



SECTION 9

AQUATIC INVASIVE SPECIES

This fact sheet addresses the impacts of aquatic invasive species on water quality and how *you* can make a difference with *Best Management Practices (BMPs)*. BMPs are actions you can take to protect our natural resources. **The ultimate goal of this information is to prevent, detect, and control aquatic invasive species in and near our waterways while minimizing negative impacts to water quality.**

1. Read the facts and information in the following pages.
2. Fill out the Risk Assessment Worksheets in order to analyze your property's individual needs.
3. Fill out the Action Worksheet, then **take action!**

This section is categorized into 4 main topics: Prevention (pages 9-3 and 9-4), Early Detection/Rapid Response (page 9-5), Control Methods (pages 9-6 and 9-7), and Identification (pages 9-8 through 9-22)

What Are Aquatic Invasive Species?

Aquatic invasive species (AIS) grow, reproduce, and spread rapidly in water environments. They are animals, plants, and other organisms (microbes) that are not native to the area and have the potential to cause harm to the economy, human health, our natural resources, and ultimately our quality of life. They succeed due to favorable environmental conditions, and a lack of natural predators, competitors, and diseases. Aquatic invasive species (AIS) are also referred to as “nuisance” and “exotic” species, and they are one of the most significant threats to our water resources today.

Why Are They Here?

Although there are a number of sources for the introduction of invasive species, such as, wind, water, and animals, most invasive species are introduced by humans. It is important to recognize this is a global issue, as well as a local one. The invasion begins across the world via imported fruits and vegetables, ship ballast waters, vehicles, shipping containers, exotic pet and aquarium trade, and human travel.



Figure 9-1 Ships as pathways



Figure 9-2 Decorative ponds as pathways

Once these non-native species arrive in North America, they spread in many different ways. In some cases, we deliberately introduce new species as garden ornamentals, range forage plants for cattle, and animals and insects used for bio control. Most often they are introduced unintentionally through numerous pathways: travelers, pets and animals, recreational boats and vessels, and the trade of ornamentals.

While the majority of introduced species are not harmful to the economy or the environment, a small percentage are very damaging and need to be eradicated as soon as they are detected.

Why Do We Care?

Invasive species are a form of biological pollution; they can be detrimental to the economy, human health, and natural resources. They spread easily in today’s global network of commerce and are difficult and costly to control. Invasive species can impede industries, damage habitat, threaten agriculture, and reduce our quality of life.

Introduced species outcompete native plants and animals and alter important ecosystem functions such as food chains, habitat, fire, and flooding. Invasive species also hybridize with native species, causing complex environmental changes.

The cost to prevent, monitor, and control invasive species is enormous (including costs to crop damage, fisheries, forests, and other resources). Economic losses are estimated at \$137 billion per year, according to the National Institute of Food and Agriculture.

The introduction of aquatic invasive species to the United States has been rapidly increasing and causing widespread damage. The impacts are vast and include the loss of native plant and animal communities, reduced property values, impaired drinking water, severely degraded recreational uses, such as swimming, boating, and fishing, increased flooding, and enormous ongoing prevention and control costs.

What Can You Do?

The following pages outline Best Management Practices used to help combat aquatic invasive species. It is simple to apply Best Management Practices, and the satisfaction that comes from protecting our lakes and streams is priceless.

The health of our aquatic ecosystems requires a very specific biological balance in order to be sustained. With this in mind, methods used to manage aquatic invasive species need to address this balance fully before being applied. **Please read this fact sheet and utilize the resources provided before you attempt to control any aquatic plant or animal on your own.**



Figure 9-3 *Eurasian watermilfoil on prop*



Figure 9-4 *Trailer and boat with attached weeds*

CURRENTLY IN IDAHO WATERS

*Currently in Benewah, Kootenai, and/or Shoshone Counties

***Eurasian milfoil** *Myriophyllum spicatum* (pg 9-8)

Curlyleaf pondweed *Potamogeton crispus* (pg 9-9)

Flowering rush *Botomus umbellatus* (pg 9-10)

Brazilian elodea *Egeria densa* (pg 9-11)

Parrotfeather milfoil *Myriophyllum aquaticum* (pg 9-13)

Yellow floating heart *Nymphoides pelata* (pg 9-15)

Didymo/rock snot *Didymosphenia geminata* (pg 9-22)

Crayfish (pg 9-20)

Asian Clams *Corbicula fluminea* (pg 9-21)

Wetlands and Riparian Zones

***Purple loosestrife** *Lythrum salicaria* (pg 9-16)

Yellow flag iris *Iris pseudocorus* (pg 9-17)

***Common reed** *Phragmites australis* (pg 9-14)

MOST UNWANTED OR IN NEARBY STATES

Quagga and zebra mussels *Dreissena sp.* (pg 9-18 and 9-19)



Figure 9-5 *Dreissena infested boat*

Prevention

Idaho currently has aggressive state-wide prevention efforts in place, however, active participation by all water users is key to addressing this important issue. Because human actions are the primary means of invasive species introduction, it is our responsibility to work towards positive solutions. Prevention is far less expensive than control, so let's work to keep them out!



Clean Everything

Anything that gets wet, needs to be cleaned. This includes boats, trailers, inflatable rafts, life jackets, flippers, waders (especially felt), fishing rods, you name it.

Non-absorbent items

- Detergent - soak or spray all surfaces for at least one minute in 5% dishwashing detergent (2 cups detergent with water added to make 2.5 gallons).
- Bleach - soak or spray all surfaces for at least one minute in 2% household bleach (1 cup of bleach with water added to make 3 gallons).
- Hot water - soak for at least one minute in very hot water kept above 140° F (hotter than most tap water) or for at least 20 minutes in hot water kept above 113° F (uncomfortable to touch).

Absorbent items require longer soaking times to allow thorough saturation. For example, felt-soled waders require:

- Hot water - soak for at least 40 minutes in hot water kept above 113° F.
- Hot water plus detergent - soak for 30 minutes in hot water kept above 113° F containing 5% dishwashing detergent.
- Freezing any item until solid is likely to kill most organisms.

Drying is effective in insuring organisms are dead.

- Items must be completely dry to the touch, inside and out, then left dry for at least another 48 hours before use.
- For mussels, it is recommended that the item dry for 30 days after leaving a waterbody with a known infestation. Didymo and quagga/zebra mussels can survive for months in moist conditions.



Do Not Release

Do not release plants, animals, or fish into a body of water, unless they originally came from that particular body of water. If your family no longer wants your **aquarium and aquatic pets**, do not dump any of the plants, animals or water into nearby water, storm drains, or toilets. Give them away, take them back to the pet store, or bury them away from storm drains or water bodies.

