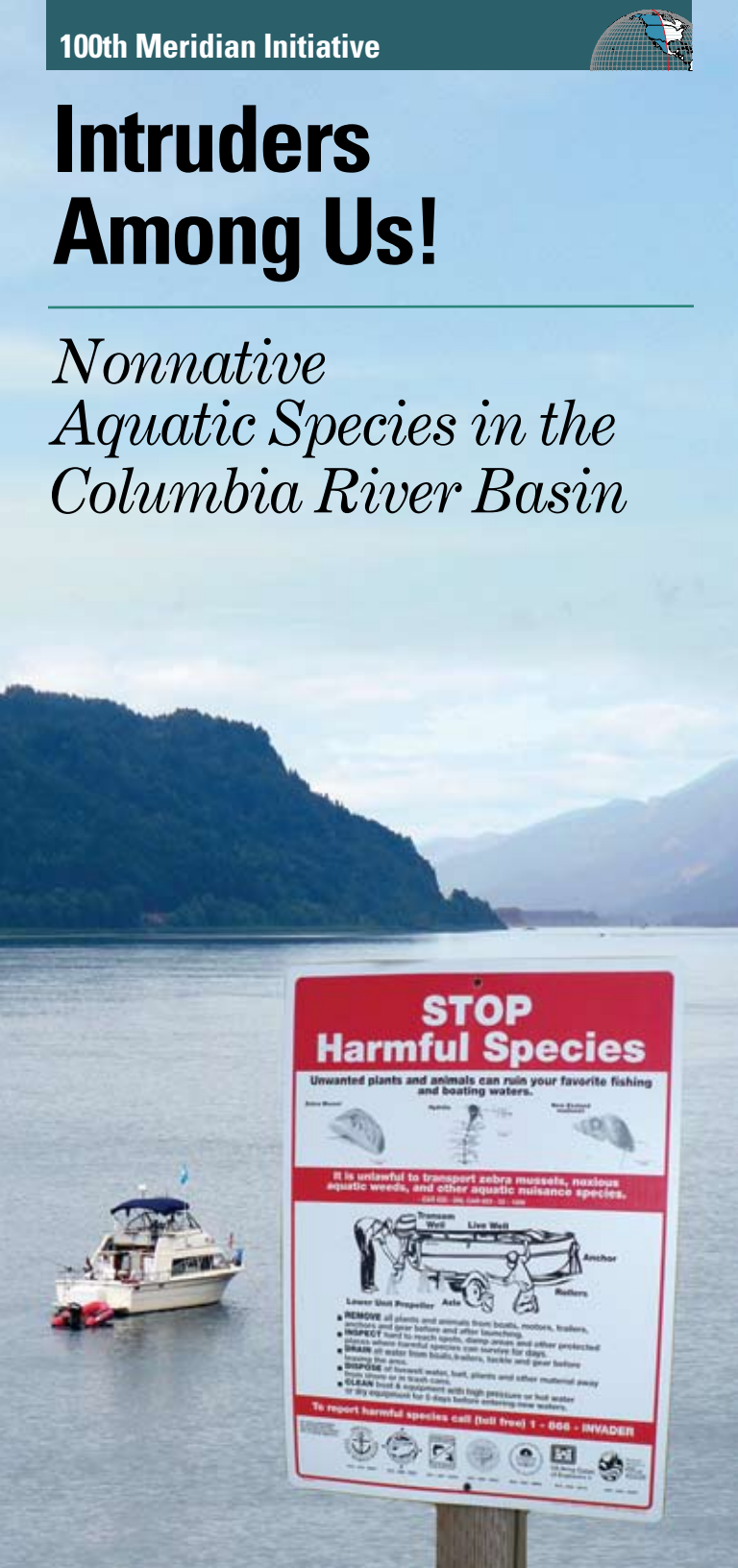
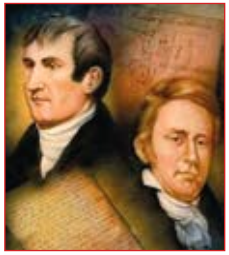
Intruders Among Us!

Nonnative Aquatic Species in the Columbia River Basin



A Different Kind of Pioneer



Meriwether Lewis, Capt. John Clark

When Lewis and Clark navigated the vast waters of the Columbia and Snake rivers, were they serenaded by the chorus of bullfrogs? Did they paddle through tangled filaments of Eurasian watermilfoil? Did they dine on carp and catfish? They did not—because these species didn't exist in the Columbia Basin 200 years ago!

