

# POCKET GUIDE

## AQUATIC NUISANCE SPECIES



# GREATER YELLOWSTONE ECOSYSTEM



**“Transcending boundaries in one of America’s most treasured ecosystems”**

**This guide is intended to increase awareness of aquatic nuisance species (ANS) and aquatic invasive species (AIS) within the Greater Yellowstone Area (GYA). The GYA encompasses Grand Teton and Yellowstone National Parks; Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer, Gallatin, and Shoshone National Forest areas; the National Elk Refuge and the Redrock Lakes Wildlife Refuge; and their gateway communities in the states of Idaho, Montana, and Wyoming.**

**It was made possible through funding from the National Fish and Wildlife Foundation, Jackson Hole One Fly, and members of the Aquatic Invasive Species Subcommittee of the Greater Yellowstone Coordinating Committee. The AIS Subcommittee includes representatives from federal, state, and county agencies, and non-profit organizations.**

Prepared by Diane McGee and Susan O'Ney  
Grand Teton National Park

Special thanks to the  
**MADISON RIVER**  
-FOUNDATION-

for funding the final, printer-ready design.  
Design by Random Acts of Creativity, Virginia City, MT

**COVER PHOTOS - TOP TO BOTTOM**  
Brazilian waterweed ~ Nature Conservancy  
New Zealand mudsnail ~ United States Geological Survey  
Zebra mussel ~ United States Geological Survey  
Rusty crayfish ~ United States Geological Survey

PUBLISHED 2010

The information in this guide was obtained from a number of sources including:

AIS Working Group [www.cleaninspectdry.com](http://www.cleaninspectdry.com)

Federation of Fly Fishers [www.fedflyfishers.org](http://www.fedflyfishers.org)

Global Invasive Species Database, managed by the Invasive Species Specialist Group [www.issg.org](http://www.issg.org)

Gulf States Marine Fisheries Commission <http://nis.gsmfc.org>

Michigan Department of Natural Resources [www.michigan.gov](http://www.michigan.gov)

National Aquatic Invasive Species Database <http://nyis.info>

National Institute of Invasive Species Science [www.niiss.org](http://www.niiss.org)

100th Meridian Initiative [www.100thmeridian.org](http://www.100thmeridian.org)

Ontario Ministry of Natural Resources [www.invadingspecies.com](http://www.invadingspecies.com)

Protect Your Waters [www.protectyourwaters.net](http://www.protectyourwaters.net)

Sea Grant – Michigan [www.miseagrant.umich.edu](http://www.miseagrant.umich.edu)

Sea Grant – Minnesota [www.seagrant.umn.edu](http://www.seagrant.umn.edu)

Sea Grant – Oregon <http://seagrant.oregonstate.edu>

Trout Unlimited Whirling Disease Foundation  
[www.tu.org/science/aquatic-invasive-species-ais](http://www.tu.org/science/aquatic-invasive-species-ais)

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

USGS Nonindigenous Aquatic Species <http://nas.er.usgs.gov>

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### WHAT ARE AQUATIC NUISANCE SPECIES?

Aquatic Nuisance Species are nonnative organisms, either aquatic or terrestrial, introduced into rivers, lakes, and streams across the country. They generally have no natural predators, so their populations grow unchecked. Once established, these species cause irreparable harm: introducing disease; out-competing native species; altering food chains; changing the physical characteristics of bodies of water; damaging equipment; devastating water-delivery systems; and negatively impacting local and national economies.

### PREVENTION REMAINS OUR BEST DEFENSE!

You could be transporting these invasive species. They can hitchhike a ride to other waters on your equipment – ruining your favorite lakes, rivers and streams in the Greater Yellowstone Area (GYA). This affects everyone! The GYA drains into the Columbia, Mississippi, and Great Basins. Invasions into these waters have the potential to affect most of the country. We need to stop the spread of aquatic nuisance species currently found in the GYA and protect it from new invasions.



Please prevent introduction or spread in GYA waters.

**CLEAN, INSPECT & DRY  
ALL RECREATIONAL EQUIPMENT**

### WHAT CAN YOU DO?

Follow a general set of procedures every time you come in contact with any body of water – CLEAN, INSPECT, DRY. By doing so, you can protect waters that you use and enjoy from harmful aquatic plants or hitchhikers. Some of these unwanted hitchhikers may be so tiny that you cannot see them, but they can live in mud, dirt, sand, and on plant fragments.

#### Clean

- Before leaving any water, clean your equipment such as boats, motors, trailers, anchors, decoys, floats, nets, boots, and waders.
- Remove any visible plants, fish or animals.
- Remove mud, dirt, scum, etc. since it may contain unwanted hitchhikers.
- Remove plant fragments that may be able to start new plant populations or contain unwanted hitchhikers.

#### Inspect

Before leaving any water, it is important to examine all your equipment, boats, trailers, clothing, boots, buckets, etc. for hitchhikers, mud, and plants.

#### Dry

Eliminate water from all equipment before transporting anywhere. Much of the recreational equipment used in water contains many spots where water can collect and potentially harbor these aquatic hitchhikers. If possible, allow for 5 days of drying time before entering new waters.

### ADDITIONAL PRECAUTIONS

Do not release or put plants, fish or animals into a body of water unless they came out of that body of water.

Do not release unused live bait into the waters you are fishing.

Be aware of any bait regulations, because in some waters, it is illegal to use live bait.

