



**REPORT THIS SPECIES!** **Oregon:** 1-866-INVADER or Oregon InvasivesHotline.org; **Washington:** 1-888-WDFW-AIS; **California:** 1-916-651-8797 or email [invasives@dfg.ca.gov](mailto:invasives@dfg.ca.gov); **Other states:** 1-877-STOP-ANS.

**Asian carps**—fish in the Cyprinid family—have been part of our culture for centuries. We use them as ornamental aquarium fish (goldfish and koi) and food fish, and to help keep aquaculture ponds clean. However, when Asian carps escape into natural waterways, they can cause big problems for human health, the economy, and the environment. Four species of Asian carps have escaped in the United States and are of concern: grass carp (*Ctenopharyngodon idella*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*H. nobilis*, previously known as *Aristichthys nobilis*), and black carp (*Mylopharyngodon piceus*).

### Species in the news

Asian carps: Friend or Foe to Devils Lake, OR?

### Learning extensions

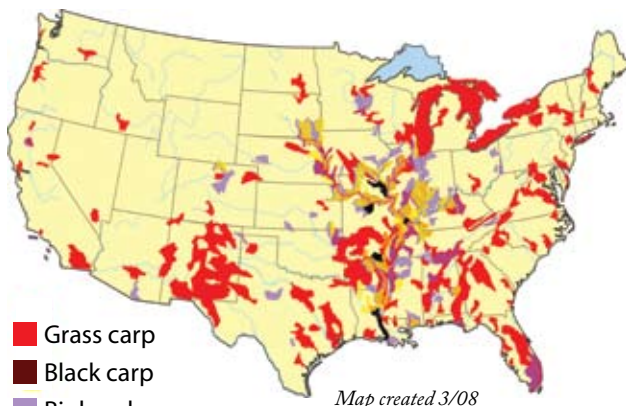
Hazardous Path to the Columbia Gorge

### Resources

*From Pest to Profit*, an NBC video ([www.msnbc.msn.com/id/15533981/](http://www.msnbc.msn.com/id/15533981/))

## Why you should care

Asian carps can become so abundant that they completely change a river ecosystem, affecting native species and preventing us from enjoying and benefiting from the river. In some areas, Asian carps are so plentiful that fishermen are unable to pull up their nets, due to the weight of the carps. In the Mississippi River and its tributaries, carps can displace native species by crowding out native species and outcompeting native species for food. They are also a human health hazard: silver carp leap from the water when they hear boat motors and can knock a boater unconscious.



- Grass carp
- Black carp
- Bighead carp
- Silver carp

Map created 3/08

Data on map represents established population and species occurrence data

## How they got here and spread

Asian carps were initially introduced to benefit the aquaculture industry in the Midwest; grass carp were imported to control aquatic vegetation in ponds; silver and bighead carps were introduced to control plankton blooms. Black carp was accidentally introduced as a contaminant in a grass carp shipment, but it was later introduced deliberately to control a parasite-hosting snail.

## What you can do

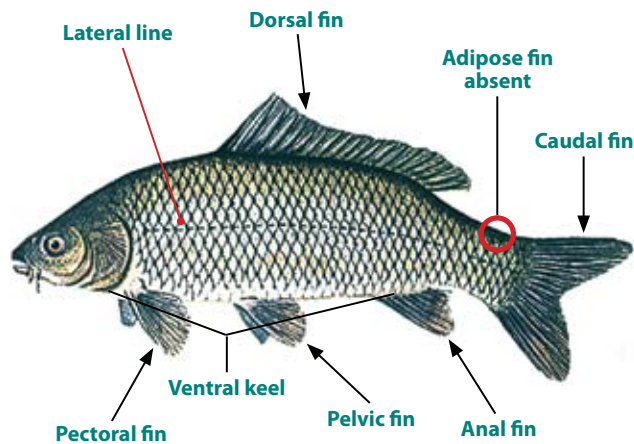
Help prevent the spread of Asian carps by learning to identify them and reporting all sightings.

Before transporting your boat between water bodies, empty your bail bucket, live well, and bilge on dry land. Never move or dump live fish from one body of water into another.

## COOL FACTS

When frightened by sounds such as boat motors, silver carp can leap out of the water, reaching heights of 2 to 4 meters.