Bait

The use of live bait is unlawful in the state of Idaho, with the exception of crayfish caught in the same waterbody that is being fished or used. **Do not dump bait or bait water.**

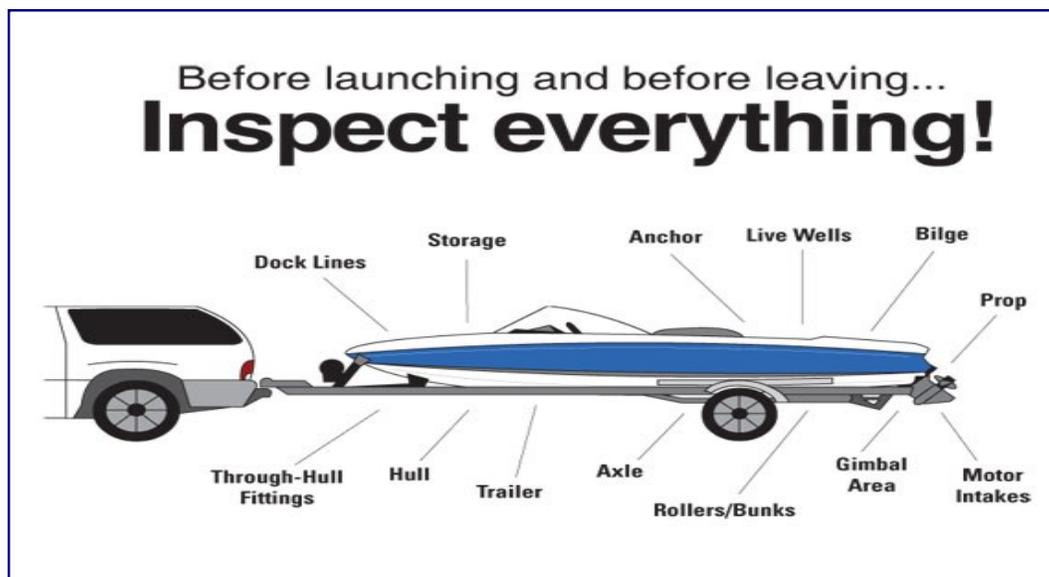
Ornamental Garden Plants

Many plants on Idaho's noxious weed list are sold online and in some cases at local nurseries. Become familiar with invasive plants by utilizing this publication, your local weed department, or the Idaho Department of Agriculture.

Talk About It

Tell your neighbors and friends what you have learned. **Spread the word - not the weed!** Talking about this pressing issue will greatly increase the chances for protecting our lakes. The process of informing the public by local, state, tribal, and federal agencies is expensive, time consuming, and sometimes intrusive, especially when folks are trying to relax and enjoy the lake during the beautiful summer months. Telling one person can sometimes be enough!

In Idaho, ***“Expect to be Inspected,”*** boaters are required by law to remove harmful plants and animals from boats and trailers. Boat inspections are now mandatory in Idaho for all traveling watercraft. All boats are considered contaminated until inspected. Look for your nearest boat inspection station. The time commitment involved is well worth the luxury of a beautiful day on a clean lake. For more information on Idaho’s current efforts, visit: www.invasivespecies.idaho.gov



Clean

- ◆ Remove all visible plants and debris; bag and dispose away from storm drains, ditches, and waterways. If you find something suspicious, place it in a sealed container with water and call Idaho State Department of Agriculture (208) 332-8564.
- ◆ Thoroughly wash everything, including crevices and other hidden areas.
- ◆ Rinse, scrub or pressure wash away from storm drains, ditches or waterways.

Drain

- ◆ Thoroughly drain your boat before leaving the area, including wells, ballast, and engine cooling water.
- ◆ Rinse or flush under flooring, at inflation chamber joints or other areas that can trap mud and debris.

Dry

Allow time for your boat to completely dry before launching in other waters. If you have been in a known zebra/quagga mussel infested waterbody, it is recommended your boat dry for 30 days.

Dispose

Dispose of plant matter and debris by bagging and placing in trash disposal. If you find something suspicious, place in a sealed container with water and call Idaho State Department of Agriculture (208) 332-8564.

Early Detection / Rapid Response

Catching aquatic invasive species early and controlling them before they cause significant damage or spread to other water bodies provides the best (and sometimes only) hope of eradication. Under the “Idaho Invasive Species Act of 2008” the state has determined “Prevention, early detection, rapid response, and eradication are the most effective and least costly strategies against invasive species because they combat new invasions before they expand beyond feasible control.” Below are suggestions on how you can help be part of the solution.

Know What to Look For

Know what you are looking for and look often! Not all plants and animals are invasive, many are beneficial and necessary to fish habitat and biodiversity. Learn how to differentiate invasive species from native species. This guidebook includes identification pages for plants and animals currently of concern. There are also numerous online resources available for aquatic invasive species.

The vast majority of new infestations are found near boat ramps and along the nearshore (0-11ft). These areas should be surveyed regularly for new infestations. If you find something suspicious, collect a sample, write down the exact location, and call one of the agencies listed in the Resource Directory page 9-23.

Form Volunteer Monitoring Groups

Waterfront residents have a unique opportunity and responsibility to be knowledgeable on potential threats to water quality. Volunteer monitoring is an excellent means of early detection and a great opportunity to get involved.

Volunteer groups can be trained by local professionals to identify aquatic plants and animals, monitor for new infestations, report findings, take water samples, and educate their neighbors. If a group like this does not exist in your watershed, create one of your own. Call the CDA Tribe, IDEQ, or the UI Extension listed on page 9-25 to let them know your group is interested in volunteering.



Figure 9-6 A local weed monitoring group

Get involved!
The quality of our water is well worth the time commitment.

Idaho Laws and Efforts

Idaho Eurasian Watermilfoil Program, 2006

This program was created to eradicate Eurasian watermilfoil. The ability to facilitate this specialized program required the hiring of aquatic plant specialists in the Idaho Department of Agriculture, the cooperation of numerous local, state, tribal, and federal agencies, and millions of dollars. To continue the efforts put in place future control methods need to be addressed, and participation by all water users is vital.

The Idaho Invasive Species Act of 2008

The State of Idaho, Idaho Statute

This law includes provisions that allow the state to determine what is invasive, to set up mandatory inspection and decontamination stations for boats, and to set up a \$5 million emergency response fund. This law is under House Bill 632 Title 22 Chapter 19 and shall be administered by the Idaho Department of Agriculture.

Idaho Invasive Species Fund, 2009

Idaho State Department of Agriculture

This legislation provides funding programs to prevent the introduction of aquatic invasive species in Idaho. **This law requires all vessels, both motorized and non-motorized to purchase and display the Invasive Species Fund sticker in order to legally launch and operate in Idaho.** Stickers can be purchased through the Idaho Department of Parks & Recreation.

National Laws and Efforts

Lacey Act, 1900

This act prohibits trade in wildlife, fish, and plants that have been illegally taken, possessed, transported or sold.

The National Invasive Species Act, 1990

This law has been the nation’s chief protection against new aquatic invaders, especially those that arrive in ballast water. It was passed in response to the invasion of the zebra mussel and other species that damaged the Great Lakes.

Control Methods

There are a variety of techniques used for controlling aquatic invasive species, often they are combined in what professionals call Integrated Pest Management (IPM). Determining what control methods to use varies based on the type of species, the degree of infestation, location, cost, recognized scientific research, lake management approaches, and established polices and permitting. Because aquatic invasive species management is a very specialized field, always contact a plant professional before attempting to control aquatic invasives yourself. The information provided here is meant to provide the public a *basic* understanding of control methods. It is *not* a “how to” guide.

For detailed information on aquatic plant management please see [Resource Directory](#) on page 9-23.

Manual Control

Bottom Barriers, Water Drawdown
Hand pulling, Raking, Digging, Cutting

Advantages

- Easy to use around docks and swimming areas.
- Equipment is inexpensive.
- Hand pulling allows the flexibility to remove undesirable plants while leaving native ones.

Disadvantages

- Plants often re-colonize the cleared area and treatment may need to be repeated throughout growing season.
- Labor intensive, so not practical for large areas or thick weed beds.
- It is difficult to contain and collect all plant fragments. Many aquatic plants re-grow from fragments.
- Some plants, like flowering rush, have massive rhizomes and are difficult to dig by hand.
- Pulling and raking stirs up the sediment and makes it difficult to see remaining plants.
- Hand-pulling and raking disturbs bottom-dwelling animals, can break plant parts off and can be labor intensive.