Please check local regulations:

Idaho Fish & Game: (208) 334-3700

<http://fishandgame.idaho.gov>

Montana Fish, Wildlife & Parks: (406) 444-2535

<http://fwp.mt.gov>

Wyoming Game & Fish: (307) 777-4600

<http://gf.state.wy.us>

Wash your dog with water as warm as possible and brush its coat.

### REPORTING PROCEDURE

This guide book is not intended to be an identification guide. However, if you think you have found an aquatic nuisance species in the GYA whose location is not already noted in this guide, please report it. It is an important step in managing these species.

**If possible, please take a photo & document the location details (such as with GPS)**

**Report Your Finding  
Call 1-877-StopANS**

### SPECIES IN THE GREATER YELLOWSTONE AREA

This guide includes several nuisance species of concern. There are many others throughout the country and around the world that cannot be included in this guide but could be a problem if they made their way into the GYA.

At the time of publication of this guide, these species have been confirmed to be present in the GYA (see species location details in this guide): didymo (algae); North American bullfrog (amphibians); New Zealand mudsnails and the red-rim melania snail (invertebrates-snails); and whirling disease and chytrid fungus (pathogens).

The following symbols will be used throughout this guide book:

 = Present in the GYA

 = Presence is unknown in the GYA

### ACRONYMS USED THROUGHOUT THIS GUIDE BOOK:

<b>GYA</b>	Greater Yellowstone Area
<b>GTNP</b>	Grand Teton National Park
<b>USGS</b>	United States Geological Survey
<b>YNP</b>	Yellowstone National Park



PHOTO: GRAND TETON NATIONAL PARK



PHOTO: GRAND TETON NATIONAL PARK

**COMMON NAMES** Didymo, rock snot  
**SCIENTIFIC NAME** *Didymosphenia geminata*

**DESCRIPTION-** Native in the GYA. Freshwater algae that attaches to rocks, plants, or other stable underwater surfaces and can form large “nuisance blooms”. Brownish yellow to white in color; colonies or mats of didymo look like sewage sludge or wet tissue paper. It appears slimy, but to the touch it feels like wet wool.

**HABITAT-** Shallow waters of freshwater streams and rivers; sunny open areas with stable water flows of moderate to high current; and below outlets of lakes and reservoirs.

**LOCATION IN THE GYA-** GTNP: Lake Creek within the Laurance S. Rockefeller Preserve; Wyoming: Little Greys River in the Greys River Drainage, Fish Creek in the Gros Ventre River drainage, Upper Green River.

**PATHWAY OF INTRODUCTION AND SPREAD-** A single cell can multiply to form new colonies. Spreads by attaching to boats, boat trailers, and other equipment like fishing and diving gear and waders (especially neoprene and felt-soled waders).

**IMPACTS-** “Nuisance blooms” out-compete other stream organisms, such as aquatic plants, insects, and trout populations. Its range is expanding and forming nuisance growths in streams, and the potential impacts on new waters is a concern. Economic impacts include fouling of water pipes and a potential link to a decline in fisheries. The growths become snagged in fishing gear and make swimming areas unappealing.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment, especially fishing gear.



PHOTO: JEFFREY LOVICH/USGS



PHOTO: GARY NAFIS CALIFORNIAHERPS.COM

**COMMON NAMES** Bullfrog, North American bullfrog  
**SCIENTIFIC NAME** *Rana catesbeiana*

**DESCRIPTION-** The largest frog in the U.S. with a distinctive fold of skin extending from the eye to the ear. Adults weigh up to one pound and can be over 7 inches in length; tadpoles are large, up to 6 inches long. Color varies from dull green or olive to brown, with dark blotches on the back and legs; underbelly is cream or yellow colored.

**HABITAT-** Warm lakes, ponds, cattle tanks, bogs, and sluggish portions of streams and rivers.

**LOCATION IN THE GYA- GTNP:** Kelly Warm Springs

**PATHWAY OF INTRODUCTION AND SPREAD-** Spread when they escape from aquaculture farms, ornamental ponds or are released from aquariums.

**IMPACTS-** Adults have an enormous appetite and can eat anything they can catch and swallow, including birds, fish, crustaceans, bats, snakes, turtles, and other frogs. A high reproduction rate and limited predation allow it to quickly establish itself and dominate a variety of native species causing their decline.

**WHAT YOU CAN DO-** Do not release an unwanted pet into natural areas. Donate it to a local school, hospital, library, nursing home; give it to family, friends, or neighbors; or ask your local pet store for advice.



PHOTO: ANN MURRAY, UNIVERSITY OF FLORIDA / IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.



PHOTO BY W.T. HALLER, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.

COMMON NAMES	Brazilian waterweed, Brazilian elodea, waterweed
SCIENTIFIC NAME	<i>Egeria densa</i>

**DESCRIPTION-** Submerged, perennial, rooted aquatic plant, generally bright green; white flowers emerge during summer and fall.

**HABITAT-** Shallow waters of freshwater lakes, streams, ponds, and ditches.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced through the dumping of aquarium contents into waterways. It can spread between waters via plant fragments that attach to boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Forms dense stands over very large areas, restricting water movement, trapping sediment, and causing changes in water quality. Severe infestations may impair recreational uses including boating, fishing, swimming, and water skiing. It can also infest water intake structures in hydropower reservoirs.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.



PHOTO: VIC RAMEY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.