Plans are in place to use the enormous amount of Asian carps in Midwest rivers as a food source. The St. Louis Zoo is investigating ways to feed this cheap protein to penguins, sea lions, and pelicans.



Adapted from Kraft et al. (2006)

**Figure 1.** Diagram of a carp image

## Asian Carps

Asian carps are very large fish, reaching lengths greater than 1 m (Table 1). The largest reported black carp was 70 kg! Asian carps have a single dorsal fin; pelvic fins are set back on the body; and the pectoral fins are low on the side (Figure 1). There is no adipose fin. Asian carps belong to a family of fish called Cyprinids. Cyprinids do not have teeth on their jaws; instead, the teeth are in the back of their throats in a structure called the pharyngeal arch. They use these pharyngeal teeth and a masticatory pad located on the roof of the pharynx to process food. The size, shape, and number of these pharyngeal teeth are specific to the diet of each species and are a very useful distinguishing characteristic (Figure 2).

**Silver carp** can grow to 1.9 m in length and can weigh up to 35 kg. They can live up to 20 years. Silver carp are similar to bighead carp, except for their silver color and a ventral keel that extends forward to the anterior part of the breast, almost to the gill membranes. Its gill rakers are well adapted for eating plankton; the gill rakers are fused together, forming a sponge-like apparatus.

**Bighead carp** are named, of course, for their big head! They can weigh as much as 40 kg and grow to over 1 m in length. They have a mottled color pattern. Eyes are located low on the head, below the midline. The body is dorso-ventrally elongated and laterally compressed (elongated and flattened from top to

Size	Length (m)	Weight (kg)
Grass carp	up to 1 m	up to 45
Black carp	greater than 1 m	up to 70
Bighead carp	over 1 m	up to 40
Silver carp	up to 1.9 m	up to 35

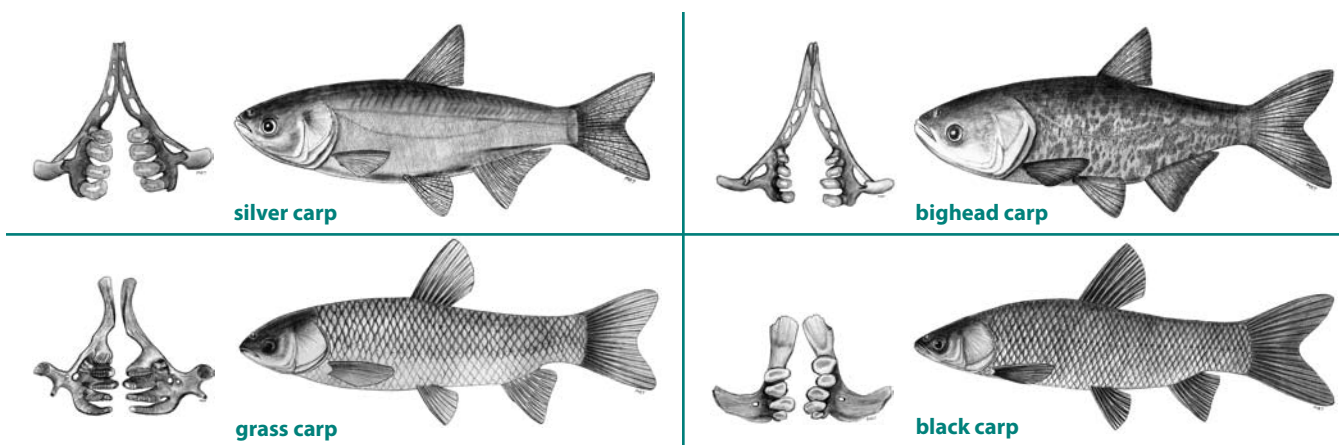
**Table 1.** Length and weight of Asian carps by species.

bottom). Bighead carp have long, close-set gill rakers, adapted to straining plankton from the water. The ventral keel extends forward to the base of the pelvic fins. The pharyngeal teeth of the bighead carp are moderately long and rounded.

