

ON THE LOOKOUT FOR AQUATIC INVADERS

Identification Guide for the Pacific Northwest



© iStock photo.com/Karl Martin

INTRODUCTION

Nonnative species are altering freshwater and marine ecosystems in the Pacific Northwest, and more species are introduced every year. This identification guide has been developed as a tool to help watershed councils and other community-based groups increase their understanding of aquatic invasive species (AIS), and to begin monitoring for species of particular concern to their watersheds. It provides background information and key identification characteristics of many aquatic invaders that are already established or likely to become established in the Pacific Northwest. Ultimately, greater awareness of the pathways that spread AIS to new regions can help prevent their introduction, and monitoring efforts can help identify and respond to new invasions before they become a problem.

Participants take caution:

Monitoring activities are a potential AIS pathway. Make sure to clean your gear and boots to prevent spreading aquatic invaders to new areas.

REPORT THIS SPECIES!

Please report sightings of AIS that pose a serious risk to aquatic ecosystems, as labeled in this booklet. This will allow authorities to rapidly respond to new aquatic invaders. Limited control options exist for some established species not labeled for reporting.

Developed by **Scott Wiedemer** and **Samuel Chan**



CONTENTS

Let's Work Together

- 4 Controlling Invasive Species
- 4 Boaters and Anglers
- 5 Gardeners, Hikers, and Watershed Stewards

Freshwater Organisms

- 6 Nutria
- 8 Feral Swine
- 10 Zebra and Quagga Mussel
- 12 Asian Clam
- 14 New Zealand Mudsnaill
- 16 Bullfrog
- 18 Red-eared Slider
- 20 Rusty Crayfish
- 22 Ringed and Virile Crayfish
- 24 Red Swamp Crayfish

Marine Organisms

- 26 Chinese Mitten Crab
- 28 European Green Crab
- 30 Australasian Burrowing Isopod
- 32 Marine Clams
- 34 Solitary Sea Squirts
- 36 Didemnum

Marine Plants

- 38 Spartina
- 40 Japanese Eelgrass
- 42 Asian Kelp

Freshwater & Riparian Plants

- 44 Hydrilla
- 46 Brazilian Elodea
- 48 Milfoil
- 50 Giant Salvinia
- 52 Didymo
- 54 Yellow Flag Iris
- 56 Reed Canarygrass
- 58 Purple Loosestrife
- 60 Knotweed

Fish

- 62 Asian Leaping Carp
- 64 Atlantic Salmon
- 66 Other Nonnative Fish

PARTNERS IN THIS EFFORT:



LET'S WORK TOGETHER



John Schaefer

CONTROLLING INVASIVE SPECIES

The Pacific Northwest is renowned for its natural environment. Diverse plant and animal communities thrive in our ecosystems. Unfortunately, these natural communities and systems are increasingly threatened by aquatic invasive species, a form of biological water pollution. Harmful nonnative plants and animals are moving into our coasts, waterways, and wetlands, degrading habitats, displacing desirable species, damaging infrastructure, contaminating water resources, and necessitating expensive control treatments.

Once established, invasive species spread relentlessly, each generation taking over more territory. Unlike other forms of

water pollution such as oil spills, however, invasive species don't dissipate with time and they will permanently alter the environment. Awareness and early detection help us contain these threats and keep them from spreading and causing further damage to the environment and our quality of life.

This guide is an introduction to some of the more prominent and harmful aquatic, riparian, and wetland invasive species in our region. It is not too late to stop the spread and establishment of these species. You can make a difference in your community and watershed by

- staying informed and “connected.” Learn about the species listed in this guide. Visit **OregonInvasivesHotline.org**, **oregoninvasivespecies.com**, or **anstaskforce.gov/campaigns.php** for more information on invasive species and access to other resources available on the Web. Contact the experts and agencies listed on the back of this publication.
- detecting and reporting these invasive species. Be vigilant and report sightings by calling **1-866-INVADER** or going to **OregonInvasivesHotline.org**.