PHOTO: ANN BOVE ©2002

COMMON NAMES	Curly leaf pondweed, curly pondweed, curly-leaved or crispy-leaved pondweed
SCIENTIFIC NAME	<i>Potamogeton crispus</i>

**DESCRIPTION-** Submerged, perennial, rooted aquatic plant; green to red brown in color; leaf edges are wavy; flowers between May and June that are red-brown in color.

**HABITAT-** Freshwater lakes, rivers, streams, ponds, ditches, and canals, but also brackish (salty) waters; rooted in silt or clay, and sometimes gravel or sand.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced intentionally when planted for waterfowl and wildlife habitat. The plant can spread between waters via plant material such as plant fragments or fruit that are transported with boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Forms dense stands that cover and dominate large areas, crowding out other species, impeding water flow, and potentially altering oxygen levels with impacts on fish. Can impact water recreational activities when colonies restrict access to docks and sport fishing areas and piles of dying curly leaf pondweed cover shorelines.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump unwanted plants into natural areas. Put discarded plants into a plastic bag and throw away in the trash.



PHOTO: RICHARD R. OLD, [WWW.XIDSERVICES.COM](http://WWW.XIDSERVICES.COM)



PHOTO: ALISON FOX, UNIVERSITY OF FLORIDA, [WWW.BUGWOOD.ORG](http://WWW.BUGWOOD.ORG)

COMMON NAME Eurasian water-milfoil  
SCIENTIFIC NAME *Myriophyllum spicatum*

**DESCRIPTION-** Submerged, perennial aquatic plant; green feather-like leaves and stem brownish-red to light green; flowers between late July and early August with pink petals.

**HABITAT-** Found in freshwater lakes, ponds, and slow moving areas of rivers and streams, and can tolerate somewhat salty waters.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced through the dumping of aquarium contents into waterways. Motorboat traffic contributes to natural fragmentation and the distribution of fragments throughout lakes. It can spread between waters via plant material that attaches to boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Competes aggressively to displace and reduce the diversity of native aquatic plants. Spring growth begins earlier than other aquatic plants and quickly grows to the surface, forming dense canopies that overtop and shade the surrounding plants. Dense beds restrict swimming, fishing and boating, clog water intakes and result in decaying mats that foul lakeside beaches.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.

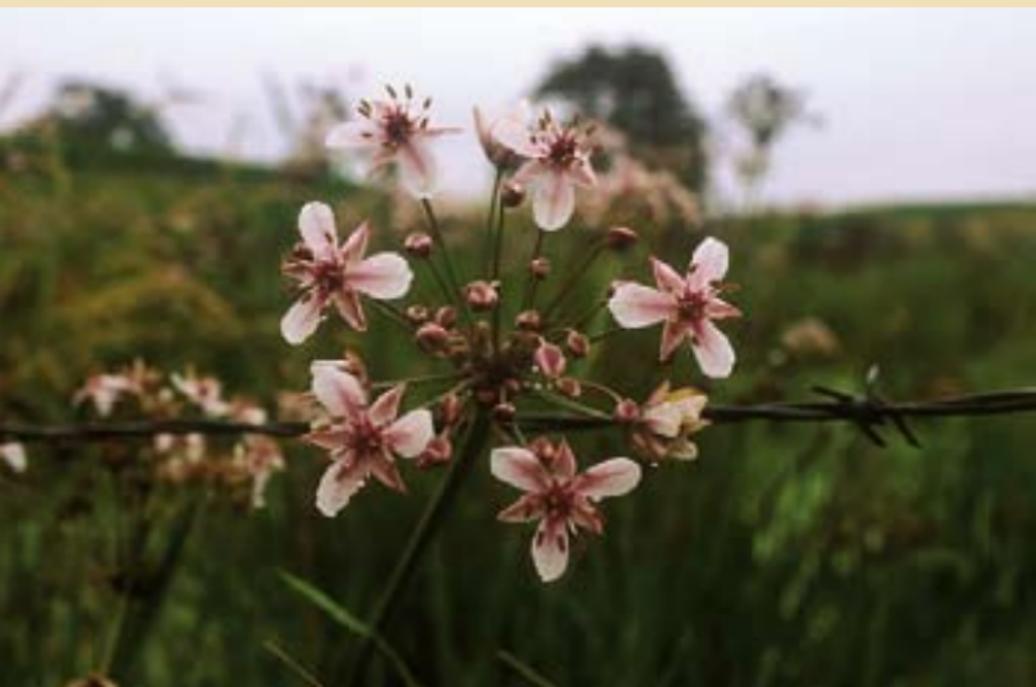


PHOTO BY ANN BOVE, ©2002



PHOTO: MANDY TU/THE NATURE CONSERVANCY/GLOBAL INVASIVE SPECIES DATABASE

COMMON NAME Flowering rush  
SCIENTIFIC NAME *Butomus umbellatus*

**DESCRIPTION-** Perennial aquatic plant partly submerged in water, partly above water surface; green linear leaves up to 4ft long; pink flowers emerge in a whorl on a tall stalk during summer and fall.

**HABITAT-** Shallow, freshwater lakes, rivers, marshes, ponds, and wet ditches.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced as a garden plant for ornamental purposes. It can spread between waters via dispersal of seeds, root fragments, and bulbils transported with boats, boat trailers, and other equipment like fishing or diving gear. Any of this plant material is capable of growing into a new plant.

**IMPACTS-** Can displace native riparian vegetation. Its very wide range of hardiness makes it capable of being widely invasive. It can hinder recreational uses of water.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump unwanted plants into natural areas. Put discarded plants into a plastic bag and throw away in the trash.