Figure 9-7 Hand removal

Bottom Barriers (Benthic Barriers)

Barriers cover the plants and lake bottom like a blanket. They compress plants, reducing the amount of light they receive, stifling growth. Studies have been conducted to determine the most effective and least destructive (to native aquatic life) time frame for barriers to stay down. Idaho Department of Lands (IDL) created specific guidelines for the design of barriers and a time frame for leaving them in the lake bed. These guidelines make barriers easy to manage, ensuring they don't stay on the bottom of the lake becoming “trash.” Also, leaving barriers in for too long, allows sediment to build up on top. This is a problem because plants re-grow in this sediment and the weight of the sediment makes removal of the barrier difficult. The installation of barriers is easiest in spring when aquatic plant growth is low. Idaho Department of Lands (IDL) requires a permit for the installation of bottom barriers. Please contact Idaho Department of Lands (208)769-1577 for more information. Note: Within waters or submerged lands of the CDA Reservation, permission is required from the CDA Tribe's Lake Management Department (208)686-1800.



Figure 9-8 Diver installing 10 x10 bottom barrier

Water Level Drawdown

Lowering the water level of a lake or reservoir can have a dramatic impact on aquatic plants growing in the nearshore. Plants exposed to air, due to water drawdown, are susceptible to freezing temperatures in the winter months. If exposed before a thick layer of snow accumulates, there is often a high mortality rate. However, some aquatic invaders (such as flowering rush) are suspected to do best in exposed and disturbed areas created by drawdown. What might be helpful in controlling some could very well make others worse. Drawdowns can also have other negative impacts to the ecosystem, such as increased erosion and changes in available fish and wildlife habitat.

Biological Control



Figure 9-9
Stem weevil

Biological controls are predators or competitors of invasive species. Use of biological controls can involve importing exotic predators/competitors to help control exotic species, or utilizing predators/competitors native to the area. The need for biological control methods has increased due to concerns surrounding the environment

and health. It is a priority for scientists to consider the wider implications of introducing a foreign species and as a result, the decision process for this control method can often be time consuming. Several studies have been conducted on the use of native watermilfoil weevils, *Euhrychiopsis lecontei*, for the control of Eurasian watermilfoil. For more information on weevil projects please see the Resource Directory at the back of this chapter.

Mechanical Control

Cutting Boats, Rotovators, Dredging

Mechanical methods utilize large power-driven equipment. Under some circumstances, mechanical controls can be more beneficial than other methods of control. They are generally restricted to small areas such as bridges, flood control structures, marinas, and swimming areas.

Advantages

- Immediate clearing of vegetation in small areas.
- Plant material is removed. It is not left to decompose in water, utilizing valuable oxygen.

Disadvantages

- High equipment cost
- Labor intensive
- Slow and inefficient (generally a couple of acres a day)
- Rapid re-growth (requires frequent repeated treatments)
- Native plants are removed, and aquatic life can be destroyed.
- Plant fragments created
- Soil disruption
- Increased water turbidity (muddy/cloudy)
- Problems with disposal of removed plant material

Chemical Control

Aquatic herbicides are chemicals used to treat infestations that are too dense and too vast to be affected by other control methods. Because chemical control can have negative environmental and health implications, preventing dense infestations that require chemical treatment is the priority in aquatic plant management.

Very Important!

Always contact a plant professional before trying to control aquatic weeds on your own. Actions you take can have a detrimental impact on your health, your neighbors health, and water quality. Many waterfront residents draw their drinking and irrigation water from lakes and streams. Diversity in aquatic plant life is vast, what works on one may not work on another. Don't take this specialized science into your own hands. Your local weed supervisor is available to help you with your aquatic weed concerns.

BASIC AQUATIC HERBICIDE INFORMATION

Aquatic herbicides are sprayed directly onto floating or emergent plants or are applied to the water in either a liquid or pellet form. Factors such as water flow, water temperature, type of chemical, and plant species are very important to consider. The United States Environmental Protection Agency (EPA) regulates and approves what aquatic herbicides are safe to use. Idaho Department of Agriculture regulates what aquatic herbicides can be used in Idaho. It is illegal to apply aquatic herbicides not registered in Idaho. It is illegal to apply aquatic herbicides against label instructions.

Eurasian Watermilfoil

Myriophyllum spicatum

Eurasian watermilfoil is a non-native aquatic plant that was once commonly sold as an aquarium plant. As its name suggests it has its origins in Europe and Asia. It probably arrived in the United States in the 1940s and quickly spread to all but a few states. It is suspected that this incredibly invasive aquatic plant was introduced into the CDA Basin from boat trailers travelling from other parts of the Columbia River Basin. *Even a tiny fragment* of the plant is enough to establish a colony that can quickly out-compete the beneficial native aquatic plants. Because it is widely distributed and difficult to control, watermilfoil is considered to be the most serious aquatic weed problem in the Northwest.

Eurasian watermilfoil is a perennial, which means unless exposed to air and killed by a hard frost, plants will come back the next growing season. Plants can be found growing in up to 30 feet of water, depending on water clarity. It can grow as deep as light will penetrate. Massive rooted colonies can become so dense that they not only compromise the water quality, but can suffocate fish and destroy spawning habitat for some species.

Most water based recreational activities are affected to some degree by Eurasian watermilfoil. Boats can have trouble navigating through the nearly solid floating mats occasionally getting stuck. Fish populations can decline and swimmers have been known to drown in rare instances. Dense floating mats can also clog the inlets of power generating plants and increase the cost of maintenance.



Figure 9-10 Eurasian watermilfoil shown sprouting a white adventitious root off stem in right corner. Bottom right shows four leaves with 10 or more leaflets.



Figure 9-11 Typical appearance Eurasian watermil-

foil as a group. watermilfoil is easy to identify; however, identifying the exact species is more challenging. All watermilfoil have feather-like leaves arranged in a whorl of four leaves around the stem. The Eurasian variety usually has twelve or more leaflet per leaf while the native northern variety has fewer than ten. The leaves of the Eurasian variety tend to collapse around the stem when taken out of water, while the northern species tend to remain more rigid. Also, the stem is generally more reddish with the Eurasian species.

IDENTIFYING EURASIAN WATERMILFOIL

- Twelve or more leaflet pairs on each leaf.
- Leaves tend to collapse around the stem when removed from the water. Other milfoil species have thicker stems and are usually more robust.
- Mature leaves are typically arranged in whorls of four.

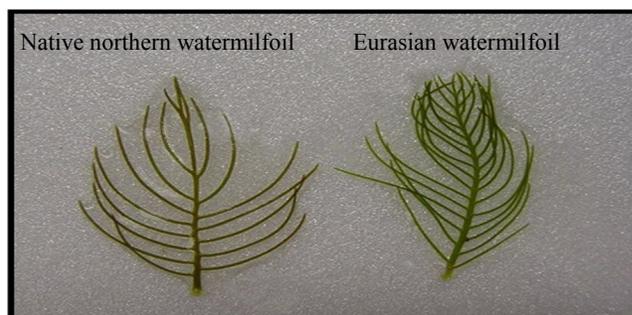


Figure 9-12 Native Northern watermilfoil has less than 10 leaflets. Eurasian watermilfoil has more than 10 leaflets.

Curlyleaf Pondweed

Potamogeton crispus

Like most invaders, curlyleaf pondweed is not native to North America. It was brought to the United States as a popular aquarium plant. Curlyleaf tolerates low water clarity and will readily invade disturbed areas. It is believed to spread from one body of water to another primarily by the unintentional transfer of turions (Figure 9-13) carried on trailered boats and personal watercraft

Curlyleaf is a submersed aquatic plant that generally grows in 3-15 feet of water. In spring, curlyleaf pondweed can form dense mats that may interfere with boating and other recreation on lakes. Curlyleaf can also cause ecological problems because it can displace native aquatic plants. In midsummer, curlyleaf plants usually die back, which results in mats of dying plants piling up on shorelines, this event is often followed by undesirable algal blooms. This is a result of the plants decomposing and adding excess nutrients in the water.

