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GREAT LAKES AND MISSISSIPPI RIVER INTERBASIN STUDY

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Asian Carp Eradication January 2011

We already have a massive invasive species problem, that's about to get worse with the addition of Asian carp.

To be successful, any plan, anything, has to have a Beginning, a middle, and most important and end.

I suggest we change the name to Asian carp Eradication Plan, our goal. Control is never ending, thus you are always stuck in the middle. Eradication is an end, and we all should be working towards that end.

If it is possible for invasive species to wipe out or "eradicate" native species, then it is possible for our native fish to wipe them out back.

There is something wrong, when someone keeps saying, "we've never done this" or "We've never done that" over and over again. I submit we've never had a giant flying Carp problem before either!

There's also something wrong when someone keeps saying "It won't work" over and over again. Especially, when it's been done before elsewhere!

After many years of study, Common Carp control experts have concluded that "After reductions, stocking of predator species is essential to control numbers of young carp", Also "In areas where carp have not reached a nuisance level, a dense predator base should be maintained to provide a high level of predation on young carp." This is where we are at now with the Great Lakes.

Since Asian carp spawn 3 or more times a year, then it's 3 times more essential that we have predators in place and "maintain dense levels".

According to studies, the best predator seems to be a panfish type. One that eats eggs, fry and juvenile size carp, and can survive in warm water areas, backwaters, swamps etc.. which are the spawning/nursery areas of Asian Carp.

Our native Perch fit this role perfectly, and with their wider mouth gape, can feed further into the Asian Carp life cycle. Depending on size most of the carps first year, or be a predator longer than say a Bluegill, with a much smaller mouth. As a bonus, Perch also eat Zebra/Quagga mussels, Gobies, spiny fleas and most of the current invasive species we have now.

So by maintaining a high native predator level to attack the Asian carp, we are also attacking our other invasive species problem at the same time. Perch are also natural prey, for our other native predators, Walleye, Pike, Muskie, that would also eat Asian Carp, but target larger ones

that might get past the Perch, and restore our Natural Ecosystem, which we're also supposed to be trying to do. What Nature planned is always best!

There is no downside to a high native fish population. We are supposed to be working towards that goal anyway. It's all downside with a high invasive species population, worse if it's topped off with Asian Carp!

Stocking is a common tool used to restore native species. The Saginaw Bay/Huron Walleye population, was restored with stocking. (Saginaw Bay Recovery plan MDNR). The MDNR is currently trying to restore native Cisco, with a stocking program. The S.O.N.S. of Lake Erie (Save our Native Species) Group, stocks 2 million Perch annually in Lake Erie. Maryland is working to restore it's Perch population, through stocking. Many other examples. So it's not like it hasn't been done before. Recruitment or (surviving the spawn attempt to adult) is being intercepted by invasive species. So native fish populations struggle to survive.

Just cutting the Perch limit to 20, (or less) close during spawn, costs nothing, and is long term prudent protection of the population. Slot limits on Walleyes (only one over 23 inches) protects a core spawning group of large female prime spawners, and maintains high predator base. Also costs nothing. In short, A little SELF CONTROL on our part goes a long way! Just because we can keep fish, doesn't mean we should. Safe spawning/nursery zones can also be created real easy.

We have invasive species dying of old age, and Native fish, not living long enough to learn how to swim! We need to reverse that and soon! The proof is going on in the lake now!

If we all Work together, we can win this fight!

Sincerely,

Tom Matych

3979 Holton Duck Lake Rd.

Twin Lake Mi. 49457

1.1 PURPOSE

The Framework is a dynamic document, reflecting an ever-increasing body of knowledge gathered from ongoing research and monitoring, and builds on the December 2009 deployment of federal, state, local, and Canadian resources to conduct an eradication effort in the Chicago Sanitary and Ship Canal (CSSC). Many actions described in this Framework, such as research and feasibility studies, are expected to provide additional data that may be included in future Framework updates. However, the main objectives of this initial Framework are:

- Outline the urgent actions participating agencies are taking to apply full authorities, capabilities, and resources in order to prevent establishment of Asian carp in the Great Lakes. While scientific opinion is not unanimous that Asian carp would devastate the ecology of the Great Lakes, the participating agencies agree that we cannot wait until the outcome can be predicted with absolute certainty. We must act preemptively with comprehensive measures to prevent establishment of carp in the Great Lakes or their tributaries. Experience has shown that controlling populations of AIS, once established in a new environment, is far more expensive and difficult than preventing their entry to the Great Lakes in the first place.