PHOTO: JAKE JARVIS WWW.RAWUTAH.COM



PHOTO BY A. MURRAY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.



COMMON NAMES	Parrot feather, Brazilian watermilfoil, water-feather
SCIENTIFIC NAME	<i>Myriophyllum aquaticum</i>

**DESCRIPTION-** Submerged, perennial aquatic plant; feather-like leaves are bright green in color; flowering occurs in spring and sometimes fall with inconspicuous white flowers.

**HABITAT-** Slow-moving water in rivers, lakes, ditches and ponds; stems may grow along shorelines in wet soils and can survive periods with lower water levels.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced to the U.S. as an ornamental pond plant and has been dumped into waterways. It can spread between waters via plant fragments that attach to boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Forms dense stands over large areas, shading out other organisms. Interferes with irrigation and drainage canals and restricts recreational activities.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump unwanted plants into natural areas. Put discarded plants into a plastic bag and throw away in the trash.



PHOTO: VIC RAMEY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.

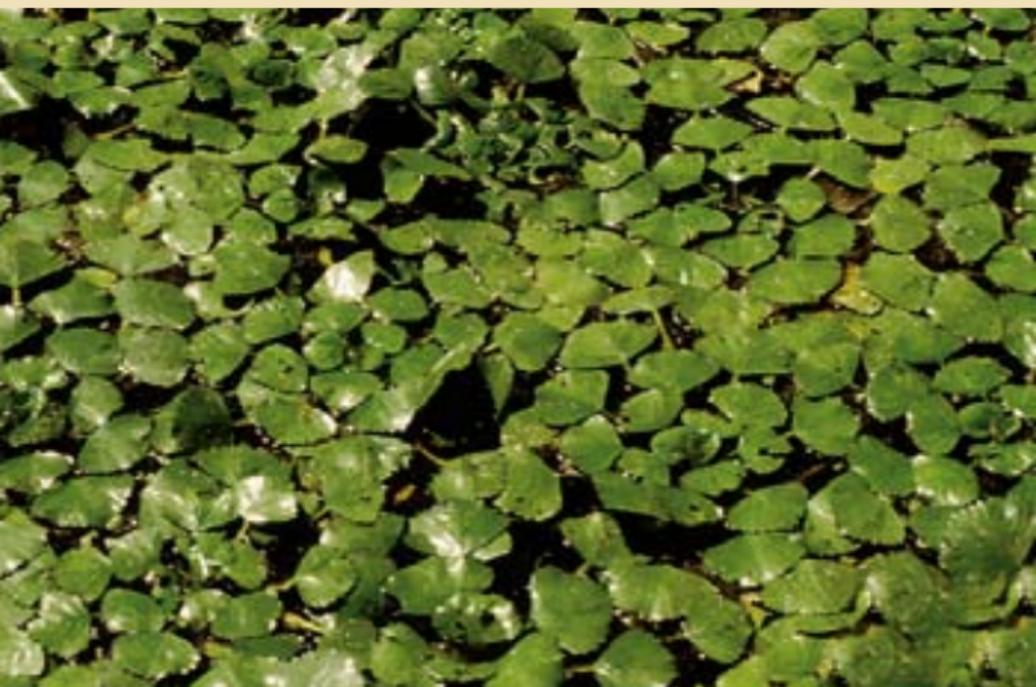


PHOTO: VIC RAMEY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.

COMMON NAMES	Water chestnut, European water chestnut, water nut, water-caltrop
SCIENTIFIC NAME	<i>Trapa natans</i>

**DESCRIPTION-** Floating, annual aquatic plant, rooted in substrate or free-floating; rosette of floating, fan-shaped leaves, each leaf having a slightly inflated stem; flowering begins in the summer with small, white flowers.

**HABITAT-** Generally found in open and still waters, flood canals, rivers, lakes, reservoirs and swamps.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced to the U.S. as an ornamental pond plant and has been dumped into waterways. It can spread between waters via plant material such as fragments, fruits or seeds that are transported with boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Forms dense, large floating mats, shading out submerged plants and other organisms, and interfering with recreational activities such as boating, fishing and swimming; a hard nut with barbed spines accumulates on shore and can cause injury when stepped on.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump unwanted plants into natural areas. Put discarded plants into a plastic bag and throw away in the trash.



PHOTO: VIC RAMEY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.



PHOTO: DON C. SCHMITZ, FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION .

COMMON NAMES	Water thyme, hydrilla, water weed, Florida elodea
SCIENTIFIC NAME	<i>Hydrilla verticillata</i>

**DESCRIPTION-** Submerged, perennial, rooted aquatic plant; green leaves with serrated edges grow in a circular pattern; flowers during summer and fall that are either whitish to reddish in color or light green with red streaks.

**HABITAT-** Rivers, lakes, ponds, streams, and wet ditches, in shallow waters but also at depths greater than 23 ft.; found in freshwater but can tolerate mildly salty water.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced by dumping of aquariums. The plant can spread between waters via plant material such as plant fragments or buds that are transported with boats, boat trailers, and other equipment like fishing or diving gear, which can give rise to new plants.

**IMPACTS-** Forms tall and dense stands in the water column, blocking sunlight penetration, potentially displacing other aquatic organisms, and impeding water flow. Heavy growth commonly obstructs boating, swimming, fishing, and other recreational activities and also blocks the withdrawal of water used for power generation and agricultural irrigation.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.