Long-term management requires the reduction or elimination of turions to interrupt the lifecycle. Cutting can be effective, if the precautions are taken to retrieve turions. Ultimately, the most important action that you can take to limit the spread of curlyleaf and other non-native aquatic plants is to remove all vegetation from your watercraft before you move it from one body of water to another.

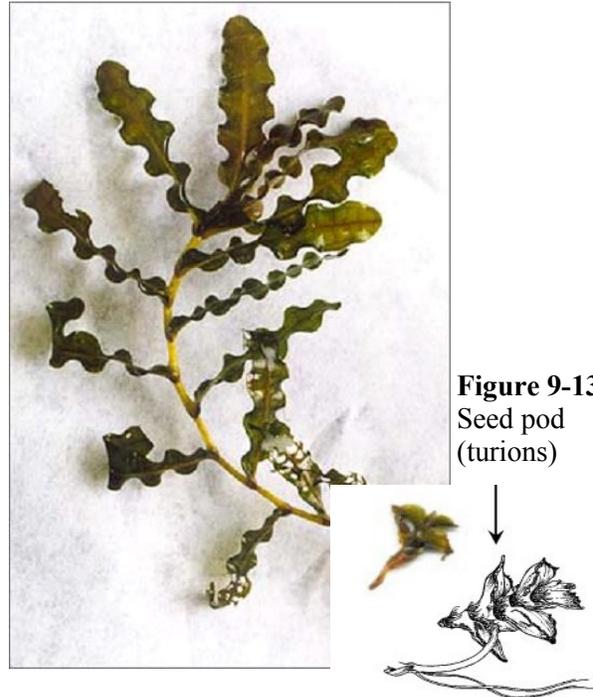
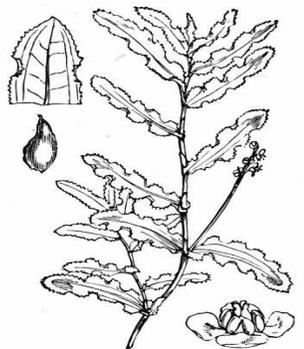


Figure 9-13
Seed pod
(turions)

Identifying Curlyleaf Pondweed

Curlyleaf is similar in appearance to many native pondweeds commonly found in Idaho lakes, but it can be distinguished from other pondweeds by its unique life cycle and distinct curly leaf.

- Identifiable by its distinctive leaf; curlyleaf has very wavy edges.
- Unlike other pondweeds, curlyleaf begins growing in early spring. In some regions it will die back midsummer. In north Idaho it persists into fall.
- Flower stalks and buds (turions) stick up above the water surface in June and appear reddish-brown.



963. *Potamogeton crispus* L.
Curly Pondweed.

- ◇ Clean, drain, and dry your boat and trailer
- ◇ Do not release aquarium or water garden plants into the wild, rather seal them in a plastic bag and dispose in the trash.
- ◇ Consider using plants native to Idaho in aquariums and water gardens.



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Flowering Rush

Butomus umbellatus

Flowering rush is an exotic plant that was likely introduced to North America from Europe as a garden ornamental. Once in a watershed, it spreads locally by rhizomes and root fragments, transported by animals, boats, flowing water and ice movement.

Flowering rush grows as an emergent plant along shorelines and as a submersed plant in lakes and rivers. This plant can form dense stands, which interfere with lake use and crowd out native vegetation. Flowering rush can create a marsh out of a bay in very short order.

Protecting native riparian or shoreline plants is an important way to help keep flowering rush out of your shoreline. It likes exposed, bare soils so keep your native vegetation intact and dense. It is very difficult to control and eradicate flowering rush. Inappropriate control methods can worsen the flowering rush problem. Hand digging can be used to remove small isolated plants, but use extreme care to remove all root fragments as the rhizomes break easily risking further spread. **Any disturbance to the root system will cause small reproductive structures on the roots to break off and spread to other areas.** Methods such as raking or pulling only disturb the root system and are not recommended. If this method is used, dispose of plants far away from shoreline and thoroughly dry all the flowering rush plant once removed from the water. Any amount of moisture will aid its survival.

It is very difficult to kill flowering rush with herbicides. Herbicides are easily washed away from the narrow leaves of this plant. At this time, no specific herbicide has been successful at controlling flowering rush long term.



Identifying Flowering Rush

Flowering rush looks very similar to native rushes that occur in wetland areas. It is easy to identify by the stem which is triangular in cross section (Figure 9-15). This is easy to determine by pinching stem in half and by looking at the root system (9-16). Most flowering rush plants do not flower.

- The stems are green and triangular in cross section.
- Plants can be found growing along the shore and submerged in water with erect leaves, reaching to about 3 feet in height.
- When plant grows beyond being submerged, it will often lay limp on the surface of the water.
- When first emerging in spring, new leaves appear purple and are difficult to see in mud.



Figure 9-14 *What was once open water, is now dense with flowering rush*



Figure 9-15 *Stem in cross section*



Figure 9-16 *Rhi-*

Brazilian Elodea

Egeria densa

Brazilian elodea is a popular aquarium plant often sold under the name “anacharis.” It was likely introduced into the U.S. from the aquarium trade and is often transported on boat trailers and propellers. Although the sale of Brazilian elodea is prohibited, it is present in some Idaho waters.

Brazilian elodea can grow in waters up to 20 ft deep, or it may grow as floating mats. Because it can form dense stands, it impedes swimming and boating. Brazilian elodea can spread at a rate of 100 acres per year and spreads fastest under drought conditions. Infestation by the noxious weed may slow water flow resulting in the build-up of sediment and constricted waterways. Brazilian elodea may clog intakes shutting-down hydroelectric plants.

A variety of methods have been known to control the spread of Brazilian elodea with mixed results. Hand removal of the plant may result in small fragments growing into entirely new plants. A variety of herbicides are effective at killing the plant. There is no herbicide that specifically targets Brazilian elodea; application often kills native plants as well. Given the risks of herbicide use in aquatic systems, prevention is the best way of keeping Brazilian elodea out of the our waterways.

- Clean, drain, and dry your boat and trailer.
- Do not release aquarium or water garden plants into the wild, rather seal them in a plastic bag and dispose in the trash.
- Consider using plants native to Idaho in aquariums and water gardens.
- If you detect this plant in a lake, pond, or stream, please contact Idaho Department of Agriculture or your local noxious weeds supervisor.



Figure 9-17 *Brazilian elodea* (large plant on right) compared to native *Elodea canadensis* (smaller plant on the upper left).

Identifying Brazilian Elodea

Brazilian elodea looks very much like a larger, more robust version of its commonly-found native relatives, *Elodea canadensis* and *Elodea nuttallii* (Figure 9-17).

- Bright green leaves and stems
- Leaves in whorls of 3-8
- Leaves linear to oblong 1-1¼” long, ⅛” wide with finely toothed leaf margins, toothless midrib
- Showy flowers with 3 white petals
- The plant has a very leafy appearance and grows until it reaches the surface where it forms a dense mat.

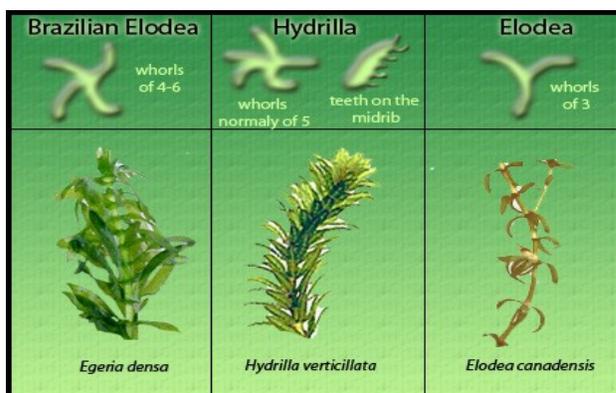


Figure 9-18 Comparative diagram of similar species

Hydrilla

Hydrilla verticillata

Hydrilla (*Hydrilla verticillata*) is native to Africa, Australia, and parts of Asia. It was introduced to the United States in 1960 through the aquarium trade. It has quickly spread across the country and is now considered to be one of the most problematic aquatic weeds nationwide. In southern states, managing its spread costs millions of dollars a year. Although limited populations exist in Idaho, early identification and prevention are keys in controlling its spread.

