)



Photo credit: USDA Forest Service

METHODS OF DISPERSAL:

Once introduced, they reproduce rapidly and spread locally by swimming to new areas and by migrating over land to new habitats.

HABITAT:

They can be found living in lakes, ponds, cattle tanks, bogs, oxbow wetlands, and slow-moving areas of rivers and streams. They prefer to live in warm, shallow, calm water.

PHYSICAL DESCRIPTION:

The North American bullfrog is the largest frog in the United States.

- Contains a distinctive fold of skin extending from the eye to the ear.
- Color varies from dull green/olive to brown with dark blotches on the dorsal (top) side of the back and legs.
- Cream or yellow underbelly.
- Breed in June and July.
- Females produce 10,000-20,000 eggs.
- Olive green tadpoles grow to a length of 4.5 inches.
- Live for 7-9 years in the wild.

ADAPTATIONS:

- Counter-shading camouflage (dark dorsal side/light ventral side) allows them to blend into their environment.
- Adults may migrate over land to find suitable habitat if their existing habitat dries up.
- Tadpoles can transform into adults as quickly as 4 months in warmer climates and 3 years in colder climates.
- During the winter, adults hibernate in the mud or in small cave-like structures.



Photo credit: Hazel Calloway (2013) University of Virginia

IMPACTS:

- Aggressively outcompete native frogs and other amphibians.
- Voraciously eat birds, rodents, frogs, snakes, turtles, lizards, and bats.
- Tadpoles graze heavily upon algae, reducing food for benthic invertebrates such as snails.
- Difficult to remove once established.



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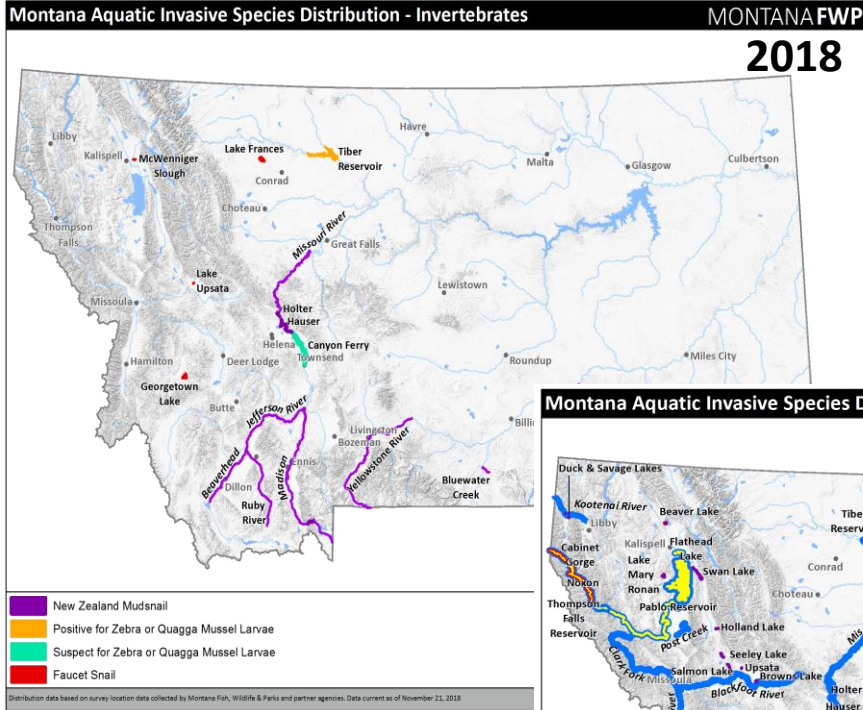
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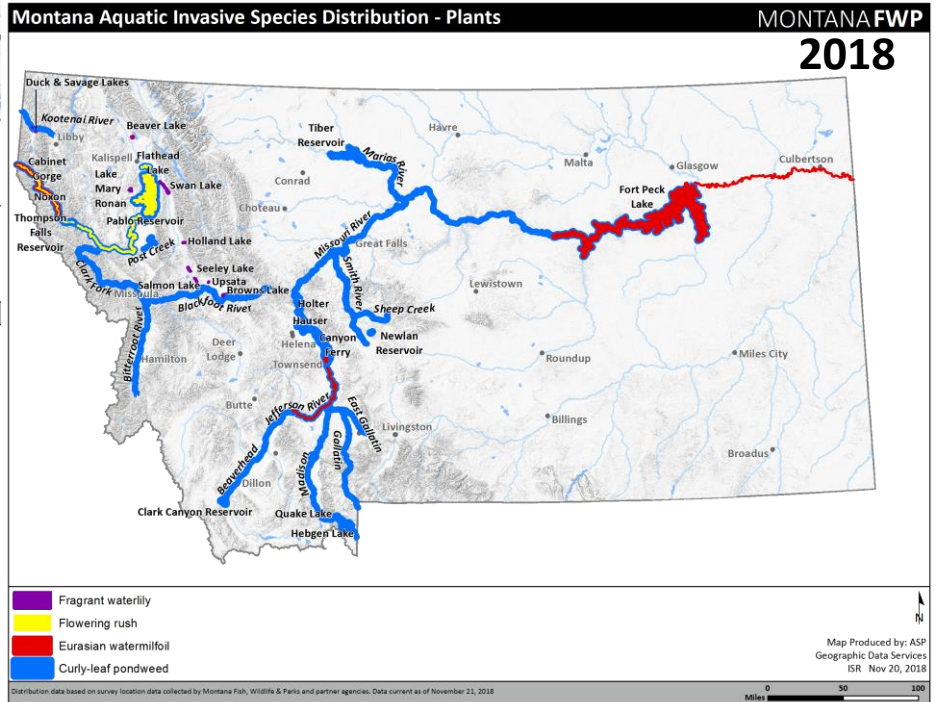
The Wonder Whys of AIS