At least 85 species have been introduced to the Columbia Basin over the last two centuries, and those are just the ones we know about. Some, like New Zealand mudsnails, hitchhiked here from foreign lands. Others, like brook trout, were introduced on purpose from other parts of the United States. With this global mix of organisms, the Columbia River Basin is an international melting pot of alien aquatic species.

Are these exotic species all bad?

No. But some plants and animals explode in numbers when introduced outside their native range. Such organisms are labeled as invasive, pests or nuisance species when their expansive populations lead to economic or ecological damage. But nonnative species provide human benefits as well and that complicates how we manage them.

Bullfrog

Nonnative species have permanently changed the nature of Columbia Basin waters and in some cases have caused economic and environmental damage. Understanding these impacts helps us better appreciate the importance of preventing and rapidly detecting new introductions of harmful species.

See pages 10 and 11 to learn how you can help.

This Problem Affects YOU!

Nutria damage stream banks

Why worry about whether the Columbia River Basin contains harmful aquatic nonnative species?

For one thing, they cost us a lot of money. States like Idaho are spending millions of dollars per year just to control aquatic weeds such as Eurasian watermilfoil. A recent project to eradicate an introduced baitfish in Oregon's Diamond Lake cost $6 million. Beyond what we spend on control, invasive species rack up direct economic losses, such as damage by nutria to streamside property owners.

Aquatic intruders can lead to fishing closures

Aquatic intruders also limit our ability to enjoy the region's natural resources. It's no fun to boat in a lake matted with Brazilian elodea or to find your favorite fishing spot is closed due to an introduced fish disease.

Although harder to measure, invasive species cause major impacts to our ecosystems.

Nonnative game fish prey on young salmon, purple loosestrife crowds out native wetland plants and New Zealand mudsnails modify the entire food web of streams they take over. And these problems all pale in comparison to the billions of dollars in damage that aquatic intruders like zebra mussels inflict on other regions…costs we would likely face if they arrive in the Columbia Basin.

Zebra mussels clog pipes, costing taxpayers billions

Worse yet, these impacts don't go away, they just grow.

Once invasive species sink their teeth in a new location, they're rarely eliminated or contained.

River of Change…

Human development in the Columbia River Basin produced a wave of physical and ecological changes. With those changes also came a parade of exotic species introductions. Here's a glimpse of that history:

1800
1792 Arrival of Robert Gray into the Columbia River
1805 Lewis and Clark Expedition reaches Snake River

1820

1840

1844 Oregon City: first incorporated U.S. city in Columbia Basin

1860

1871 Shad introduced into California
1876 Shad caught in Columbia River
1879 Introduction of common carp
1880 **-1880**

1894 U.S. Fish Commission shows decline of native salmon fisheries
1900 **1896** Little White Salmon National Fish Hatchery begins operations
1914 Bullfrog introductions authorized

1920

1933 Construction of Rock Island Dam, first Columbia River dam
1940 **1938** Asian clams discovered in Columbia River
1943 Feral nutria documented in the Pacific Northwest

1960
1965 Eurasian watermilfoil first documented in the Northwest
1972 Construction of Lower Granite Dam on Snake River

1980 **1980s** New Zealand Mudsnail found in Snake River
1995 Siberian prawns found in the lower Columbia
1997 Japanese mitten crab collected in Columbia River
2000 **2001** 1st major Columbia River aquatic invasive survey
2005 Rusty crayfish found in John Day River, Oregon
2006 Amur goby found in Columbia River
2010 **2007** Hydrilla found in Idaho's Brunneau River

Common carp

…Agents of Change!

Throughout history, whether on purpose or by accident, people have transported aquatic nonnative species in many ways:

Shipping: Ships entering the Columbia may discharge contaminated ballast water (used to keep ships stable) and can also harbor nonnative species on their anchors, hull, etc.

Recreational boating: Boaters may unknowingly spread aquatic plants and animals attached to their watercraft and trailers or traveling in their livewells.

Fishing: Many nonnative fish in the Columbia Basin were put there intentionally to enhance fishing opportunities. Imported live bait is also an introduction source.

Outdoor recreation: Hunters, hikers, campers and other outdoor enthusiasts (and associated pets or animals) can spread invaders between watersheds.

Aquariums and water gardens: From goldfish to yellow iris, nonnative plants and animals have found their way from hobbyist tanks and ponds into the Columbia Basin.