GOLDFISH (*CARASSIUS AURATUS*)

PHOTO: M.E. BROWN USGS



ROUND GOBY (*NEGOBIUS MELANOSTOMUS*) PHOTO: ERIC ENGBRETSON - US FISH & WILDLIFE SERVICE

Many species of fish have been introduced to areas outside of their native ranges. For more information on nonnative fish in the GYA, contact the local Fish & Game office:

Idaho Fish & Game: (208) 334-3700

<http://fishandgame.idaho.gov>

Montana Fish, Wildlife & Parks: (406) 444-2535

<http://fwp.mt.gov>

Wyoming Game & Fish: (307) 777-4600

<http://gf.state.wy.us>

**PATHWAY OF INTRODUCTION AND SPREAD-** Personal aquarium dumping, escape from aquaculture pens, bait bucket release, the live seafood trade, ship ballast water dumping, and other activities. Fish species are frequently introduced intentionally for recreational sportfishing.

**IMPACTS-** The impact of nonnative fish on new ecosystems is not fully understood. Impacts vary substantially and generally depend upon the life history traits of each nonnative fish species and their interaction with native species. Introduced fish often alter aquatic ecosystems through competition with and predation upon native species. This can decrease populations of native fish and other aquatic organisms. Some nonnative fish can reproduce with native fish, affecting the purity of the native fish population genetics. Nonnative fish that feed on and remove aquatic plants can alter aquatic habitat in lakes, rivers, and streams.

**WHAT YOU CAN DO-** Unused bait or bait packaging should not be released into the water. Put it in a plastic bag and throw away in the trash. Be aware of any bait regulations, because in some waters, it is illegal to use live bait. Do not release or put fish into a body of water unless they came out of that body of water. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them, give them away, or ask your local pet store for advice. Otherwise, put unwanted aquarium fish in a plastic bag and throw away in the trash.



PHOTO: USGS



PHOTO: JASON GOECKLER, KANSAS WILDLIFE AND PARKS

COMMON NAMES	Asian clam, Asiatic clam, prosperity clam
SCIENTIFIC NAME	<i>Corbicula fluminea</i>

**DESCRIPTION-** Small freshwater clam that is triangular in shape; color is yellowish-to blackish-brown.

**HABITAT-** Found in fresh water at the sediment surface or slightly buried; prefers fine clean sand, clay, and coarse sand, although this species may be found on most any underwater surface.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced into the U.S. as a food item for humans. Spread by the aquaculture industry and aquarium dumping. Bait buckets, live wells, bilge water, boat hulls/motors/trailers, and other equipment like fishing gear or diving equipment, could potentially be contaminated with clams or free-floating larvae and be transported between waters.

**IMPACTS-** Filters suspended matter from the water column, which significantly increases water clarity, leads to excessive plant growth and alters lake nutrient regimes. It may compete with native mollusks for food and habitat. The clam can infest and interfere with irrigation systems and canals, and block water flow through industrial raw water intake pipes.

**WHAT YOU CAN DO-** CLEAN, INSPECT and DRY all recreational equipment. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.



PHOTO: UNITED STATES BUREAU OF RECLAMATION

**SIDE VIEW**

Few or no zigzagged stripes



Convex ventral surface

**BOTTOM VIEW**

No pronounced ridge



Bilaterally asymmetrical;  
curved mid-ventral line

PHOTO: MICHIGAN SEA GRANT  
WWW.MISEAGRANT.UMICH.EDU

PHOTO: MYRIAH RICHERSON, USGS

COMMON NAME Quagga Mussel  
SCIENTIFIC NAME *Dreissena rostriformis bugensis*

**DESCRIPTION-** Small, variably striped, freshwater mussel up to 3 cm long; color is usually pale and may have colored bands, bars, or few to no zigzagged stripes.

**HABITAT-** Found in freshwater lakes, reservoirs, ponds, and slow-moving or sluggish rivers; attaches to hard surfaces such as rocks, docks, cement, wood, and aquatic vegetation or may partially bury itself into soft sediments.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced to the U.S. by ballast water carried by commercial vessels and potentially on fouled ship hulls. Larval stage and adult mussels spread between waters when they are transported in bait buckets, live wells and bilge water or attached to boat hulls/motors/trailers and other equipment like fishing or diving gear or on attached aquatic plants. Adult quagga mussels can survive for up to 22 days out of water with the right conditions.

**IMPACTS-** Forms colonies in great numbers and filters large quantities of plankton from the water. This decreases the food supply for native organisms and increases water clarity, which changes the makeup of plants and other organisms, including fish. These mussels pollute swimming areas with sharp shells and can cause damage to boating equipment. They can damage water intake pipes causing significant cost and safety concerns to industry and municipal water users.

**WHAT YOU CAN DO-** CLEAN, INSPECT and DRY all recreational equipment.



PHOTO: LAKE ERIE BAY CITY TIMES (COURTESY GREAT LAKES ENVIRONMENTAL RESEARCH LAB).

## SIDE VIEW

Zigzagged stripes



Flat ventral surface

## BOTTOM VIEW

Pronounced ridge



Bilaterally symmetrical;  
straight mid-ventral line

COMMON NAME      Zebra Mussel  
 SCIENTIFIC NAME    *Dreissena polymorpha*

**DESCRIPTION-** Small, striped, strongly ridged, freshwater mussel usually 2-2½ cm in length; color is black or brown with variable white to yellow striped or zigzagged patterns.