Here's what you can do if you are an outdoor recreationist (boater, angler, gardener, hiker, hunter) or you work near waterways

BOATERS AND ANGLERS

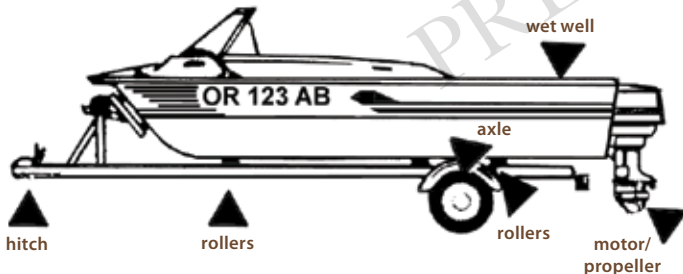
Aquatic invasive species can very easily spread between waterways by hitching a ride on boats and trailers. Some species can even cause expensive damage to your boat. Protect Oregon's waterways and never launch a dirty boat!

- Inspect hard-to-reach spots, damp areas, and other protected places on your boat. Harmful species can survive in such places for days. Feel for small

bumps, which could be attached organisms. Remove any plants and animals you find before leaving the water.

- Clean your boat and equipment with high-pressure hot water, or allow equipment and your boat to dry in sunny conditions for at least five days before entering new waters. For more information about clean boating activities, visit anstaskforce.gov/campaigns.php or contact the Oregon State Marine Board at **503-378-8587**.
- Drain and empty water entirely from the motor, wet well, and bilge on land, before leaving the water body.
- Remove any plants, dirt, and water from your gear and clothing.
- Dispose of bait properly. Empty your bait bucket on land in a trash container before leaving the water body. Never release live bait into the water or release aquatic animals from one water body into another.

Key places to check your boat for aquatic organisms



GARDENERS, HIKERS, AND WATERSHED STEWARDS

- Learn about the prominent aquatic invasive species. Do not buy or share aquatic invasives.
- Inspect and clean your equipment, tools, and clothing of seeds, soil, and plant fragments before entering and after leaving natural areas and waterways.
- Do not dump pond plants or animals into natural areas.
- Inspect, decontaminate, rinse, and remove “hitchhiking” invasive plants and animals from purchased aquatic plants before setting them in your garden.
- Remove and properly dispose of aquatic invasive plants by drying them, away from natural areas. When possible, place them in a plastic bag for disposal in the trash.

Pets and aquariums:

- Don't dump your pets. If you have a pet that you can no longer care for, contact your local pet store, humane society, veterinarian, or other expert, for guidance on appropriate and humane options.
- Don't dump your aquarium water into natural habitats. Seal aquarium plants in plastic bags and place them in the trash.
- Make responsible pet and aquarium purchases. Check to see whether they are listed as invasive species by local agencies. Many pets may live longer, grow bigger, and take more care than you realize. Before choosing a pet, do some research and be sure you're ready to care for it long term.

NUTRIA (*MYOCASTOR COYPUS*)



C.C. Lockwood, www.cclckwood.com

DISTRIBUTION

Native to South America, nutria have been introduced to Europe, Asia, North America, and Africa.

In the U.S., nutria populations are found in many states, often in coastal areas. Along the west coast, populations in Oregon and Washington are expanding.

Nutria are increasingly common in urban and suburban environments.

SPECIES AT A GLANCE

The nutria is a large, semi-aquatic rodent that lives in colonies along rivers, lakes, and wetlands. It often invades and damages ecologically sensitive areas by tunneling into riparian zones to create large burrows.

It is adaptable to a broad range of climatic conditions.

Historically, the nutria has been important to the international fur trade, which includes trapping and farming them for their high-quality fur.



Samuel Chan, Oregon Sea Grant

Nutria burrows and shoreline erosion at Devil's Lake, Oregon

HOW THIS SPECIES SPREADS

Wild nutria populations have been established through accidental escapes from nutria farms and by intentional introduction for trapping.

Nutria damage in a Louisiana wetland



Louisiana Dept. of Wildlife and Fisheries, www.nutria.com



Aurelio Perrone, Applied Ecology Research Center, Turin, Italy

ENVIRONMENTAL IMPACTS

Nutria are opportunistic feeders, consuming roughly 25 percent of their body weight in vegetation each day. Nutria feeding habits can dramatically alter the plant ecology of invaded ecosystems by depleting wetland vegetation.