- Integrate and unify the future actions of participating agencies. While agencies have coordinated significantly in the past, this Framework is a comprehensive, integrated approach to address the Asian carp threat to the Great Lakes, and helps to further unify the participating agencies by:
  - Describing actions to prevent establishment of carp.
  - Identifying lead agencies.
  - Establishing funding for actions.
  - Determining the most effective approach for implementing actions.

- Transition from a single-point defense to a multi-tiered approach. Electric barriers remain the most important defense mechanism against Asian carp expansion through the CAWS. However, success in preventing Asian carp from establishing a self-sustaining population in the Great Lakes depends on the ability to build upon this technology, located at a specific geographic point, to a multi-tiered defense encompassing structural solutions, biological controls, eradication response options, and other approaches.

- Provide direction while recognizing that the history of Asian carp migration demands flexibility by participating agencies. This Framework allows participating agencies to adjust plans to better serve the goal of preventing carp migration to the Great Lakes. This is meant to be a living document subject to change as the situation dictates.

The fisheries management agencies agree that rebuilding native fish populations that can provide predation on young carp can be an important tool. It is known that native species, if present in sufficient numbers, can prey on juvenile Asian carp and could lead to a decline in their population numbers. However, it is well documented that Asian carp do outcompete native species. This is the case in both the Mississippi River and Illinois River where the majority of the species present are now Asian carp. Through overfishing activities that can result in a large decline in Asian carp population numbers, native species would have the ability to re-establish themselves and once again become the dominant species. There would also be a benefit realized in that by removing Asian carp from areas proximate to the electric barriers, this would lower the likelihood that Asian carp could find a way to migrate upstream of the electric barriers. Lastly, the fisheries management agencies are committed to restock native species when those opportunities become available.

- Identify opportunities for existing stakeholder agencies to actively engage additional stakeholders' cooperation. The Great Lakes region has a proud and vibrant history of cooperation, as evidenced by the *Great Lakes Regional Collaboration Strategy*, *Great Lakes Restoration Initiative Action Plan*, and the multi-jurisdictional contributions to the December 2009 effort to prevent Asian carp from penetrating the United States Army Corps of Engineers (USACE) electric barriers. Cooperation is crucial to keep Asian carp out of the Great Lakes. Aggressive outreach at key milestones in this Framework's development process will result in (1) innovative and effective ideas, (2) more solid stakeholder commitments, and (3) a better chance at lowering the risk of invasion.

Goal 4: Minimize potential adverse effects of feral bighead, black, grass, and silver carps in the United States.	
Strategies and Recommendations	**Species**
Strategy 3.4.1. Enhance organisms adversely affected by Asian carps.	
3.4.1.1. Monitor populations of species most likely to be affected by Asian carps.	Bighead, Black, Grass, Silver
3.4.1.2. Restore or supplement numbers of native species through direct release (i.e., stocking).	Bighead, Black, Grass, Silver
3.4.1.3. Protect or restore native species through methods other than stocking.	Bighead, Black, Grass, Silver

Baby Asian Carp Look like Shad!
Perch and Walleye eat Shad!

Understanding carp population dynamics: a key to control

Przemek Bajer* and Peter W. Sorensen, and Paul Brown, Dept. Primary Industries, Marine and Freshwater Resources, Victoria, Australia

The size of all populations of fish including common carp is ultimately determined by recruitment and survival rates. Understanding how these two processes are controlled by

rebound of the species. In areas where carp have not reached a nuisance level, a dense predator base should be maintained to provide a high level of predation on young carp.