**HABITAT-** Found in freshwater lakes, rivers, reservoirs, and ponds; attach to submerged hard surfaces such as rocks, docks, cement, wood, and aquatic plants.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced to the U.S. by ballast water carried by commercial shipping vessels and potentially on fouled ship hulls. Larval stage and adult mussels can spread between waters when they are transported in bait buckets, live wells and bilge water, attached to boat hulls/motors/trailers and other equipment like fishing or diving gear, or on attached aquatic plants. Adult zebra mussels can survive for up to 22 days out of water with the right conditions.

**IMPACTS-** Forms colonies in great numbers and filters large quantities of plankton from the water column. This decreases the food supply for native organisms and increases water clarity, which changes the makeup of plants and other organisms, including fish. These mussels pollute swimming areas with sharp shells and can cause damage to boating equipment. They can damage water intake pipes causing significant cost and safety concerns to industry and municipal water users.

**WHAT YOU CAN DO-** CLEAN, INSPECT and DRY all recreational equipment.



PHOTO: COLIN VAN OVERDIJK/USGS



COMMON NAMES      Freshwater shrimp, scud  
SCIENTIFIC NAME      *Gammarus fasciatus*

**DESCRIPTION-** Small shrimp up to ½ inch in length; black eyes and white or transparent in color and can be confused with the native scud, *Gammarus lacustris*.

**HABITAT-** Bottom level of freshwater rivers and lakes and is particularly abundant in shallow areas. Can tolerate very low levels of salinity.

**PATHWAY OF INTRODUCTION AND SPREAD-** Means of introduction includes transport in stored water on boats, arrival on aquatic plants, arrival with stocked fish, dispersal via canals, and/or introduction via fish bait. Can spread between waters when they are transported in bait buckets, live wells and bilge water.

**IMPACTS-** It has potential to displace similar native species and alter food webs. It is an intermediate host to aquatic parasites that can infect predatory birds and fish.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment.



PHOTO: WIKIPEDIA COMMONS-DULOUP/ USGS

COMMON NAMES	Red swamp crayfish or crawfish, Louisiana crayfish or crawfish
SCIENTIFIC NAME	<i>Procambarus clarkii</i>

**DESCRIPTION-** Large (up to 4½ inches), aggressive, warm water crayfish that is usually colored a dark red with spiky, reddish dots.

**HABITAT-** Found in flowing to still freshwater swamps, wetlands, ditches, lakes, rivers, and streams with mud or sand bottoms.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduction via aquarium or garden pond dumping; release or escape of unused crayfish from bait buckets and fishing lines; accidental release from aquaculture facilities and live food trade.

**IMPACTS-** Reproduces rapidly, often dominating invaded ecosystems where it aggressively competes with native crayfish and other aquatic species for food and habitat. It is a host for parasites and diseases. Burrowing causes bank erosion and often damages irrigation structures and channels.

**WHAT YOU CAN DO-** CLEAN, INSPECT and DRY all recreational equipment. Unused bait should not be released into the water. Put it in a plastic bag and throw away in the trash. Be aware of any bait regulations, because in some waters, it is illegal to use live bait. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.



PHOTO: JEFF GUNDERSON, MINNESOTA SEA GRANT



COMMON NAME Rusty crayfish  
SCIENTIFIC NAME *Orconectes rusticus*

**DESCRIPTION-** Large (up to 4 inches), aggressive, crayfish whose color is variable but consistently has large, rust-colored spots on either side of the shell and black bands on the claw tips.

**HABITAT-** Found in freshwater lakes, rivers, and streams with rock, gravel, clay, or silt bottoms. Prefer deep pools and fast currents with cover from predators, such as rocks, logs, and debris.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduction via aquarium dumping; release or escape of unused crayfish from bait buckets and fishing lines; releases of those used as classroom science specimens.

**IMPACTS-** Eats and damages stands of aquatic plants, reducing food sources and aquatic habitat for aquatic invertebrates and fish. Often out-competes native crayfish species for food and habitat and negatively impacts fish populations through competition for food and predation on fish eggs. With their strong claws and aggressive nature, they can also pose a menace to swimmers.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Unused bait should not be released into the water. Put it in a plastic bag and throw away in the trash. Be aware of any bait regulations, because in some waters, it is illegal to use live bait. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted contents in a plastic bag and throw away in the trash.



WATER FLEA

PHOTO: TOM FERRO/USGS



SPINY WATER FLEA

PHOTO: MICHIGAN SEA GRANT,  
WWW.MISEAGRANT.UMICH.EDU



FISHHOOK WATER FLEA

PHOTO: IGOR GRIGOROVICH/  
GLOBAL INVASIVE SPECIES DATABASE

COMMON NAMES	water flea, spiny water flea, fishhook water flea
SCIENTIFIC NAMES	<i>Daphnia lumholtzi</i> , <i>Bythotrephes longimanus</i> , <i>Cercopagis pengoi</i>

**DESCRIPTION-** Predatory crustaceans that are nearly invisible to the naked eye. Most distinguishing characteristics are tail spines, some with barbs.

**HABITAT-** They inhabit a wide variety of warm water habitats including reservoirs, large rivers, river oxbows, and deep lakes. Can tolerate low levels of salinity for short periods of time.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced via ballast water discharge from commercial shipping vessels. Spread through angling and recreational boating on equipment that can be coated with eggs and adults.