Nutria burrowing and riparian grazing cause streambank instability and erosion. This behavior can alter the habitat and hydrology of rivers, lakes, wetlands, and coastal swamps.

HABITAT

Nutria prefer lakes, rivers, streams, and wetlands. They often burrow into steeply incised banks of lakes and rivers.

IDENTIFICATION

Nutria are excellent swimmers with webbed hind feet and cylindrical, rat-like tails.

While swimming, they are often mistaken for beavers. Nutria have brown fur; the chin is typically covered by white hairs, and they have large, yellow-orange incisors (front teeth).

Nutria burrows often indicate their presence in an area.

CHINESE MITTEN CRAB (*ERIOCHEIR SINENSIS*)



Paul Heimowitz, U.S. Fish and Wildlife Service

DISTRIBUTION

The Chinese mitten crab is native to China and Korea along the Yellow Sea.

This species is found throughout the San Francisco Bay watershed and has migrated as far inland as the Sierra Nevada foothills of California.

Range expansion along the west coast is expected.

SPECIES AT A GLANCE

The Chinese mitten crab is a burrowing crab that has a catadromous lifecycle. This means it spends the majority of its life in the freshwater reaches of coastal watersheds but reproduces and develops in brackish estuaries.

This crab causes significant damage to the aquatic ecosystems it invades. High-density populations are common and often disrupt the food chain and ecology.

Other species of mitten crab are also a concern, including the Japanese mitten crab (*Eriocheir japonica*).



Underside view of female (left) and male (right)

HOW THIS SPECIES SPREADS

The Chinese mitten crab was first identified in San Francisco Bay in 1992. It was introduced from ship ballast water or intentionally as a food source.

Ocean currents and ballast water are capable of spreading the planktonic larvae of this species to new coastal areas.

The Chinese mitten crab migrates upstream to freshwater areas as a juvenile and is able to traverse over land, allowing it to navigate around obstacles (such as dams).

ENVIRONMENTAL IMPACTS

The Chinese mitten crab is an opportunistic feeder that preys upon and competes with native flora and fauna for limited habitat and resources.

Burrowing causes significant erosion damage to levees, streambanks, and irrigation structures.

Massive hordes of mitten crabs migrate to the estuary for reproduction, causing an annual nuisance that disrupts industrial water intake and fish migration.

Mitten crab burrows leave this streambank susceptible to erosion.



HABITAT

The Chinese mitten crab inhabits riverbanks, levees, and estuaries of coastal watersheds.

The Chinese mitten crab reproduces and exists as a juvenile in saltwater estuaries, but spends most of its adult life in upland freshwater habitat, sometimes hundreds of miles from the sea.

IDENTIFICATION

The most identifiable feature is the dense patch of hair on its white-tipped claws.

The carapace (shell) width of adult crabs reaches about 4 to 8 cm, with a notch in the middle and four spines on each side.

Mitten crabs are light brown in color and their legs are long, more than twice the width of the carapace.

REPORT THIS CRAB!

In Oregon, call 1-866-INVADER or go to OregonInvasivesHotline.org
In other states, contact the National Invasive Species Hotline: 1-877-STOP-ANS

SPARTINA:

SALT MEADOW CORDGRASS (*SPARTINA PATENS*)

DENSE-FLOWERED CORDGRASS (*SPARTINA DENSIFLORA*)



USDA-NRCS PLANTS Database, <http://plants.usda.gov>

Smooth cordgrass (*Spartina alterniflora*)

SPECIES AT A GLANCE

There are 13 similar species of spartina or cordgrass, a group of deciduous, erect, marsh grasses that grow in salty to brackish water estuarine areas. Four spartina species have become aggressive invaders to the U.S. west coast, often transforming open estuaries into meadows that dramatically alter estuarine habitat and hydrology.

Eradication efforts in the Siuslaw estuary and Coos Bay aim to eliminate spartina from Oregon. Extensive eradication efforts are also occurring in Washington's Puget Sound and Willapa Bay.