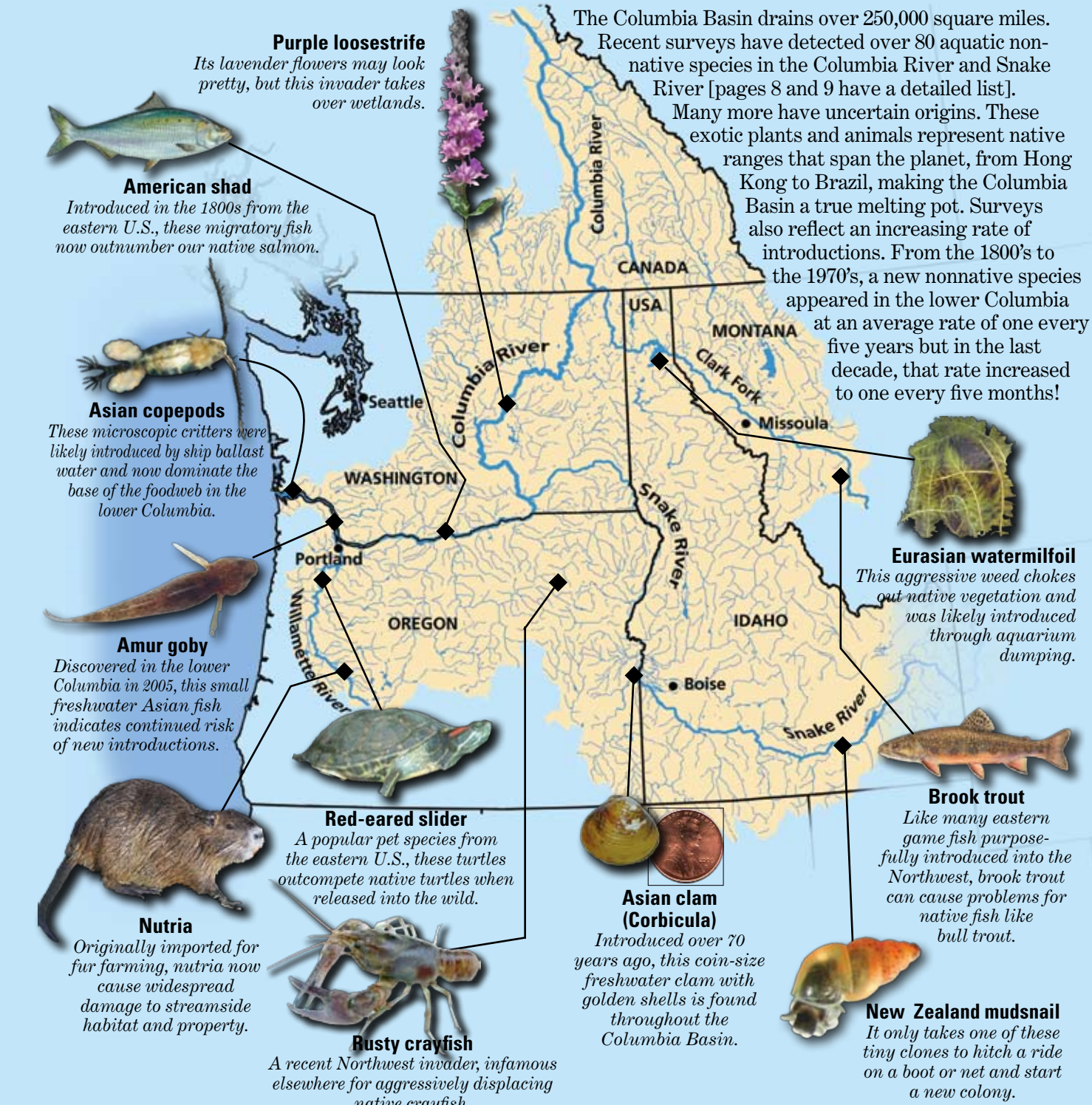
Aquaculture and live seafood: Can be a problem when nonnative shellfish and other species escape or are disposed of improperly.

Research and education: Scientists and teachers working with nonnative species can themselves be an introduction source and also may spread problems during fieldwork.

Habitat restoration: Although done with good intentions, equipment movement, plants and other site restoration materials can introduce unwanted invaders.

The Columbia River Basin: A Melting Pot

The Columbia Basin drains over 250,000 square miles. Recent surveys have detected over 80 aquatic non-native species in the Columbia River and Snake River [pages 8 and 9 have a detailed list]. Many more have uncertain origins. These exotic plants and animals represent native ranges that span the planet, from Hong Kong to Brazil, making the Columbia Basin a true melting pot. Surveys also reflect an increasing rate of introductions. From the 1800's to the 1970's, a new nonnative species appeared in the lower Columbia at an average rate of one every five years but in the last decade, that rate increased to one every five months!