**Grass carp** often reach lengths of 1 m and can weigh as much as 45 kg (more than a Labrador retriever). Grass carp have an oblong, pale-gray body; a wide head; rounded belly; and large scales. Their pharyngeal teeth are adapted to eating aquatic vegetation. The teeth are long, serrated, and may have hooks. Though indiscriminate feeders of native and nonnative aquatic plants, grass carp were introduced for biological control of aquatic weeds. Grass carp introduced for biological control of aquatic weeds are unable to reproduce in open waters, because they have been bred with triploid genes. Fish with triploid genes result when fertilized eggs are treated with heat, cold, or hydrostatic pressure, rendering them sterile. However, the potential exists for a small percentage of the treated eggs to be diploid, allowing the fish to reproduce.

**Black carp** closely resemble grass carp, but black carp have a slightly darker color as an adult. The most reliable way to distinguish black carp from grass carp is to inspect the pharyngeal teeth. Black carp teeth are smooth rather than serrated, making them well adapted to crushing mollusk shells. The largest reported black carp weighed 70 kg—the average weight of an adult person!

# Asian Carps



**Figure 2.** Illustrations of Asian carps and the dorsal view of their pharyngeal teeth. Carp illustrations are by Matt Thomas and reproduced from Schofield et al. 2005.

## NATIVE AND INVASIVE RANGE

Asian carps originate from Eastern Asia, where their habitat includes slow-moving waters such as lakes and backwaters of large rivers. Although their habitat is normally freshwater, Asian carps can tolerate low levels of salinity. Asian carps are broadly distributed in the Midwest. Currently, there are no breeding populations of Asian carps in western states, but many western rivers, especially the Columbia, are vulnerable to invasion. Grass carp have been reported in Washington, Oregon, and California. Bighead carp have been reported in California. At least one species of Asian carp has established in the Mississippi, Ohio, Illinois, Trinity, and Missouri rivers.

## WEST COAST DISTRIBUTION

While the west coast has no breeding populations of Asian carps, carps can still invade. Fishermen traveling from the Midwest may accidentally bring and release juvenile Asian carps (as bait fish) to the Columbia River, providing a chance for an invasion to occur. It is important that boaters do not use Asian carp for bait and that they inspect, dry, and clean their boats to prevent the introduction of Asian carps.

## ECOLOGY

### Life cycles and migration patterns

Asian carps release their eggs into the water column, which develop as they float down stream. Seasonal changes in river conditions, such as an increase in depth, turbulence, flow, and water temperature (17 to

30°C is ideal) stimulate spawning, because these conditions are needed for early egg development. Laboratory research suggests that eggs need high water hardness (greater than 200 mg/l CaCO<sub>3</sub>) for successful incubation; however, the relationship between hardness and egg survival is not well understood. Asian carps require long (at least 100 km) rivers for successful reproduction (to allow time for development of eggs suspended in the water column), and floodplains are needed for larval and juvenile development.

Fecundity increases with age and body weight. Individual bighead carp females can produce up to 1 million eggs; silver carp and individual grass carp females can produce up to 2 million eggs. Eggs are semi-buoyant, and the current carries them downstream. Floodplains associated with rising water levels provide nursery areas for larvae and juveniles.

Age at sexual maturity varies, depending on the carp species and environmental conditions (Table 2). All species reach sexual maturity sooner in warmer waters.

Asian carps are long-lived fish. Grass carp live up to 11 years; silver carp can live up to 20 years.

Species	Age at sexual maturity (years)
Bighead (male)	2
Bighead (female)	3
Black	6–11
Grass	4–7
Silver	3–4

**Table 2.** Age at sexual maturity by species of carp.



Carp species	Temperature tolerance (°C)	Maximum salinity tolerance (in parts per thousand)	Oxygen (mg/L)	Diet
Bighead	Tolerance not reported. Prefers 25°C	8 (juveniles)	0.5	Plankton
Black	0 to 40°C	Not reported; however, larvae are known to migrate into brackish waters	2	Benthic invertebrates (juveniles eat zooplankton and small fish)
Silver	0 to 40°C	4	0.5	Plankton
Grass	0 to 40°C	14	0.5	Vegetation (juveniles will eat invertebrates)

**Table 3.** *Habitat and diet preferences of Asian Carps*

### Habitat and food webs

Asian carps naturally occur in a variety of freshwater habitats, including large rivers and warmwater ponds, lakes, and backwaters that receive flooding or are otherwise connected to large rivers. They also have been introduced widely to ponds, lakes, reservoirs, and canals, where they grow well but probably cannot spawn and recruit without access to an appropriate riverine habitat.

