Learn the facts about Asian carp

Silver, bighead, and grass carps are all invasive fishes (along with several other carp species) that originally came from large rivers in Asia and so are often referred to as "Asian carp." Silver and bighead carps have become highly invasive in rivers such as the Mississippi and Illinois Rivers, where they can comprise up to 75% of the fish biomass. The closest reproducing population of silver and bighead carps to date is thought to be in Iowa, and both species now threaten to become established in Minnesota.

Asian carps pose threats to aquatic vegetation, food webs, commercial and recreational fishing, and silver carp pose an extra threat to human health due to their propensity to leap out of the water when disturbed by watercraft.

What they look like & life cycle

All carps in the genus Hypophthalmichthys can be characterized by a stout body with a large head, downward-facing eyes, small scales, and a jaw without teeth. Two defining features of the genus are gill rakers and epibranchial organs, which sense chemical food cues and may control reflexive filter feeding behavior in bighead carp. Carp also have an above-average sensitivity to sound.

**Bighead carp** (*Hypophthalmichthys nobilis*):
- Up to 51 inches long and 110 pounds
- Mature at 2-7 years old, live up to 9 years
- Silver in color with dark blotches along the dorsal region, and have no scales on their heads
- Adults spawn in rivers, and their eggs drift into low-flow nursery areas.
  - Each female can produce up to one million eggs per year. Both juveniles and adults eat zooplankton, the basis of the food chain.

**Silver carp** (*Hypophalmichthys molitrix*):
- Up to 39 inches long and 77 pounds
- Mature at 2-6 years old, live up to 20 years
- Silver with no scales on their head and a downward slanting mouth
- Similar spawning habits to bighead carp. Females can produce up to two million eggs per year. Juveniles eat zooplankton and phytoplankton; adults just eat phytoplankton.

**Grass carp** (*Ctenopharyngodon idella*):
- Up to 59 inches long and 99 pounds
- Mature at 4-7 years old, live up to 21 years
- Olive green with a rounded snout and an over-hanging upper lip
- Females produce up to two million eggs per year. Juveniles prey on aquatic invertebrates; adults eat aquatic and terrestrial plants.

Where they’re found

Populations of bighead and silver carps are established in the Mississippi River and its tributaries downstream of pool 16, near Davenport, Iowa. In Minnesota, individual Asian carps have been caught, but there is no evidence to date that they are reproducing in Minnesota waters.

- Fifteen individual bighead carp have been caught in the St. Croix River since 1996
- Ten silver carp have been caught in the Mississippi River in Minnesota since 2008, as far upriver as Pool 2, near Cottage Grove, in 2014
- Numerous individual grass carp have been caught in Minnesota, including in the Mississippi River and the St. Croix River. Many are thought to be escapees from stocking operations in Iowa, which allows for the sale of sterile grass carp.

How they spread

Bighead and silver carps were imported to the southern U.S. in the 1970s to remove algae from catfish farm ponds and wastewater treatment plants. They escaped into local waterways shortly afterwards following severe flooding in which farm ponds overflowed their banks. Since then, they have been traveling upstream and spreading to major river systems, including the Mississippi River.

Bighead carp thrive in degraded and channelized river environments, making the Chicago River and the Mississippi River ideal pathways.

Weaknesses that may be targeted for detection, prevention, and control include: a tendency for these fish to aggregate and shoal; their unique olfactory and eating habits; their swimming capabilities; and their exceptionally good sense of hearing as compared to other native fish.

Photos: Asian Carp Regional Coordinating Committee, Nancy Stone (Chicago Tribune), USGS, EcoWatch
Asian carp research at the
Minnesota Aquatic Invasive Species Research Center

Current research at MAISRC focuses on detection using optimized eDNA and microbial techniques, prevention using enhanced bubble curtains and modifications to locks and dams, control using Judas fish techniques and attractants, and possible eradication using native pathogens. Efforts also include a risk analysis to guide Asian carp management decision-making.

MAISRC researchers have:

• Developed a valid and reliable qPCR assay marker and used it to determine optimal eDNA sampling and extraction procedures and available eDNA extraction kits, using common carp as a model
• Determined that eDNA does not persist across large expanses of natural waters, calling to attention a new, critical need to sample waters in an extremely strategic manner
• Demonstrated that juvenile silver and bighead carps shoal (aggregate) in the laboratory, meaning that the Judas fish concept has potential to be used to locate and control these species
• Found that masculinization of carps using steroid implants appears to be a viable technology for use with Judas fish
• Shown that olfaction drives feeding responses and that the epibranchial organ functions as a pharyngeal taste organ
• Shown that food attractants have the potential to be used for control of bighead and silver carps
• Demonstrated that silver and bighead carps are strongly repelled by sound in a highly directional manner that is associated with local acoustic particle motion
• Shown that the simple and inexpensive technology of an enhanced bubble curtain can, on its own, deflect nearly 90% of both bighead and silver carps from entering experimental channels in the laboratory
• Identified two novel viruses from common carp and grass carp mortality events: novel picornavirus and novel paramyxovirus
• Identified the first report of Grass Carp Reovirus (GCRV) associated with fish mortality in the United States
• Completed the first step in a risk assessment, which identified a list of potential adverse effects that could result from the establishment of Asian carp in Minnesota
• Identified the primary tensions and conflicts in Asian carp management in Minnesota through interviews and focus groups with a diverse set of agency officials and stakeholders

For more information
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