



Asian Carp: Threats to the Lower Great Lakes and St. Lawrence River?

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Asian carp have been getting a great deal of attention in the media lately, from the national news to YouTube videos. There is great concern about these non-native fish moving to the Great Lakes. The term "Asian carp" is a little confusing. There are 7 species of carp in North America, including common carp and goldfish, but they all originate from Asia. Of these, 4 species are a potential threat to the Great Lakes: bighead, silver, black and grass carp. By far, the greatest threat comes from two of these species, the silver (*Hypophthalmichthys molitrix*) and bighead (*Hypophthalmichthys nobilis*) carp. Typically, these are the two species that are known as Asian carp. Silver carp are also the species that are noted for their high-flying, jumping behavior which causes people to refer to them as flying carp. People have been seriously injured aboard watercraft after collisions with airborne silver carp.

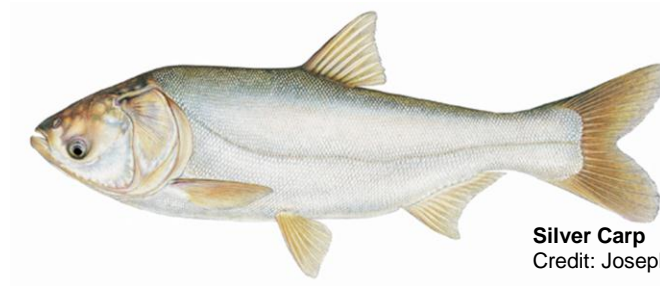
Both species are similar in their ecology and appearances, but can be easily distinguished from each other. There are few other native fish species that resemble the Asian carp as adults. Unlike other fish, the eyes of the Asian carp are low-set and found nearer to the underside of the head. Asian carp also have large upturned mouths and lack the sensory whisker-like, barbels that easily identify common carp. The real challenge, however, is identifying these carp as juveniles. This can be a special challenge for wild bait harvesters who can easily mistake juvenile carp for native bait species. The risk of accidentally introducing carp with bait is very real and anglers should be aware of this threat.

Invasive species have caused quite a stir in the Great Lakes because of all the damage done to food webs. The Asian carp are invasive species of concern to many people because of their diets and feeding habits. Unlike species such as zebra and quagga mussels, ruffe and spiny water fleas that were introduced via ballast from foreign shipping, the Asian carp were actually purposefully introduced in the 1970s. North American catfish farmers in the Southern states introduced these fish to control algal growth in their ponds, which can cause off-flavors in farmed catfish.

Flooding events from the Mississippi and larger connected rivers adjacent to catfish farms flushed Asian carp into the rivers during the 1990s. Reportedly, they are thriving in their new river habitats and appear to be affecting the ecology of the rivers at the expense of native species. Asian carp are now found in at least 18 states and are well adapted to living in large rivers in their North American range.

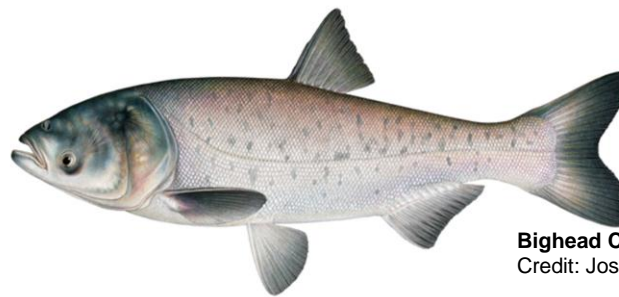
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They live in main river channels, connecting tributaries and channels and in backwater areas. They can be found just beneath the surface (silver carp) to between 15' and 60' depths. A single female carp can produce 600,000 to 1.6 million eggs per year. Interestingly, the eggs float and can be carried by water currents to new areas, increasing their potential to spread.



Silver Carp

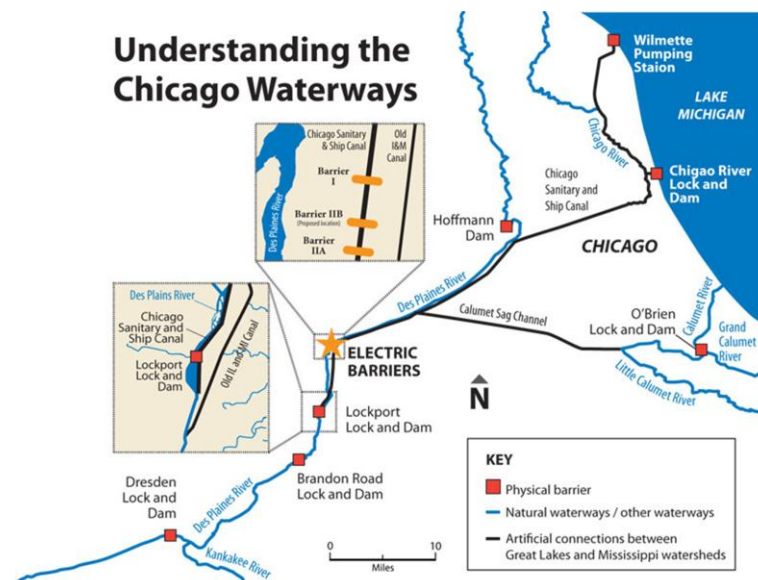
Credit: Joseph Tomelleri, Cimarron Trading Co.



Bighead Carp

Credit: Joseph Tomelleri Cimarron Trading Co.