Purple loosestrife
Its lavender flowers may look pretty, but this invader takes over wetlands.

American shad
Introduced in the 1800s from the eastern U.S., these migratory fish now outnumber our native salmon.

Asian copepods
These microscopic critters were likely introduced by ship ballast water and now dominate the base of the foodweb in the lower Columbia.

Amur goby
Discovered in the lower Columbia in 2005, this small freshwater Asian fish indicates continued risk of new introductions.

Eurasian watermilfoil
This aggressive weed chokes out native vegetation and was likely introduced through aquarium dumping.

Red-eared slider
A popular pet species from the eastern U.S., these turtles outcompete native turtles when released into the wild.

Brook trout
Like many eastern game fish purposefully introduced into the Northwest, brook trout can cause problems for native fish like bull trout.

Nutria
Originally imported for fur farming, nutria now cause widespread damage to streamside habitat and property.

Asian clam (Corbicula)
Introduced over 70 years ago, this coin-size freshwater clam with golden shells is found throughout the Columbia Basin.

Rusty crayfish
A recent Northwest invader, infamous elsewhere for aggressively displacing native crayfish.

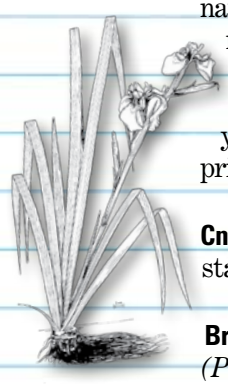
New Zealand mudsnail
It only takes one of these tiny clones to hitch a ride on a boot or net and start a new colony.

Intruder Log

Eurasian watermilfoil

The following list represents many of the nonnative aquatic species occuring and documented in the Columbia Basin. Quite a few lack common names, reflecting that others likely remain undiscovered.

Plants: Allegheny monkey-flower, American white waterlily, brass buttons, Brazilian elodea, cress, curlyleaf pondweed, Eurasian watermilfoil, European pond water-starwort, fanwort, flowering rush, narrowleaf cattail, parrotfeather milfoil, purple loosestrife, reed canarygrass, spike watermilfoil, water speedwell, water celery, yellow flag iris, water mint, water primrose



Yellow flag iris

Cnidarians: *Cordylophora caspia*, starlet sea anemone

Bryozoans: Magnificent bryozoan *(Pectinatella magnifica)* , *Urnatella gracilis*

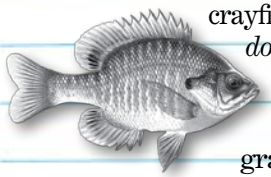
Annelid Worms: *Branchiura sowerbyi*, *Chaetogaster diaphanous*, *Eukerria saltensis*, *Hobsonia floridana*, *Manayunkia aestuarina*, *Manayunkia speciosa*, *Paranais frici*, *Polydora cornuta*, *Pseudopolydora kempi*, *Stylodrilus heringianus*, *Streblospio benedicti*

Purple varnish clam

Molluscs: Big-ear radix, Chinese mystery snail, Asian clam *(Corbicula)*, New Zealand mudsnail, purple varnish clam, softshell clam

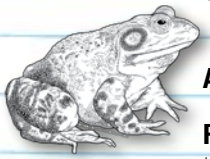
Siberian prawn

Crustaceans: *Balanus improvisus*, *Caecidotea laticaudatus*, *Caecidotea racovitzai racovitzai*, *Caecidotea racovitzai*, *Crangonyx floridanus*, *Crangonyx pseudogracilis*, *Grandidierella japonica*, *Harpacticella paradoxa*, *Limnoithona sinensis*, *Limnoithona tetraspina*, *Melita nitida*, *Monocorophium acherusicum*, *Nippoleucon hinumensis*, *Pseudodiaptomus forbesi*, *Pseudodiaptomus sinopinus*, red swamp crayfish, ringed crayfish, rusty crayfish, Siberian prawn, *Sinocalanus doerri*, *Sinelobus stanfordi*



Bluegill

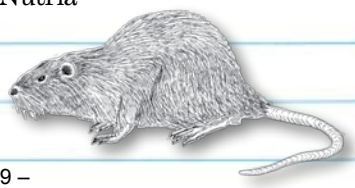
Fish: American shad, Arctic grayling, banded kilifish, black bullhead, blue catfish, black crappie, bluegill, brown bullhead, brook trout, brown trout, channel catfish, common carp, convict cichlid, fathead minnow, flathead catfish, golden trout, goldfish, grass carp, grass pickerel, green sunfish, lake trout, largemouth bass, mosquitofish, northern pike, Oriental weatherfish, pacu, potted catfish, pumpkinseed, redear sunfish, red-bellied pacu, smallmouth bass, split-tails, spottail shiner, striped bass, tadpole madtom, tench, tiger muskie, tilapia, walleye, warmouth, white catfish, white crappie, yellow bullhead, yellow perch



Amphibians: Bullfrog

Reptiles: Red-eared slider, snapping turtle

Mammals: Nutria



Stop Aquatic Hitchhikers!