Asian Carps can tolerate a wide temperature range but prefer warmer waters (Table 3). Grass carp, black carp, and silver carp have been reported to tolerate water temperatures near 0 to 40°C. Grass carp and bighead carp prefer a temperature of 25°C.

Juvenile bighead carp can tolerate salinities up to 8 ppt for a short period of time, and grass carp tolerate salinities up to about 14 ppt (Table 3). Some authors

have reported that silver carp cannot tolerate salinities greater than 4 ppt. However, larvae are known to migrate to brackish-water areas of the Caspian Sea, where salinities range from 6 to 12 ppt. The black carp is known to occasionally inhabit the deltas of rivers (for example, Yangtze River, China), where it may encounter brackish waters. However, information on salinity tolerance of black carp has not been reported.

Asian carps can tolerate very low oxygen levels (Table 3). Bighead, grass, and silver carp juveniles are tolerant of oxygen levels lower than 0.5 mg/L. Black carp is tolerant of oxygen levels as low as 2 mg/L.

The diet of Asian carps is summarized in Table 3. Bighead and silver carp are primarily filter feeders. However, they do use their pharyngeal teeth to crush plankton cells, because they do not have the digestive fluids necessary to break down the cells. In fact, the mucous coating of some blue-green algae allows the algae to survive the digestive process and pass unharmed through the carp's digestive tract. Bighead carp also feed on zooplankton and detritus, suggesting that they may be able to invade habitats that normally cannot support filter feeders.

Grass carp are famous for their insatiable appetite for aquatic plants. Where introduced, grass carp dramatically alter habitat by eating nearly all the vegetation. However, small grass carp actually feed on invertebrates before switching to plants.

Black carp are bottom feeders whose diet consists primarily of benthic invertebrates, such as bivalve mollusks and crayfish. As juveniles, black carp eat zooplankton and small fish.

### How Asian carps got here

Asian carps were imported at a time when few people realized the potential harm from introduced species. In 1963, grass carp were introduced to control aquatic vegetation in aquaculture ponds. Silver and bighead carp were introduced to Arkansas in 1973 to control nuisance plankton blooms. Black carp were



Kevin Irons, Illinois Natural History Survey

# Asian Carps

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accidentally introduced in the 1970s as a contaminant in a grass carp shipment. Black carp were later introduced deliberately for use as a food fish and to control a parasite-hosting snail in catfish ponds. They were subsequently released into open waterways.

## How Asian carps spread

Grass carp were released intentionally, and it is likely that silver and bighead carp were purposefully stocked into lakes and rivers. Asian carps are easily spread through fish-harvesting activities, because juvenile carps are often confused with other small fish, such as gizzard shad. Fishermen who unknowingly collect juveniles as bait, scientists who collect and monitor fish in many river systems, and commercial fishermen who ship fish (including live bighead carp) from the Mississippi may all contribute to their spread.

## Ecological impacts

**Grass carp.** Grass carp dramatically alter the underwater landscape by rapidly consuming large amounts of vegetation. Loss of vegetation adversely affects the native fish, birds, and invertebrates that depend on aquatic plants for reproduction and refuge. Other herbivores, such as other fishes and crayfish, suffer when grass carp outcompete them for food. Grass carp can even damage riparian areas; in the absence of aquatic vegetation, grass carp will dig into banks to uproot and eat riparian plants. Grass carp feeding behavior also increases water turbidity and alkalinity and decreases dissolved oxygen.

Sterile, triploid grass carp are produced and introduced to areas where aquatic vegetation control is a

high priority. However, the illegal sale of diploid carp as triploid carp undermines this effort and contributes to the spread of reproducing populations. Grass carp are long-lived, so even non-reproducing populations have the potential to dramatically alter an ecosystem by depleting the vegetation.

**Black carp.** Black carp are molluskivores; a four-year-old juvenile is capable of consuming 1 to 2 kg of mollusks per day. Therefore, black carp threaten freshwater mussel populations, which are the most endangered group of aquatic biota in North America. By depleting native mollusk populations such as fingernail clams, black carp compete with native molluskivores such as fish, turtles, migrating waterfowl, raccoons, otters, and muskrats.