AIS Inquiry Station #1 Invasive Mollusks Map:

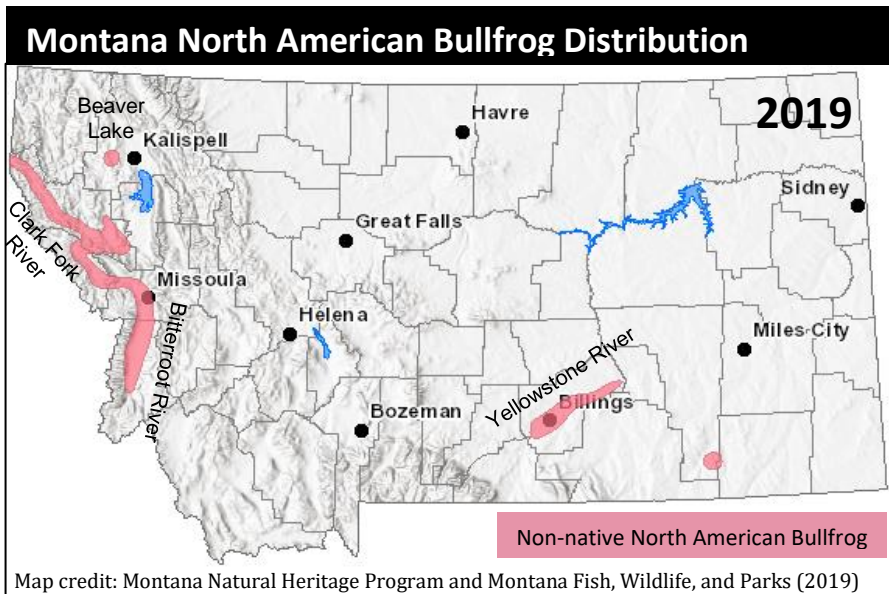
Lesson Material (4 of 4)



AIS Inquiry Station #2 Invasive Aquatic Plants Distribution Map:



AIS Inquiry Station #3 Bullfrog Distribution Map



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