Once established, hydrilla forms dense mats that interfere with recreation and wildlife. Hydrilla outcompetes native plants by growing under less light, more efficiently utilizing nutrients, and reproducing extremely effectively. Hydrilla propagates through various mechanisms including dispersing seedlings and sprouting new plants from root and stem fragments.

However, hydrilla's real secret to its success is the ability to produce structures called turions and tubers (Figures 9-19 and 9-20). Turions are small green structures that form at the base of leaves. Turions can break free and produce entirely new plants. Tubers are small potato-like structures that reside underground and may remain dormant for several years. Tubers and turions can withstand drying, freezing, herbicides, and ingestion by waterfowl. One square meter of hydrilla can produce 5,000 tubers!

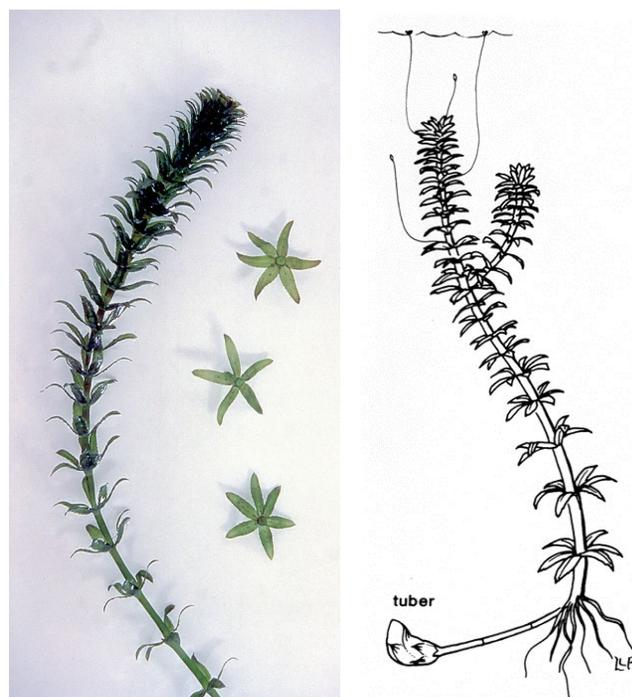


Figure 9-20 *Hydrilla* can be distinguished from Brazilian elodea and native elodea species by the presence of tubers.

Identifying Hydrilla

Hydrilla closely resembles the non-native Brazilian elodea (Figure 9-18) and native elodea species. You can distinguish hydrilla from these look-alike species by:

- The presence of tubers (0.2 to 0.4 inch long, off-white to yellowish, pea-like structures buried in the sediment). Neither Brazilian elodea nor waterweed has tubers.
- Leaves in whorls around the stem (generally five leaves per whorl)
- Serrations or small spines along the leaf edges
- The midrib of the leaf is often reddish when fresh.



Figure 9-19 *Hydrilla turions*



Parrotfeather Milfoil

Myriophyllum aquaticum

Parrotfeather milfoil (*Myriophyllum aquaticum*) was introduced to the United States from South America from the aquarium and water gardens trade. Parrotfeather rapidly spreads into shallow waters by fragmentation of stems and rhizomes.

Parrot feather can form dense mats of vegetation entirely covering the water's surface. Because the stems of the plant are so tough, it is difficult to swim, ski, boat, or fish in parrot feather stands. It is of particular concern because it provides an ideal habitat for mosquito larvae, deteriorates water quality, blocks passage of migrating fish, and causes flooding due to its large mass.

Parrot feather is extremely difficult to control. Because it forms dense mats above the water's surface, herbicide application is difficult, and its waxy leaves and stems inhibit herbicide uptake. Biological control is limited because sterile grass carp find the plant unpalatable. Physical removal of parrotfeather often produces fragments which actually spread the plant.

Prevention is the best way to stop the spread of parrotfeather!

- Clean, drain, and dry your boat and trailer.
- Never release aquatic plants or animals into streams, rivers, or lakes. Place them in a plastic bag and dispose of them in the trash.
- Use native plants in water gardens.



Identifying Parrotfeather Milfoil

- Bright green fir-tree-like leaves and stems that rise above the water level (emergent)
- Leaflets arranged in whorls (4-6) around the stem
- Leaflets with feather-like leaf arrangement
- Dense mat of intertwined brownish stems (rhizomes) in the water
- Reddish, feathery-leaved, limp, underwater leaves may be present
- Although they are both in the same genus and closely related, Eurasian watermilfoil doesn't have above-water leaves.



Common Reed

Phragmites australis

Common reed (*Phragmites australis*) has a native strain and an introduced invasive strain. Both strains have been identified in the Coeur d' Alene Basin. This invasive wetland grass is threatening the ecological health of wetlands across the United States by creating tall dense stands which crowd out native plants and animals, block shoreline views, reduce access for swimming, fishing, and hunting and can create fire hazards.

Invasive phragmites is primarily distinguished by its very large size.

Identifying Invasive Phragmites

- Grows up to 16 feet in height
- Stems are very stiff and light green
- Dark green leaves grow to 2 feet long, 1 inch wide and are alternated along the stem
- Very thick, very long rhizomes
- Flowery seed plumes are 1-2 feet long, silvery tan and often drape to the side



Phragmites usually grow in sunny open areas and do not appear to spread into areas where there is dense vegetation. Phragmites spread primarily through rhizomes but it will also reproduce from seed. Each node on the canes can root and grow into a new plant.

Figure 9-21 *Phragmites standing tall*

Controlling invasive phragmites can be difficult, once it has become established. Identifying it early on greatly increases the chances for eradication. Methods for control include mowing, burning, crushing, shading, grazing, or herbicides. In most cases a combination of methods and multiple treatments is effective. Given the possible risks of herbicide use in or near aquatic systems, prevention is the best way of keeping this invasive giant out of the waterways.



Figure 9-22 *Invasive phragmites on the left is dense with dark green leaves. Native phragmites on the right is less dense and light green.*

Figure 9-23 *Long, thick rhizomes of invasive phrag-*



Figure 9-24 *A comparison between invasive and native phragmites.*

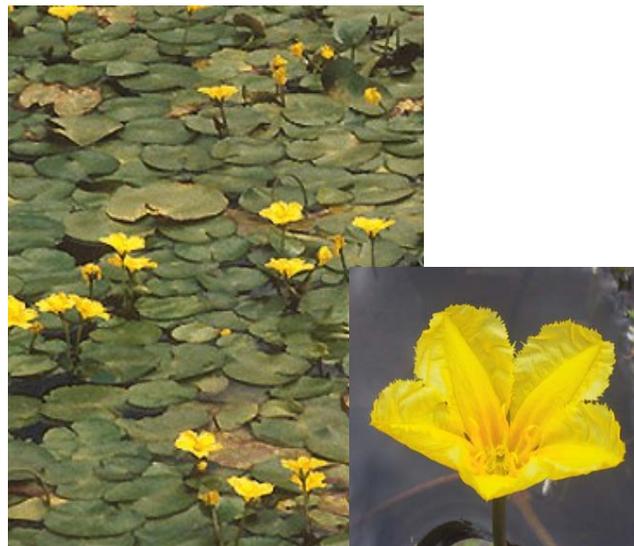
Yellow Floating Heart

Nymphoides peltata

Yellow floating heart (*Nymphoides peltata*) was introduced to the United States as an ornamental water plant. It is native to Asia but now occurs in over 15 states in the US. Common names include; Asaza, entire marshwort, floating heart, and fringed water lily. A very small population has been found in Idaho, however dense populations have been found in Washington on the Spokane River and Long Lake (Lake Spokane).