**Silver and bighead carp.** As filter feeders, silver and bighead carp have the potential to deplete plankton populations, especially when the fish are at high densities. Loss of plankton will affect other planktivorous organisms, such as juvenile fish and mussels. However, as Duane Chapman of the USGS notes, the impact of carp on plankton is highly variable, due to differences in stocking densities and species of plankton. "Certain noxious blue-green algae are controlled by silver and bighead carp, but others are not and can even be exacerbated (because these algae pass through the gut of the fish unmolested, and pick up quite a nutrient dose while in the gut). Also, consumption of zooplankton and larger and colonial phytoplankton leaves an open niche that is often filled by nanophytoplankton, so you end up with really green water and few zooplankton." Also, research to date has been conducted exclusively in lakes, so we know nothing about the effects of silver and bighead carp in river ecosystems.

## "I'd like a carp burger with fries, please."

Coming soon to a fast-food joint near you! Some groups have proposed intensive harvesting of the carp as means of control and to make "Surimi," a fish paste, to create "carp burgers." Surprisingly, in a "blind" taste test (consumers were not told what kind of fish they eating) conducted by the University of Arkansas, consumers rated canned silver carp equal to or better than canned tuna fish and salmon. Plans are in place to use the enormous amount of Asian carps in Midwest rivers as a food source. The St. Louis Zoo is investigating ways to feed this cheap protein to penguins, sea lions, and pelicans.

## ECONOMIC IMPACTS

### Beneficial

Asian carps benefit the aquaculture industry by improving water quality. Grass carp control vegetation, and black carp consume disease-carrying snails. As filter feeders, silver and bighead carp may help reduce undesirable plankton, such as toxic blue-green algae. However, research on the effect of silver and bighead carp on plankton levels has produced mixed results, and more studies are needed to confirm the effect of silver and bighead carp on water quality.

Grass carp improve recreational and fishing opportunities in natural lakes that are otherwise plagued by mats of aquatic vegetation, which prevent water access.

The large numbers of Asian carps found in Midwest rivers have inspired some entrepreneurial thinking about potential markets for these fish. Because Asian carps are viewed as a potential source of inexpensive protein, some entrepreneurs are considering selling them in the form of carp patties to prison cafeterias. Some zoo managers are considering feeding some form of carp to piscivorous zoo animals. Cosmetics makers are investigating using the large amount of collagen in Asian carps' skin in makeup. Commercial fishermen have had success selling live, wild-caught bighead carp to Asian buyers in New York City.

### Detrimental

Controlling the spread of escaped Asian carps requires very costly technology. For example, it will cost \$10 million to install an electrical barrier in a Chicago canal to prevent the spread of Asian carps to the Great Lakes.

The establishment of large, self-sustaining populations of Asian carps may compromise commercial fishing in the Mississippi basin. Asian carps have become a large portion of the commercial catch, often forcing fishermen to abandon their fishing sites because nets heavy with carp become impossible to lift.

By negatively affecting native fauna, an invasion of Asian carps could have a substantial impact on the economy of the Great Lakes. The sport and commercial fisheries of the Great Lakes are valued at \$4.5 billion annually.

Jumping silver carp are hazardous to boaters and water-skiers. The sound of an outboard engine often causes silver carp to jump out of the water and collide with boaters, which causes serious injury to people and damage to equipment. The damage caused by silver carp is compared to being hit by a flying bowling ball! Loss of these recreational activities will likely have an influence on local economies.

### CULTURAL SIGNIFICANCE

Asian cultures value Asian carps as a food source. In China, black carp are considered one of the most desirable food fish and have been cultured for at least 1,000



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### COOL FACTS

Silver carp was first introduced to the United States to help consume plankton from sewage lagoons and catfish farms. Grass carp can consume up to 40% of their body weight in a day. In the absence of aquatic vegetation, grass carp will lift their heads clear of the water to consume terrestrial plants along the edge of the water. Bighead and silver carp lack a true stomach, which requires them to feed almost continuously.

The sound of an outboard motor often causes silver carp to leap out of the water and collide with boaters, causing serious property damage and human injury.

Asians often prefer that bighead carp remain alive until immediately before eating.

years. The popularity of Asian carps in China has led to overfishing and dwindling populations.