SMOOTH CORDGRASS (*SPARTINA ALTERNIFLORA*)

ENGLISH CORDGRASS (*SPARTINA ANGLICA*)

DISTRIBUTION

Smooth cordgrass and salt meadow cordgrass naturally occur along the Atlantic coast, from Canada to the Caribbean and Central America. English cordgrass originated in England. Dense-flowered cordgrass is from South America.

These species have invaded multiple sites in California (predominantly in San Francisco Bay and Humboldt Bay) and Washington (including Willapa Bay, Gray's Harbor, and Puget Sound).



Samuel Chan, Oregon Sea Grant

Smooth cordgrass rhizome (*Spartina alterniflora*)

HOW THESE SPECIES SPREAD

Spartina has been intentionally introduced to new regions for bank stabilization and marsh restoration.

Aquaculture operations, watercraft, and boat trailers can accidentally transport spartina to new areas.

Spartina spreads within an estuary via seeds and vegetative propagation. Ocean currents can potentially transport spartina along the coast to new estuaries.

Spartina anglica in Puget Sound



HABITAT

These species are found in the low to upper salt marsh and in mudflat habitat.

IDENTIFICATION

Leaf blades are green and hairless and have ridges on the upper surface. Leaf width and length vary widely between these species. The ligule, a thin membrane where the leaf blade meets the stem, consists of a row of fine hairs.

Flowering times vary from April to November for different species, with flowers found on two to several spikes that diverge from the stem.

Plants are 15 cm to 2.5 m tall and grow in dense, single-species stands.

Identification of spartina to the species level can be very difficult and may require an expert.

ENVIRONMENTAL IMPACTS

Spartina forms dense stands that cover large areas and trap sediment. Increased sedimentation dramatically alters estuarine habitat and hydrology by transforming mudflats to salt marsh, while channelizing water flow.

Dense spartina stands reduce biodiversity and habitat for native wetland birds, animals, and invertebrates.

Interference with oyster aquaculture has also occurred.

REPORT THIS PLANT!

In Oregon, call 1-866-INVADER or go to OregonInvasivesHotline.org
In other states, contact the National Invasive Species Hotline: 1-877-STOP-ANS

HYDRILLA (*HYDRILLA VERTICILLATA*)

James R. Allison, Georgia Dept. of Natural Resources, www.invasive.org



DISTRIBUTION

Hydrilla is native to southern Asia, but it has been widely introduced across Europe, Australia, Africa, and North America.

In the 1950s, hydrilla was first introduced to the U.S. as an aquarium plant. It has spread throughout the southeastern U.S. and the east coast.

Along the west coast, several watersheds in California have been infested.

Eradication efforts in Pipe and Lucerne lakes in Washington aim to eliminate hydrilla from the state.

SPECIES AT A GLANCE

Hydrilla is a submersed, rooted, freshwater aquatic plant, found in lakes, rivers, and streams.

When established, hydrilla often forms thick, intertwined stands that fill much of the water column, with dense mats forming at the water surface.



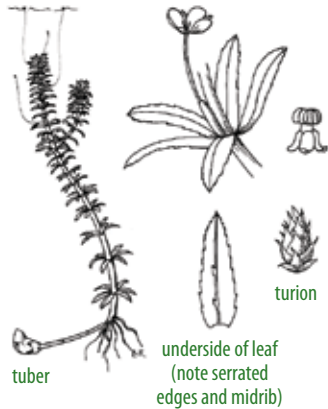
Hydrilla covers a lake in Florida.

Vir. Ramey, Center for Aquatic and Invasive Plants, University of Florida

HOW THIS SPECIES SPREADS

Hydrilla is a popular and hearty aquarium plant. The intentional dumping of personal aquariums has introduced hydrilla to aquatic systems throughout the world.

Boating, fishing, bait shipment, irrigation, and aquaculture are secondary pathways that spread hydrilla from initial areas of introduction.



Sketch: Center for Aquatic and Invasive Plants, University of Florida; photo: Colette Jacono, U.S. Geological Survey



ENVIRONMENTAL IMPACTS

Hydrilla produces dense mats and spreads rapidly, crowding out native vegetation, reducing water quality, and disrupting the food chain and ecology.