Yellow floating heart is an aggressive perennial aquatic plant that grows in dense patches, limiting light for native species and creating stagnant areas with low oxygen levels underneath the floating mats. These mats make it difficult to fish, water ski, swim or paddle. Primary reproduction is by seed, but the stolon, a long stem attached to the underside of the leaf, can also form new plants. The rope-like stems are attached to adventitious roots on the lake's bottom (Figure 9-25). This plant prefers slow moving rivers, lakes, reservoirs and ponds.

Yellow floating heart is very difficult to control through mechanical and chemical means once it is established. Bottom barriers can be used in small areas to prevent growth. If plants are harvested or cut, all plant pieces should be removed from the water. Given the risks of herbicide use in aquatic systems, prevention is the best way of keeping yellow floating heart out of our waterways.



Identifying Yellow Floating Heart

- Shiny green leaves are heart-shaped and the size of a silver dollar.
- Leaves are arranged alternately along the stem, and oppositely on the flower stalks. Leaf margins are often rippled and purplish underneath.
- Two to five showy yellow flowers are supported several inches above the water on strong stalks.
- Flowers have 5 petals, with fringed margins, and are usually 3-5 cm in diameter. Flower generally bloom from July to September.
- Rope-like stems (Figure 9-25) are attached to adventitious roots on the lake's bottom.
- Similar plants: native spatterdock and native watershield.

- Clean, drain, and dry your boat and trailer.
- Do not release aquarium or water garden plants into the wild. Seal them in a plastic bag, and dispose of it in the trash.
- Consider using plants native to Idaho in aquariums and water gardens.
- If you detect this plant in a lake, pond, or stream, please contact ISDA or your local noxious weeds supervisor.



Figure 9-25 *Rope-like stems*

Purple Loosestrife

Lythrum salicaria

This plant is native to Europe and Asia and arrived in North America in the early 1800s as an ornamental landscape plant and through imported soil. It made its way into the Northwest in the 1980s and can be found growing in gardens, gravel pits, potholes, roadsides, stream banks, and lakes. Don't be fooled by this plant's beauty, it will wreck havoc on your landscape.

Commonly referred to as Lythrum, purple loosestrife is a robust perennial found in riparian areas and wetlands. Listed on the "Idaho Noxious Weed List," this plant poses a serious threat to riparian ecosystems by crowding out native grasses, sedges, and other flowering plants that provide a higher quality of nutrition and habitat for fish and wildlife.

Purple loosestrife spreads both by seeds and buds that are attached to its roots. Each flower spike is capable of producing up to 120,000 seeds. Because of its deep spreading roots and prolific seed production it is difficult to control and eradicate. It is often found in wetland environments, so the use of herbicides is limited to chemicals designed for aquatics. Five insect species have been approved for release in North America to manage purple loosestrife. Hand pulling and digging are effective on early established plants; however, one must be careful to dispose of all roots, stems, and seeds by burning.



Identifying Purple Loosestrife

Purple loosestrife is sometimes confused with fireweed (*Epilobium angustifolium*). Fireweed has alternate (staggered down the stem) leaves which are not shaped like a heart. Flowers of fireweed have four petals and eight stamens.

- Plant grows 6 to 10 feet tall.
- Showy flower spikes are purple to magenta with 5-6 petals each. Flowers bloom from July to September.
- The stems are square in shape but can have 4 to 8 sides. Leaves are opposite or whorled, and shaped like a long heart, similar to a willow.

Yellow Flag Iris

Iris pseudacorus

Yellow flag iris is not native to North America and is spreading rapidly throughout the United States and Canada. It is a perennial native to Europe, Great Britain, and Northern Africa. Introduced as an ornamental for garden ponds, it is still being sold commercially for that purpose. However, this plant just made its way onto “Idaho’s Noxious Weed List,” so retail distribution in Idaho will not be permitted. Purchases made out of the state and online are still a concern.

Yellow flag iris reproduces prolifically through its rhizomes and seeds. This has enabled it to escape its garden boundaries. The rhizomes of this plant form such dense clumps, that it is capable of out-competing other very aggressive wetland plants, such as the cattail. If a small rhizome fragment breaks off, it can drift with the water to another location and form a new plant. This problem is enhanced in the winter months when rhizomes are fragile and brittle and break off easily.

Yellow flag iris can be found growing in all wetland habitats: lakes, streams, rivers, and ponds. It likes very shallow water or mud and prefers part shade or full sun exposure. This plant will sometimes remain green during mild winters but will die back in harsh winter conditions with the rhizomes over-wintering just fine.

As with any weed, the control technique will depend on the size of the infestation and its location. Yellow flag spreads by rhizomes and seeds. Rhizomes can be removed by hand digging, but all plant parts need to be thoroughly removed. Just one piece of a rhizome will form a plant. Dispose of plant matter in garbage, as the rhizomes can survive being dried out for a considerable time. Removing flowers and seed pods can greatly reduce the spread of this plant. Seeds are buoyant due to gas inside a hard outer shell. This allows the seed to float downstream, finding a new location to grow. Shade will also reduce seed germination, so covering or mulching where plants have been removed is effective.

Chemical control has been effective, but because these plants grow close to water, contacting your local weed specialist is highly recommended. Given the risks of herbicide use in aquatic systems, prevention is the best way of keeping yellow flag iris out of the waterways.



Photo 9-26 Rhizomes

Identifying Yellow Flag Iris

- Showy yellow flowers that bloom in late spring or early summer. Flower petals are often streaked with brown/purple lines.
- Thick rhizomes that break into pieces easily. Rhizomes are often found close to the surface.
- Leaves stand erect or bend at the top with shorter leaves appearing toward the outside of the plant.
- When not in bloom, yellow flag iris can be mistaken for the common cattail.



Quagga/Zebra Mussels

Dreissenids

Quagga and zebra mussels (*Dreissena bugensis* and *Dreissena polymorpha*, respectively), known as the dreaded *Dreissenid* species, are native to the Black and Caspian Seas in eastern Europe. Quagga and zebra mussels are freshwater, bivalve mussels that were introduced to North America via trade and transport (from the ballast of an ocean-going ship) and first discovered in the Great Lakes region in the mid-1980s. Since then, the shelled devils have been marching across the nation, east to west, north to south.

Dreissenids are dreaded because of their ability to wreck things—aquatic ecosystems, water and irrigation intakes, hydropower facilities, docks and local infrastructure. These mussels are filter feeders, so they impact ecosystems by filtering the nutrients required by the entire food chain. Over time, it becomes hard for native species to outcompete the invaders for the resources available. One mussel can filter up to one liter of water per day!

Dreissenids have small byssal threads that allow them to stick to hard surfaces and multiply (Figure 9-30). Often, mussels are found in large colonies, sticking on top of each other. For both species, color patterns vary widely with black, cream, or white bands.

Note: Quagga and zebra mussels attach themselves to hard surfaces, native mussels do not, so if you see a mussel attached, report it immediately!!



Figure 9-27 Water intake pipe clogged with quagga mussels.

Until 2007 the West was seemingly still free of these invasive and highly transportable mollusks. In January of 2007 quagga mussels were discovered at Lake Mead in Nevada. Since then, they have spread to Arizona, California, Colorado, and Utah.