Asian carps are used to manage water quality in aquaculture ponds. Grass carp control vegetation; black carp control snails that host parasites that can kill cultured fish. Bighead carp are used to remove nuisance plankton, such as filamentous blue-green algae. However, few studies support the assertion that bighead carp improve water quality.

Asian cultures revere carps as a symbol of prosperity and longevity. Policies and laws that govern Asian carps in their native range are unknown.



## HISTORY SURVEY: Goldfish

Did you know that the popular aquarium pet, the goldfish (*Carassius auratus*), is also an introduced Asian carp? In fact, the goldfish is thought to be the first foreign fish species introduced to North America, probably in the late 1600s as an ornamental species.

Goldfish were the first cultured fish; their domestication began thousands of years ago in China. New strains are still developed today. For example, a new variety called the “black salty” tolerates salt water and is marketed as a live bait fish for use in salt water. (A recent study found the black salty nearly equivalent to standard goldfish in its salinity tolerance.)

Goldfish have invaded the quiet backwaters of streams across the entire United States. Their success in the wild is not surprising. Goldfish can survive in degraded conditions such as low dissolved oxygen, wide temperature fluctuations, and high levels of turbidity (cloudy water), and in brackish and polluted waters. They are also voracious omnivores and have high reproduction levels. Can you think of how goldfish escaped to the wild? Goldfish were released deliberately (often as aquarium pets) and escaped from aquaculture facilities.

## LAWS CURRENTLY IN PLACE

The Great Lakes Asian Carp Barrier Act (HR553 and S336) will provide approximately \$9 million to construct and maintain a permanent electrical barrier on the Mississippi River to prevent the spread of carps into the Great Lakes.

Many states prohibit the introduction of Asian carps or require a special permit for a bio-secure facility. In Oregon, all Asian carps are classified as prohibited except for grass carp, which is classified as controlled. Oregon allows only certified, triploid grass carp. In California, all Asian carps are classified as restricted species, except for possession by permit of triploid grass carp.

In July 200, the US Fish and Wildlife Service added the silver carp (and largescale silver carp) to the country’s list of injurious species (via the Lacey Act), making it illegal to import or transport silver carp without a permit.

On October 18, 2007, the US Fish and Wildlife Service added all forms of live black carp to the country’s list of injurious species (via the Lacey Act). It

is illegal to import live black carp, gametes, viable eggs, and hybrids into or between the continental United States, the District of Columbia, Hawaii, Puerto Rico, or any territory or possession of the United States without a permit.

## HEALTH HAZARDS

Natural resource management agencies are discouraging water-skiers from areas with heavy Asian carp infestations. The sound of an outboard engine often causes silver carp to jump out of the water and collide with boaters, which causes serious injury to people and damage to equipment. The damage caused by silver carp is compared to being hit by a flying bowling ball! Loss of these recreational activities will likely have an influence on local economies.

## MANAGEMENT STRATEGIES

Installing barriers in rivers is one way to prevent the spread of carps. The Army Corps of Engineers is constructing an electrical barrier designed to prevent Asian carps from reaching the Great Lakes, in the Chicago sanitary and ship canal. The Minnesota Department of Natural Resources is considering constructing a wall of bubbles and noise to keep carps from migrating up the Mississippi River; however, these barriers are not 100% effective.

Sterile, triploid grass carp are produced and introduced to areas where aquatic vegetation control is a high priority. However, the illegal sale of diploid carp as triploid carp undermines this effort and contributes to the spread of reproducing populations.



Nerissa Michaels, Illinois Natural History Survey

Grass carp are long-lived, so even non-reproducing populations have the potential to dramatically alter an ecosystem by depleting the vegetation.

Natural resource management agencies are encouraged to create Hazard Analysis and Critical Control Point (HACCP) plans to prevent the spread of Asian carps. If implemented, HACCP plans would help prevent new introductions by identifying the points along an invasion pathway where invasive species can most easily be removed.

Ultimately, successful control of Asian carp rests on coordinated management, regulation, public education, and further research into Asian carp biology and invasion dynamics.