Here are some simple things you can do to prevent the spread of aquatic intruders into and within the Columbia Basin:

- **Drain water and remove any attached debris, plants, or animals...**before transporting boats, fishing gear, and other equipment from one water body to another. Clean and dry when possible, and re-inspect before using in a new location. See page 12 (back) to get more information on cleaning methods.

Wash and dry boats thoroughly

- **Never release live** bait, plants or aquarium animals into a water body.
- **Provide adequate containment** for nonnative aquatic plants or animals on your property, particularly in areas subject to flooding.

Clean fishing gear between sites, and dispose wash-water safely.

- **Learn to recognize nonnative species.** Report suspected invaders to 1-877-STOPANS (786-7267).
- **Share your knowledge** with others to prevent new introductions of invasive species. Be assertive but polite if you see risky behavior!

Early detection greatly improves the odds that we can eliminate a new intruder.

If you see or suspect a new introduced species, report it to. 1-877-STOPANS (786-7267)

Some of the most harmful invaders that we need to keep out of the Columbia and Snake Rivers include:

- **Zebra and quagga mussels**— These striped freshwater shellfish foul boats, docks, pipes, and other objects. Young mussels look like grains of sand; adults are thumbnail-sized and attach with hair-like threads. (Zebra mussel shown at top right; quagga mussel below.)

- **Hydrilla**— This freshwater weed grows quickly, taking over lakes and rivers. It can reproduce from fragments, as well as from small tubers (a distinguishing feature) attached to the roots.

- **Silver carp**— Infamous for leaping from the water when alarmed, these large fish spell trouble for water recreation. Unlike common carp, they have a large upturned mouth and low-set eyes.

- **Mitten crab**— A migratory crab that breeds in saltwater and rears in freshwater. Adults possess the namesake hairy claws, with legs up to 6 inches long.

For More Information

For more information on aquatic intruders and how to prevent their spread, visit:

http://nas.er.usgs.gov

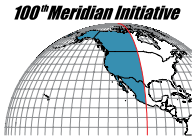
www.protectyourwaters.net

www.100thmeridian.org

STOP AQUATIC HITCHHIKERS!™

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

When you leave a body of water:



- Remove any visible mud, plants, fish or animals before transporting equipment.
- Eliminate water from equipment before transporting.
- Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.)
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

Image Credits:
Lewis & Clark—NOAA; bullfrog—Bill Leonard; nutria—The Animal Agency; pipe with mussels—Don Schloesser, Great Lakes Science Center/Michigan Sea Grant; boat inspection—Wisconsin Department of Natural Resources; angler cleaning, and mitten crab—Paul Heimowitz; zebra and quagga mussel—U.S. Geological Survey (USGS); hydrilla—John Madsen; silver carp—David Rieck, Illinois-Indiana Sea Grant; Columbia Basin Map—Northwest Power and Conservation Council; American shad—U.S. Fish and Wildlife Service (USFWS); purple loosestrife —Eric Coombs, Oregon Department of Agriculture; Asian copepod—Jeff Cordell, University of Washington; Amur goby — USGS; nutria—William Vann, EduPic Graphical Resource; red-eared slider—Wikipedia; Corbicula—John Caldeira; New Zealand mudsnail — Dan Gustafson, Montana State University; brook trout — USFWS; Eurasian watermilfoil—Alison Fox, University of Florida; Eurasian watermilfoil and yellow flag iris line art—University of Florida, Center for Aquatic and Invasive Plants; purple varnish clam—Washington Department of Fish and Wildlife; bluegill—Oregon Department of Fish and Wildlife; bullfrog, nutria and Siberian prawn line art—Barbara Gleason/BGleason Design & Illustration, LLC; Columbia Rediviva—Discovering Lewis & Clark® and Columbia River Maritime Museum; Rock Island Dam—Chelan Public Utility District; common carp—USFWS; Rusty crayfish—Jeff Gunderson, Minnesota Sea Grant.

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