Dreissenids ability to rapidly colonize hard surfaces causes serious problems to our local economies. Even people who don't recreate or use surface water for drinking or irrigation can still be seriously affected. Utility rates can increase due to the extra amount of work and maintenance at hydropower facilities, water treatment plants, and wastewater facilities. Food costs can increase due to the farmer's extra efforts required to keep irrigation pipes free and clear of quagga and zebra mussels. Recreation-based industries and activities could also be impacted: docks, breakwater walls, buoys, boats, and beaches becoming heavily colonized by *Dreissenid* mussels. **According to the Idaho Species Invasive Species Council, these mussels would cost Idaho up to \$100 million a year in maintenance costs!**

Many people are curious about the differences between quagga and zebra. Quagga mussels are larger and colonize deeper depths (up to 500') while the zebra mussels prefer cooler temperatures. They do the same thing however: attach themselves to every hard surface, filter nutrients, and multiply like mad.



Figure 9-28 Quagga/Zebra mussel comparison

A mature female quagga or zebra mussel, in the right conditions, is capable of producing up to one million eggs *per season*. To date, there are no “silver bullet” solutions to *Dreissenids* eradication. The best solution to the quagga/zebra problem is PREVENTION! In 2009 Idaho implemented a user-fee Aquatic Invasive Species sticker program to fund mandatory boat inspection stations to keep *Dreissenids* out. Be on the watch for these stations each summer. Let's all be part of the preventative solution!



Photo 9-29 Pile of zebra mussels removed from the Mississippi River.



Figure 9-31 Image using dime to demonstrate size of quagga and zebra mussels.



Figure 9-30 Image showing byssal threads.



Figure 9-32 Clogged intake pipe.

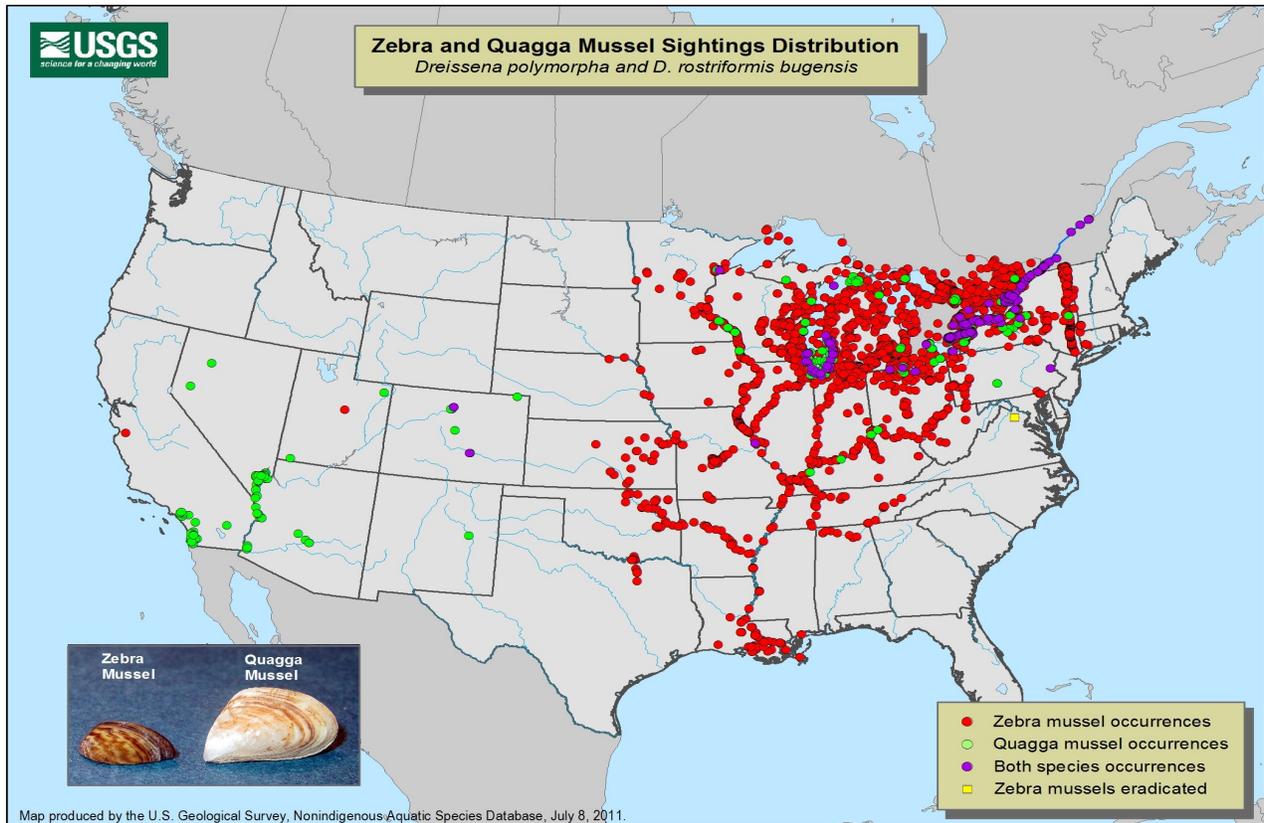


Figure 9-33 2011 map showing nationwide infestations

Crayfish

Crayfish are eco-engineers and are amongst the most impactful of aquatic invasive species. They can wreak havoc on aquatic systems by destabilizing banks, shredding vegetation, and increasing turbidity. The virile crayfish was recently identified in Lake Pend Oreille.



Figure 9-34 A native to the Idaho Panhandle, the signal crayfish (*Pacifastacus leniusculus*)

Crayfish are most frequently introduced from aquariums and by the use of live bait.

- Never release aquarium pets into the environment. Dispose of unwanted crayfish humanely by placing them in water and freezing them.
- **Live bait is prohibited in Idaho, except for live crayfish that have been caught on the body of water being fished.**
- Learn how to identify crayfish using the USGS Fact Sheet on Invasive Crayfish in the Pacific Northwest (<http://pubs.usgs.gov/fs/2011/3132/>)

- The only crayfish native to the Idaho panhandle.
- Up to 6 inches in length
- Top of claw is smooth with white band

Invasive Crayfish

If you see something suspicious, call the Idaho Invasive Species Hotline at 1-877-336-8676.



Red swamp crayfish (*Procambarus clarkii*)



Virile (Northern) crayfish (*Orconectes virilis*)



Rusty crayfish (*Orconectes rusticus*)



Ringed crayfish (*Orconectes neglectus*)

Asian Clam

Corbicula fluminea

Asian clam (*Corbicula fluminea*) is an invasive bivalve from Asia that has spread rapidly in lakes, canals, streams, rivers and reservoirs throughout North America. Asian clam is known to aggressively out compete native invertebrates, limit phytoplankton, foul water intakes, add nitrogen and phosphorus to systems, and impact aesthetic and recreational values of public beaches, lake front properties and swimming areas.

The Asian clam has high rates of filtration, metabolism, reproduction and tolerance which provide them a wide range of habitats. Producing 2,000 juveniles per day, Asian clam quickly colonize and invade areas by creating “beds” (Figure 9-35). The clam excretes high levels of nitrogen and phosphorus into the water and bottom sediments, which stimulates the growth of certain algae (Figure 9-38). They also filter high volumes of water, removing nutrients and food sources vital to other native species, especially fish populations. They are capable of both filter feeding (feeding from the water) and pedal feeding (feeding directly from the sediment), which is why Asian clam is so successful in so many different environments. In cool regions they grow to be as large as 28 millimeters, but in warmer systems they are as large as 55 mm. They are found at water depths of 5 to 250 feet (2 to 80 meters), and within the sediments buried in up to 7 inches below the surface.