### WHAT YOU CAN DO!

Fortunately, Asian carps have not established in western waterways. However, it is likely they will be able to establish and grow once introduced. Here are some steps you can take to help prevent Asian carps from spreading into the west:

- Learn to identify all four species of Asian carps.
- Before transporting your boat between water bodies, remove water from your bail bucket, live well, and bilge.
- Never dump live fish from one body of water into another.
- Report sightings. Record the exact location, freeze the specimen in a sealed plastic bag, and call your state's Fish and Wildlife Department. In Oregon, call 1-866-INVADER to report suspected Asian carps.

### INFORMATION GAPS

- A better understanding of the life history of Asian carps in the environments the carps invade would help to effectively target vulnerable life stages for control.
- Innovative control methods, such as pheromone attractants and natural repellants, are needed.
- Models of the Asian carps' ecology, such as population dynamics and trophic function, would help determine the long-term effects of Asian carps in large-river ecosystems in the United States, as well as the potential impact of carp in western waterways.

### Common Carp

Common carp (*Cyprinus carpio*) have been part of our culture for so long that few people realize they are nonnative, invasive, and problematic. Common carp are an important food and ornamental fish. They were raised for thousands of years in Europe and China, and their remains have been found in archaeological excavations. Over the last two centuries, ornamental strains (called "Koi") were developed in Japan. The common carp's importance in the Old World led to its early introduction to the United States in the 1800s. Given this rich history of breeding, trading, and transporting, it is not surprising carps have escaped to the wild in every state in the United States except Alaska. Common carp populate slow-moving waters, such as human-made impoundments and lakes all over the United States. They are also abundant in streams that are polluted by agricultural runoff and sewage. Common carp take a heavy toll on the environment and our economy. They disturb spawning and nursery areas of native fish by re-suspending silt into the water, and they are very expensive to control. Due to its great ability to spread and its negative impact on ecosystems and the economy, the common carp is now listed among the world's 100 worst invaders.

- Natural-resource managers need to develop Hazard Analysis and Critical Control Point (HACCP) plans so they are not spreading Asian carp as part of their activities.

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## ADDITIONAL RESOURCES

### Web sites

#### General info

Oregon Public Broadcasting's "Silent Invasions" Web site [www.opb.org/programs/invasives/videos.php?page=mussels](http://www.opb.org/programs/invasives/videos.php?page=mussels)

The Statesman Journal's 10-month series, "Invasive Species of Oregon." [www.InvasiveSpeciesofOregon.com](http://www.InvasiveSpeciesofOregon.com)

Aquatic Nuisance Species Project [www.aquaticnuisance.org/index.php](http://www.aquaticnuisance.org/index.php)

Hazard Analysis and Critical Control Points (HACCP) planning [www.haccp-nrm.org/](http://www.haccp-nrm.org/)

Nonindigenous Aquatic Species Program (NAS) [http://fl.biology.usgs.gov/Nonindigenous\\_Species/nonindigenous\\_species.html](http://fl.biology.usgs.gov/Nonindigenous_Species/nonindigenous_species.html)

Oregon Clean Marina Program [www.oregon.gov/OSMB/Clean/ANS.shtml](http://www.oregon.gov/OSMB/Clean/ANS.shtml)

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

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

#### Asian carp info

AsianCarp.org is an official Web site established to coordinate the implementation of control and management of Asian carps in the United States. [www.asiancarp.org/](http://www.asiancarp.org/)

Carpbusters works with sportsfisherman to prevent the spread of harmful Asian carps. [www.carpbusters.com](http://www.carpbusters.com)

USGS Fact Sheet on bighead and silver carp [www.cerc.usgs.gov/pubs/center/pdfDocs/Asian\\_carp-2-2004.pdf](http://www.cerc.usgs.gov/pubs/center/pdfDocs/Asian_carp-2-2004.pdf)

Columbia River Asian Carp Risk Evaluation. [www.asiancarp.org/Documents/Asian-Carp\\_PNWRiskEvaluation\\_022208.pdf](http://www.asiancarp.org/Documents/Asian-Carp_PNWRiskEvaluation_022208.pdf)

## Videos

The Statesman Journal's 10-month series, "Invasive Species of Oregon." Includes a video about Asian carp for downloading. [www.InvasiveSpeciesofOregon.com](http://www.InvasiveSpeciesofOregon.com)