Since their accidental release, a steady upstream movement of Asian carp is taking place towards the Great Lakes. Scientists believe that carp could make their way to the Great Lakes via the Chicago River system. Before early 1900, there were no natural connections between the Mississippi River systems to the Great Lakes. The Chicago Sanitary and Ship Canal and the Calumet Sag Channel were constructed to reverse water flow of the Chicago and Calumet Rivers, so that Lake Michigan water would flow backwards into the Des Plaines River and ultimately into the Mississippi River system. These may prove to be the principal entry routes for Asian carp into the Great Lakes.



Credit: Michigan Sea Grant

The U.S. Army Corps of Engineers (USACE), in cooperation with several other agencies, installed a series of electric barriers along the Chicago Sanitary and Ship Canal to prevent Asian carp and other invasive fish from moving between the waters of the Mississippi River and the Great Lakes. Unfortunately, carp may have already successfully bypassed the barriers. Scientists have been using a high-tech means of detecting carp from water samples by looking for Asian carp DNA utilizing Environmental DNA or eDNA. DNA is the genetic material that is used by living organisms to pass on traits to their offspring. Of concern is that Asian carp eDNA has already been detected on the Lake-side of the electric barriers. This either means that carp passed through the barriers, or somehow their DNA entered the area. Unfortunately, eDNA evidence cannot determine whether the carp were alive or dead, how many fish were present or how the carp got to the area where the tests were taken. The eDNA sampling technique is an important tool being used by the Asian Carp Regional Coordinating Committee to keep Asian carp from invading the Great Lakes.

What is it about these fish that are of such concern, other than their jumping behavior? Studies on Asian carp in Asia and here in North America reveal that that both species consume large amounts of plankton, including microscopic plants (phytoplankton), microscopic animals (zooplankton) and small insects. Part of the reason for the large appetites is due to their massive body sizes, but also because they are inefficient in digesting and converting food into growth and they also produce a great deal of waste. In spite of their small prey, these two species can grow quickly on this seemingly meager diet. Bighead carp, the larger of the two species, can reach 100 pounds, compared to silver carp that can reach 60 pounds. Although smaller, the jumping silver carp is still a good-sized fish, especially when they leap out of the water and collide with boats or people.

The fact that they eat plankton, puts them into competition with smaller fish that, in turn, are eaten by large fish. The larvae of all fish, regardless of species, must have adequate plankton supplies to survive. If carp invade the Great Lakes, the greatest risk is that they could reduce the survival of all young fish and reduce the ability to support fish biomass, an impact similar to that caused by zebra and quagga mussels.

This situation is of concern since Great Lakes plankton abundance has already been reduced by mussels and other unknown factors such as lowered levels of fertilizing nutrients (mostly containing phosphorus) in offshore areas of the Great Lakes. Fish like salmon and trout could be most affected by carp living in the offshore areas. Some biologists have suggested, however, that plankton supplies may already be so limited offshore that the Asian carp may select inshore areas where phosphorus levels are higher from nutrients washing in from surrounding land. In nearshore areas, fish like bass, perch and walleye could have lower survival of young from competition with plankton-eating Asian carp.

As impressive as these growth rates are, the question has to be asked: Can they live in the Great Lakes once, or if, they get here? Chinese studies indicate that the Asian carp favor water temperatures between 40 and 85° F. This large temperature range overlaps with most fish species in the Great Lakes, from salmon and whitefish that prefer colder waters, to sunfish, smallmouth bass and common carp that inhabit warmer waters. Scientists predict that carp could survive in most areas of North America, between 21° N to 50° N and up to 54° N for silver carp. Recent studies from Ohio suggest that Great Lakes water temperatures (at least in the Western Basin of Lake Erie) would also be suitable for carp reproduction as well.

Other studies show that carp can live in higher salinities (1-7 ppt, with full strength sea water being 34 ppt salinity), suggesting that carp may even adapt to lower and more brackish stretches of the Hudson and St. Lawrence Rivers, should they enter the Great Lakes watershed.

Asian Carp

Electrical barriers cannot be the only weapon in the fight to keep these invasive fish from establishing populations in the Great Lakes. The recently formed Asian Carp Regional Coordinating Committee (ACRCC) is a group of federal, state, and local agencies. They have developed the *Asian Carp Control Strategy Framework*, which includes several approaches from installing a chain-link fence across an Indiana floodplain to prevent large Asian carp from moving from the already infested water of the Wabash River into the Maumee River and possibly Lake Erie, to increasing commercial harvests below the barriers to reduce population levels. The complete Framework is available at:

<http://www.asiancarp.org/Documents/FrameworkDec15-2010.pdf>

According to the Asian Carp Regional Coordinating Committee, if you catch what you think is an Asian carp you should report the incident and the location to your state agency and if possible photograph the fish in question. Do not transport the fish from one water body to another and do not keep a live Asian carp in your possession. It is **illegal** under the federal Lacey Act to transport live Asian carp, including viable eggs or hybrids of the species, across state lines. For a complete factsheet:

<http://www.asiancarp.org/documents/WhatToDoIfYouFindAnAsianCarp.pdf>

Is there anything good about Asian carp? Asian carp are supposedly fine table fare. Their flesh is reportedly mild, yet flavorful. Although very bony like pike, carp fillets can be prepared in a fashion similar to that of pike by removing the pesky "Y" bones. There are a number of Asian carp recipes on the web. In a blind taste test, University of Arkansas researchers found that people preferred the taste of canned carp to canned tuna by a large margin. Asian carp are also much lower in contaminants than canned tuna, especially the high mercury levels found in tuna, which has prompted the FDA guidelines to eat no more than 2 meals of canned tuna per week.

For more information on Asian carp and their impacts:

<http://www.AsianCarp.org>

<http://www.epa.gov/glnpo/invasive/asiancarp>



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