**IMPACTS-** The impacts of this invader are not yet fully understood. It may compete with native fish and water fleas for food. Because of its spines, it is less likely to be eaten by fish in their larval and juvenile stages, which gives it an advantage over native water fleas.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment.



PHOTO: USGS



PHOTO: DAVE BRITTON, U.S. FISH & WILDLIFE SERVICE

COMMON NAMES	Chinese mystery snail, Oriental mystery snail, Asian apple snail, Chinese vivipara, rice snail
SCIENTIFIC NAME	<i>Cipangopaludina chinensis</i>

**DESCRIPTION-** Freshwater snail that has an operculum that acts as a lid or trapdoor and seals the shell's opening; typically camouflages itself with a dark green covering similar to moss; color is brownish to olive-green.

**HABITAT-** Found in shallow, quiet waters of ponds, marshes, lakes, canals, and slow-moving rivers with some vegetation and soft, muddy or sandy substrate.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced through aquarium dumping and accidental release from aquaculture farms. Spread if transported via bait buckets, live wells, bilge water, boat hulls/motors/trailers, and other equipment like fishing or scuba gear.

**IMPACTS-** Can compete with native snail species. Potential vectors for the transmission of parasites and diseases. Their shells can clog screens of water intake pipes.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment. Unused bait or bait packaging should not be released into the water. Put it in a plastic bag and throw away in the trash. Be aware of any bait regulations, because in some waters, it is illegal to use live bait. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a local school, hospital, library, nursing home; give them to family, friends, or neighbors; or ask your local pet store for advice. Otherwise, put unwanted aquarium contents in a plastic bag and throw away in the trash.



PHOTO: MIKE GANGLOFF/USGS



PHOTO: USGS, FISC - CENTER FOR AQUATIC RESOURCE STUDIES

COMMON NAMES	New Zealand mudsnail, Jenkins' spire snail
SCIENTIFIC NAME	<i>Potamopyrgus antipodarum</i>

**DESCRIPTION-** Small, slender, freshwater snail with an operculum that acts as a lid or trapdoor and seals the shell's opening; color is usually horn-colored but can range from light to dark brown.

**HABITAT-** Prefers disturbed watersheds, fresh and saltwater lakes, rivers, and slow-moving streams on hard or woody debris, rock and gravel surfaces, and vegetation in areas with high silt and organic matter. Tolerates temperatures from near freezing up to 82°F, so geothermally influenced areas may provide good habitat.

**LOCATION IN THE GYA-** Idaho: Buffalo River, Henry's Fork; John D Rockefeller Jr. Memorial Parkway: Polecat Creek, Snake River; Wyoming: Bighorn River near Thermopolis, Shoshone River in Cody; in/near YNP: Gardiner, Madison, Gibbon, Yellowstone, and Firehole Rivers, Nez Perce Creek.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced through ballast water and in the water of live game fish shipped from other infested waters. Spread via bait buckets, live wells, bilge water, and boat hulls/motors/trailers. Recreational equipment and shoes and clothing of bathers in thermal areas can spread snails to new waters. This species can become established in new waters with the introduction of a single individual.

**IMPACTS-** Populations can reach high densities that dominate the food source, competing with native snails. Can displace native species that other species, including fish, depend on for food.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment.



PHOTO: BILL FRANK - JACKSONVILLE, FLORIDA WWW.JAXSHELLS.ORG



PHOTO: BILL FRANK - JACKSONVILLE, FLORIDA WWW.JAXSHELLS.ORG

COMMON NAMES	Red-rim melania, Malaysian trumpet snail
SCIENTIFIC NAME	<i>Melanoides tuberculatus</i>

**DESCRIPTION-** Small freshwater tropical snail with an operculum that acts as a lid or trapdoor and seals the shell's opening; usually light brown color marked with rust colored spots.

**HABITAT-** Shallow, slow running water with bottoms of soft mud or soft mud and sand; also reported in relatively deep portions of freshwater pools with substrate composed largely of rocks; tolerant of low levels of salinity. Prefers warm water temperatures, so geothermally influenced areas may provide good habitat.

**LOCATION IN THE GYA- GTNP:** Kelly Warm Springs; Idaho: Warm Springs Creek near Dubois; Montana: Beaverhead Rock Warm Spring, Big Hole River near Dillon; YNP: Boiling River.

**PATHWAY OF INTRODUCTION AND SPREAD-** Introduced through aquarium dumping. Recreational equipment and shoes and clothing of bathers in thermal areas can spread snails to new waters. This species can become established in new waters with the introduction of a single individual.

**IMPACTS-** Displace native snails through competition for resources; transmission vector for several dangerous parasites that can infest people if infected snails were eaten by a crustacean that was then eaten raw by humans.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational and research equipment. Do not dump your aquarium contents into natural areas, storm drains, or flush them. Donate them to a public place, give them away, or ask your local pet store for advice. If not, put unwanted aquarium contents in a plastic bag and throw away in the trash.



**BOREAL TOAD BEING TESTED AND MONITORED FOR CHYTRID FUNGUS**

PHOTO: DONALD H. CAMPBELL, USGS



**VHS INFECTED FISH**

PHOTO: MOHAMMED FAISAL/USGS



**WHIRLING DISEASE INFECTED JUVENILE FISH**

PHOTO: TROUT UNLIMITED - WHIRLING DISEASE FOUNDATION

A pathogen is a microscopic organism, such as a bacteria, fungus, parasite, or virus that can be highly contagious and may cause disease and/or death.