Dense stands impede navigation, dramatically reduce recreational opportunities and tourism, and can block irrigation canals.

HABITAT

Hydrilla prefers still or slow-moving water in lakes and rivers. It is often found in water depths of 0–8 m.

IDENTIFICATION

Look for small, potato-like tubers attached to the root.

Serrated, pointy, green leaves grow in whorls of five around the stem, and reddish leaf midribs often have small spines. Stems can reach 9 m in length.

Turions, scaly hard buds, are found along the leaf nodes.

Flowers are small, with transparent petals 1–5 cm in length.

It is a perennial plant that is most noticeable during the summer. It is often confused with Brazilian clodea.

REPORT THIS PLANT!

In Oregon, call 1-866-INVADER or go to OregonInvasivesHotline.org
In other states, contact the National Invasive Species Hotline: 1-877-STOP-ANS

ASIAN (LEAPING) CARP: BIGHEAD CARP (*ARISTICHTHYS NOBILIS*) SILVER CARP (*HYPOPHTHALMICHTHYS MOLITRIX*)

David Reicks, University of Illinois, Illinois-Indiana Sea Grant, sgnis.org



Bighead carp

SPECIES AT A GLANCE

Silver and bighead carp are large, fast-growing, freshwater fish that can exceed 25 kg in weight. These two carp species have been introduced around the world for aquaculture production, often becoming established in new regions.

Silver and bighead carp are well known for their leaping prowess. They tend to reside in surface water and leap out of the water (up to 2 m high) when disturbed, causing boaters a serious safety risk.

DISTRIBUTION

Silver and bighead carp are native to Eastern Asia and parts of China and Russia.

They have been introduced outside of their native range into Africa, Australia, North America, and South America.

In the U.S., their range has expanded to include much of the Mississippi River basin, including the Missouri, Illinois, and Ohio rivers.



Silver carp

David Reicks, University of Illinois, Illinois-Indiana Sea Grant, sgnis.org

HOW THESE SPECIES SPREAD

Silver and bighead carp have been introduced to new regions by accidental release from aquaculture facilities, as well as by intentional introductions to create a food source and to control phytoplankton blooms in eutrophic waters.

Bait-bucket transfers can introduce these species to new waterways.

ENVIRONMENTAL IMPACTS

Silver and bighead carp are often found in high densities in the waterways they invade, becoming the dominant fish species in many areas.

They filter-feed on phytoplankton and zooplankton and graze on aquatic vegetation. This behavior can put significant pressure on the base of the food chain and dramatically alter aquatic ecosystems.

Competition with native fish species can diminish recreational fisheries.

They can potentially carry and transmit new diseases to invaded ecosystems.

Duane Chapman, U.S. Geological Survey



HABITAT

Bighead and silver carp are generally found in calm, slow-moving waters, such as lakes and backwaters of large rivers.

IDENTIFICATION

Silver carp are bright silver in color, with small scales. They have a large, toothless, upturned mouth, and their eyes are set far forward along the midline of the body. The dorsal fin has 8 rays, while the anal fin has 12–13 rays. Silver carp can reach 1 m in length and weigh up to 27 kg.

Bighead carp have a protruding lower jaw, forward-set downturned eyes, and a large head. They are deep-bodied, silver to gray in color, often with irregular dark blotches along the back and sides. The dorsal fin has 8–9 rays; the anal fin has 13–14. Bighead carp can reach lengths of 1.4 m and weigh up to 40 kg.

Bighead and silver carp can hybridize in the wild, making identification difficult in regions where they coexist.

REPORT THESE FISH!

In Oregon, call 1-866-INVADER or go to OregonInvasivesHotline.org
In other states, contact the National Invasive Species Hotline: 1-877-STOP-ANS

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To report sightings of aquatic invasive species: In Oregon, call 1-866-INVADER or go to OregonInvasivesHotline.org
In Washington, call 1-360-902-2700. In other states, call the National Invasive Species Hotline: 1-877-STOP-ANS.



Giant salvinia (Scott Bauer, USDA Agricultural Research Service, www.invasive.org)

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