Asian clams emit a unpleasant odor as they die and decompose. Once dead, their shells fragment, wash up on the beaches and make walking barefoot precarious for beach goers. Additionally, scientific studies predict that high levels of calcium produced by the clams could provide an environment conducive to the introduction of quagga and zebra mussels



Figure 9-36 Asian Clam



Figure 9-37 Peeling shell produces white spots

Identifying Asian Clam

- The outside of the shell is normally yellow-green, but color can flake, leaving white spots (Figure 9-37)
- Shell has deep concentric rings (Figure 9-36)
- The inside of shell is polished and slightly purple and there will be 3 cardinal and 2 lateral teeth (Figure 9-36)
- Usually not more than 1.5 inches wide (Figure 9-38)



Figure 9-35 Asian clams forming a “bed.”

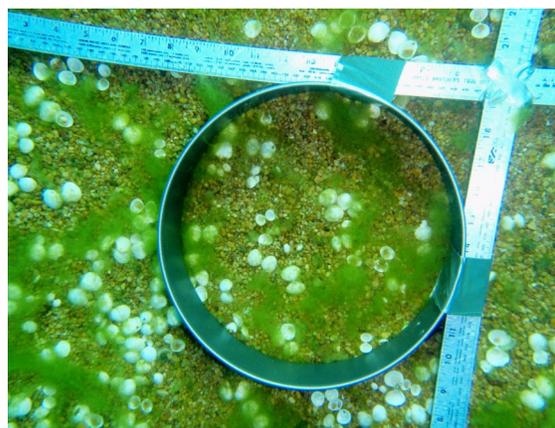


Figure 9-38 Measurement taken in clam bed; typical algae bloom found growing with clams

Didymo

Didymosphenia geminata

Native to northern North America and Europe, *Didymosphenia geminata*, also known as “didymo” or “rock snot,” is rapidly spreading and invading streams in several western states. Unfortunately, it appears that primary carriers of didymo include fishing equipment and waders, boats, dogs and just about anything that may come in contact with didymo infested water.



Didymo is a microscopic alga known as a diatom that can smother entire stream beds with mats as thick as eight inches and can ruin just about any river or creek. In areas where didymo is found, it has been documented that there is widespread loss of most aquatic insect species, and fish populations decline or move elsewhere.

Didymo can be found on rocks in moving water and is **often mistaken for fiberglass or toilet tissue**. Unlike most other algae, didymo feels like wet cotton and isn't slimy. It is generally brown, tan or yellow in color.

Preventing the Spread

Disinfect your boat, trailer, boots and other gear before entering a new body of water. Felt waders have recently been banned in several states (Maryland, Vermont, and Alaska) due to this invasive. Remember, you can't see individual didymo cells, so **thoroughly disinfect all of your equipment**.

Clean

Remove all plants, animals, and mud. Thoroughly wash everything, including crevices and other hidden areas.

Drain

Thoroughly drain your boat before leaving the area, including wells, ballast, and engine cooling water.

Dry

Allow time for your boat to completely dry before launching in other waters.

Cleaning Tips

Non-absorbent items

- Detergent - soak or spray all surfaces for at least one minute in 5% dishwashing detergent (2 cups detergent with water added to make 2.5 gallons).
- Bleach - soak or spray all surfaces for at least one minute in 2% household bleach (1 cup of bleach with water added to make 3 gallons).
- Hot water - soak for at least one minute in very hot water kept above 140° F (hotter than most tap water) or for at least 20 minutes in hot water kept above 113° F (uncomfortable to touch).

Absorbent items require longer soaking times to allow thorough saturation. For example, felt-soled waders require:

- Hot water - soak for at least 40 minutes in hot water kept above 113° F.
- Hot water plus detergent - soak for 30 minutes in hot water kept above 113° F containing 5% dishwashing detergent.
- Freezing any item until solid will also kill didymo.

Drying will kill didymo, but slightly moist didymo can survive for months. To ensure didymo cells are dead by drying, the item must be completely dry to the touch, inside and out, then left dry for at least another 48 hours before use. If cleaning or drying is not practical, restrict equipment to a single waterway.

Dispose of cleaning waste far away from waterways!

Resource Directory

Bonner County

Bonner Soil and Water Conservation District

1224 Washington Ave, Suite 101
Sandpoint, ID 83864
208 263-5310

Bonner County Noxious Weed Control Department

State and Tribal

Idaho Department of Environmental Quality (IDEQ)

2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422
www.deq.idaho.gov/

Idaho State Department of Agriculture

2270 Old Penitentiary Rd
Boise, ID 83712
(208) 332-8500
Mailing Address:
P. O. Box 790
Boise, ID 83701-0790

Idaho Parks and Recreation

PO Box 83720
Boise, ID 83720-0065
(208) 334 - 4199
www.parksandrecreation.idaho.gov/

Idaho Invasive Species Council

www.invasivespecies.idaho.gov

Idaho Department of Lands

2550 Highway 2 West
Sandpoint, ID 83864
(208) 263-5104
www.idl.idaho.gov

University of Idaho Extension

www.extension.uidaho.edu/mg/resources
www.uidaho.edu/cda/idah2o

Federal

United States Department of Agriculture (USDA)

www.usda.gov

National Invasive Species Council

<http://www.invasivespecies.gov/>

Websites

National Oceanic Atmospheric Administration (NOAA)

www.oar.noaa.gov/oceans/t_invasivespecies

Aquatic Plant Identification

Center for Aquatic and Invasive Plants
<http://plants.ifas.ufl.edu/>

NRCS/USDA Invasive Species Technical Notes
<http://www.mt.nrcs.usda.gov/technical/ecs/invasive/technotes/>

Quagga/Zebra Mussels

100th Meridian Initiative
100thMeridian.org

Stop Aquatic Hitchhikers!
Protectyourwaters.net

Invasive Species Council
www.invasivespecies.idaho.gov

Idaho Parks and Recreation
www.parksandrecreation.idaho.gov/

RISK ASSESSMENT WORKSHEETS

Aquatic Invasive Species

The assessment table below will help you identify potential environmental risks. For each question indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Worksheet** on the page 9-25 and record your medium and high-risk practices. Your goal is to lower your risks. Use the BMP recommendations to help you determine the best solution.

| | LOW RISK | MEDIUM RISK | HIGH RISK | YOUR RISK |
|---|---|--|--|--|
| Early Detection | Knowledgeable in AIS identification and routinely monitor the lake. | Know that Eurasian watermilfoil is a problem, but don't know how to tell it apart from other water plants. | Don't know why aquatic invasive species are a problem and never think about it. | <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High |
| Aquatic Weed Control | Always contact weed specialist before addressing aquatic plant problems on my property. | Pull, dig, or cut aquatic plants throughout the season. (Some plants may spread with pulling, digging, or cutting) | Use herbicides to control aquatic weeds around my dock, without consulting a weed specialist. | <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High |
| Boat & Trailer Inspection and Cleaning | Always clean and inspect boats and equipment before and after launching, to prevent spreading aquatic invasive species to other water bodies. | Check boats and equipment only when time allows. | Never clean and inspect boats and equipment. | <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High |
| Shoreline Vegetation | Have preserved or added native plants along my shoreline in order to reduce maintenance, provide wildlife habitat, filter nutrients, and prevent erosion. | Lawn stretches all the way to waters edge, but <i>don't</i> use fertilizers or apply herbicides within 25 ft of water. | Lawn stretches all the way to waters edge, and regularly mow, fertilize, and apply herbicides. | <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High |

ACTION WORKSHEET

Aquatic Invasive Species

| Write all high and medium risks below. | What can you do to reduce the risks? | Set a target date for action. |
|--|--|---|
| <i>Sample:</i> Don't know how to identify Eurasian watermilfoil. | Look at identification books and materials, then go out and get hands wet looking at the real thing. Hopefully you can't find any! | When plants begin emerging in mid July. |
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Notes

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