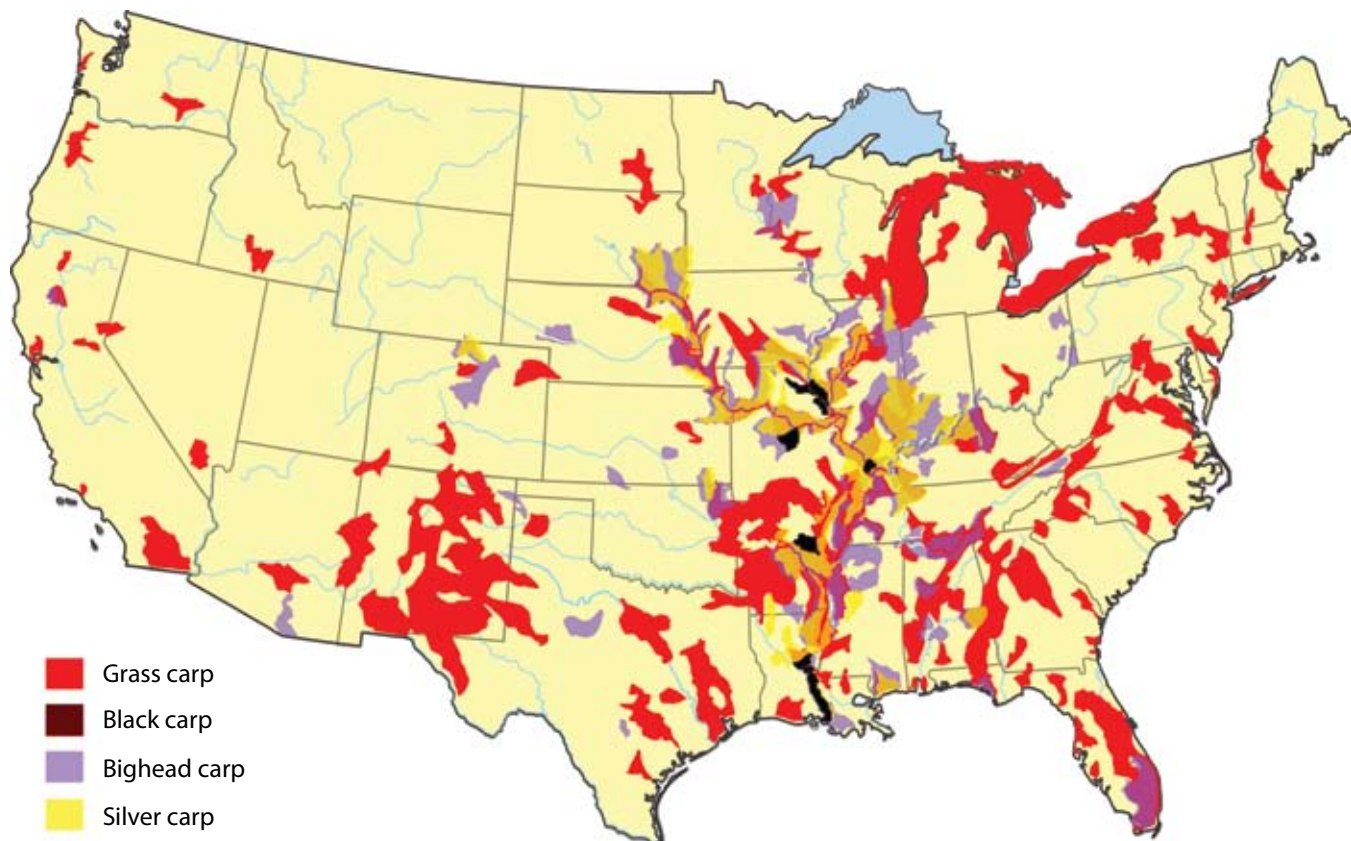
AsianCarp.org collection of videos at [www.asiancarp.org/multimedia.asp](http://www.asiancarp.org/multimedia.asp)

## Articles

Carp Lemonade, by Duane Chapman, a leading scientist studying Asian carp <http://mdc.mo.gov/conmag/2004/07/20.htm>

## Educational sites

Nab the Aquatic Invader [www.sgnis.org/kids/](http://www.sgnis.org/kids/)



*Data on map represents established population and species occurrence data. Map created 3/08*