COMMON NAME Chytrid fungus, chytrid  
SCIENTIFIC NAME *Batrachochytrium dendrobatidis*

P

**DESCRIPTION-** Fungal skin disease that infects amphibians, including frogs, toads, and salamanders

**LOCATION IN THE GYA-** Bridger Teton National Forest: Black-rock Pond; GTNP: Flagg Ranch gravel pit and Schwabacher's Landing; the National Elk Refuge (adjacent to GTNP); and YNP: Chipmunk Creek and a tributary of the Yellowstone River near the Fishing Bridge sewage treatment area.

More Information: <http://armi.usgs.gov/>

COMMON NAME Viral Hemorrhagic Septicemia (VHS)

U

**DESCRIPTION-** Virus that infects fish including cutthroat trout

More Information: <http://biology.usgs.gov/faer/vhs.html>

COMMON NAME Whirling disease  
SCIENTIFIC NAME *Myxobolus cerebralis*

P

**DESCRIPTION-** Parasite that infects fish in the trout and salmon families

**LOCATION IN THE GYA-** Montana: Madison, Gallatin, and Yellowstone rivers; Wyoming: Flat Creek in the National Elk Refuge, Upper Green River, Palisades Reservoir, Salt River; YNP: Clear Creek, Firehole River, Pelican Creek, Yellowstone River

More Information: [www.tu.org/science/](http://www.tu.org/science/)

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational and scientific equipment. Do not release or put fish or other animals into a body of water unless they came out of that body of water. Throw away fish parts and unused bait in a plastic bag.



PURPLE LOOSESTRIFE

PHOTO: VIC RAMEY, UNIVERSITY OF FLORIDA/IFAS CENTER FOR AQUATIC AND INVASIVE PLANTS.



SALTCEDAR - TAMARISK

PHOTO DAN SHARRATT, OREGON DEPT. OF AGRICULTURE

**DESCRIPTION-** Riparian plants live and act as a buffer zone along waterways. Increasing numbers of nonnative species continue to threaten native vegetation in these widely used areas.

There are numerous nonnative species of concern in the GYA and resources are available to help with their identification and reporting. This includes the “GYCC Weed Pocket Guide” produced by the Greater Yellowstone Coordinating Committee, which is available at public agencies throughout the GYA.

**WHAT YOU CAN DO-** CLEAN, INSPECT, and DRY all recreational equipment, including shoes/boots, packs, bike tires, etc. Keep dogs or other pets free of weed seed. Any hitchhiking seeds should be removed and thrown into the trash, not on the ground. Check with local weed and pest organizations to learn how to deal with the proper removal of any nuisance species. Report new weed infestations or suspicious looking plants to the local weed district.

**Idaho Weed Control Association**

<http://idahoweedcontrol.org>

**Montana Weed Control Association**

[www.mtweed.org](http://www.mtweed.org)

**Wyoming Weed & Pest Council**

[www.wyoweed.org](http://www.wyoweed.org)

### **ANGLERS**

Remove all mud and aquatic plants from your vehicle, boat, anchor, trailer and axles, waders, boots, and fishing gear before departing a fishing access site.

Drain all water from your boat and equipment - including coolers, buckets, and live wells - before departing a fishing access site or boat dock.

Clean and dry your boat and equipment between river trips. Pay particular attention to cleaning fishing equipment when moving from one location to another, even within the same watershed or on the same river. Dry boats and gear in between trips.

Be aware of any bait regulations, because in some waters, it is illegal to use live bait.

Do not release or put fish into a body of water unless they came out of that body of water.

### **DOG OWNERS**

Check dog's body including feet, coat, and collar for any visible mud, plants, or animals and remove.

Wash your dog with warm, clean water and brush its coat.

### **VISITORS**

If you have entered the water in your travels, be sure to clean anything that came in contact with that water including shoes, boots, waders, boats, trailers, dogs, etc.

Follow these guidelines while traveling so that you do not inadvertently introduce a hitchhiker to the areas you visit.

**AQUARIUM OWNERS**

Do not dump your aquarium contents into natural areas, storm drains, or flush them.

Donate them to a public place, give them away, or ask your local pet store for advice. If not, put unwanted aquarium contents in a plastic bag and throw away in the trash.

Do not even empty the water from your aquarium or fish tank into a water body. Empty the water into the toilet or onto land far from natural waters.

**BOATERS**

All types of boats (sea kayaks, whitewater kayaks, motor boats, canoes, dories or rafts) can harbor aquatic hitchhikers.

Remove all mud and vegetation from your vessel, trailer, motor, and equipment when moving between waters.

Drain and clean your live well, bait containers, and engine cooling system after every use.

Wash all boats, trailers, and equipment in between trips with high-pressure hot water. Pay particular attention to cleaning boats and equipment when moving from one location to another, even within the same watershed or on the same river. Dry boats and gear in between trips.

In most areas in the GYA, it is illegal to move live fish, aquatic invertebrates or plants from one water to another without authorization.

**HUNTERS**

Clean equipment such as boats, trailers, waders, and decoys, as well as horses and dogs.

Inspect and remove mud, aquatic plants and animals from anything that came in contact with water.

Eliminate water from decoys, boat, motor, etc.

They may look innocent,



but they could be  
giving some unwanted  
hitchhikers a ride!

**CLEAN  
INSPECT  
DRY**