AIS Inquiry Station #1

Common Name(s): flowering rush, grassy rush, water gladiolus

Scientific Name: Butomus umbellatus

ORIGIN:

Flowering rush is native to Europe and Western Asia.

PATHWAY OF INTRODUCTION:

Flowering rush was intentionally introduced to the United States from Europe as an ornamental garden plant. It was first observed in the St. Lawrence River in 1897.

METHODS OF DISPERSAL:

Once introduced, it spreads locally through growth of rhizomes or horizontal stems, fragmentation of the root system, and transport by water and animals (ex. muskrats). The root fragments, bulbils, and seeds can be dispersed to new areas with boats, boat trailers, or other equipment like fishing or diving gear.

HABITAT:

Shallow freshwater lakes, rivers, marshes, ponds, and wet ditches. Can be found from the shoreline to water up to 9 feet deep.



Photo credit: De Lafontaine and Costan (2002)



Photo credit: Christian Fischer (CC BY-SA 3.0)

IMPACTS:

- Grows in dense stands that displace native aquatic plants and waterfowl habitat.
- Decreases water accessibility from the shoreline for recreation.
- Interrupts natural water flow.
- Makes it difficult for native fish and waterfowl to move along the shoreline and to hunt for prey.
- Difficult to remove once established.





AIS Inquiry Station #1

Common Name(s): Flowering rush, grassy rush, water gladiolus

Scientific Name: Butomus umbellatus

PHYSICAL DESCRIPTION:

An aquatic perennial often found growing partly submerged and partly above the water surface. It grows up to 5 feet in height.

- Sword-shaped green leaves are triangular in cross-section and grow up to 4 feet in length.
- Pink flowers emerge in umbrella-like clusters during the summer and fall.
- Each flower is 2-2.5 cm in diameter and contains 3 petals and 3 sepals.
- Vertical stems grow upward off of the horizontal stems that grow along the bottom.



Photo credit: Greg Haubrich (2002) WSDA

ADAPTATIONS:

- Flowers grow at the top of a long stalk above the water surface and can easily be pollinated.
- Seeds can disperse with water and travel great distances.
- Pea-sized bulbils (bulb-like plant sprouts) can pop off and grow into new plants.
- The plant can easily fragment or break into smaller pieces. Each fragment can grow into a new plant.







©2002 Gary Fewless

Photo credit: Gary Fewless (2002) University of Wisconsin Green Bay



AIS Inquiry Station #2

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.



Photo credit: USGS (public domain)



Photo credit: OnTheWorldMap.com

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.





AIS Inquiry Station #2

Ridge lacking

Dreissena bugensis

Asymmetrical; no straight midventral line

(ventral view

Common Name(s): zebra mussel / guagga mussel

Scientific Name: Dreissena polymorpha / Dreissena rostriformis bugensis

Dreissena polymorpha

(ventral view)

Obvious ridge

Bilaterally symmetrical Join together in a midventral line

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.
- Photo credit: USGS Photo by Myriah Richerson 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.
- \geq Byssal threads allow them to attach to any surface.

Byssal groove

- 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.
- Zebra mussel tolerate shallow, warm areas with greater wave action, whereas quagga mussels tolerate colder temperatures and have been found at depths up to 540 feet in Lake Michigan.

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 #3

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.





AIS Inquiry Station #3

Common Name(s): Eurasian watermilfoil, spiked watermilfoil

Scientific Name: Myriophyllum spicatum

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.



Photo credit: John Halpop, Montana State University

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 Green Bay

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 #4

Lesson Material (7 of 10)

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.



METHODS OF DISPERSAL:

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

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.

Photo credit: USDA Forest Service

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.





AIS Inquiry Station #4

Common Name(s): North American bullfrog

Scientific Name: Rana catesbeiana

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.



Photo credit: Hazel Calloway (2013) University of Virginia

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.







AIS Inquiry Station #5

Lesson Material (9 of 10)

Common Name(s): Rusty crayfish

Scientific Name: Orconectes rusticus



ORIGIN:

Rusty crayfish are native to the Ohio and Tennessee River basins.

This species has not yet been detected in any Montana water bodies.

PATHWAY OF INTRODUCTION:

Rusty crayfish were introduced to non-native habitats by the release of aquarium specimens and unused crayfish from bait buckets and fishing lines.

METHODS OF DISPERSAL:

Once introduced, they reproduce rapidly and spread locally through connected waters.

HABITAT:

They can be found living in lakes, rivers, streams, and wetlands with rock, gravel, clay, or silt bottoms. They prefer deep pools with fast currents and cover from predators, such as rocks, logs, and debris.



Photo credit: Cgoldsmith1 (CC BY-SA 3.0)

IMPACTS:

- Aggressively outcompete native crayfish for food and habitat.
- Eat native plants, snails, clams, insects, other crayfish, fish eggs, and small fish.
- Reduces habitat and food sources for invertebrates and fish.
- Negatively impacts fish populations through competition for food and predation on fish eggs.
- Difficult to remove once established.





AIS Inquiry Station #5

Common Name(s): Rusty crayfish

Scientific Name: Orconectes rusticus

PHYSICAL DESCRIPTION:

The rusty crayfish is an aggressive species that can greatly alter non-native habitats.

- Grow up to 6 inches in length.
- Distinctive dark, rust-colored spots on either side of its shell and black tips on claws.
- Body color varies from green-grey to red-brown.
- Live for 3-4 years.
- Mate in late summer, early fall, or early spring.
- Females lay between 80-575 eggs.



Photo credit: UWSP

Photo credit: USGS bugwood.org

ADAPTATIONS:

- Counter-shading camouflage (dark dorsal side/light ventral side) allows them to blend into their environment.
- Large claws allow them to eat 2-3 times as much food as a native crayfish.
- Prominent eyes and a strong abdomen help them to escape from predators.
- The male's sperm is stored in the female until the eggs are ready to be fertilized. Eggs and stored sperm are released at the same time and external fertilization takes place. The fertilized eggs then attach to the bottom of the females tail section.
- Once hatched, the young will continue to cling to the female's tail section for further protection until they are large enough to be on their own.