. Because carp and other undesirable species are sure to reproduce more successfully following reductions in carp numbers, stocking of predator species is essential to control numbers of young carp. If predator populations can be increased and maintained, biologists may not need to intervene as often to preserve a desirable fish community.

A High Native Fish population can only enhance any Invasive species control plan. Currently Lake Michigan has a High invasive species population. Our native fish are not having consistent spawn success, Invasive Species are. We have multiple invasive species, with multiple access points, so a multiple or (Diverse) community of predators is called for. Experts agree this makes an Ecosystem more resistant to invasive species. Our Native yellow Perch alone eat most of the invasive species we have now, we only require sufficient numbers, to tip the balance in their favor. Since all Native fish are threatened, then all user groups should be involved. Increasing Native Fish (Predators) Does not in any way, interfere with any other part of the Asian carp Control Plan. There is no logical reason that we can't protect our native fish's spawn attempts, and increase their numbers, before the Asian Carp, get "sufficient numbers" to overrun the entire Ecosystem, thus everyone loses.

Using Native Fish Predators is an Ecologically friendly invasive control method. Doing what's best for the Natural Ecosystem, is always best for everyone concerned. The worst thing that could happen is we wind up with more Native Fish, which currently have an unlimited Invasive species food source. We merely have to help them get a good start, They will do the rest, and they work for food!

T. Matych Twin Lake Mi.

Chapter 4. Predation as a Potential Mechanism for Biological Control

Fishery biologists face many challenges while attempting to maximize fishing opportunities for anglers. One major challenge for managers is the control (i.e., reduction or elimination) of undesirable fishes. Numerous criteria are used to determine if a species is undesirable including lack of recreational value to anglers and negative affects on native, endangered or popular sportfish populations (Wydoski and Wiley 1999). If a species meets these criteria, fishery managers have a number of options to control undesirable fishes, which are broadly categorized as chemical, mechanical and biological control. Despite prior widespread use of chemicals to control undesirable fishes, this method is losing popularity among fishery agencies (Bettoli and Maceina 1996). Numerous economic, social and political ramifications are involved when conducting chemical lake renovation. Mechanical removal can be successful, but is labor-intensive and usually only a short-term solution (Wydoski and Wiley 1999). Biological control of undesirable fishes, however, is an attractive option to fishery managers. The stocking of piscivores to control undesirable fishes is particularly attractive (Wydoski and Wiley 1999). If successful, this option simultaneously provides increased recreational opportunity (i.e., more predators for anglers to catch) and reduces undesirable fish populations without the use of chemicals or labor-intensive gears. The objective of this study was to evaluate predation as a potential mechanism for biological control of white perch in Branched Oak and Pawnee reservoirs.

During 2007, foraging success was different for predators in both Branched Oak and Pawnee reservoirs (Figure 4-3). In Branched Oak Lake, walleye foraging success on white perch was greater (~ three times) than any other predator (Table 4-4). Flathead

Invasive species

ERDC/TN ANSRP-07-1
May 2007

Life History Attributes of Asian Carps in the Upper Mississippi River System

by James E. Garvey, Kelly L. DeGrandchamp, and Christopher J. Williamson

These modeling results for the silver carp population suggest that, even with the high natural mortality rates experienced by this species (Williamson 2004), considerable additional loss of fish either through selective removal or exclusion from spawning areas would be necessary to significantly affect population dynamics. Current gears used to collect this species are quite selective for large-bodied individuals (Williamson and Garvey 2005). Because strong impacts on populations will not occur unless small individuals also are affected, programs to selectively remove this species will require greater efficiency at harvesting small fish, perhaps in areas such as backwaters where older, larger fish are not present.

that wide fluctuations in population density will be likely. The high reproductive capacity of both species, in particular silver carp, ensures that attempts to exclude or remove individuals will require a massive undertaking that targets young, small-bodied fish as well as adults. If barriers such as species-selective acoustic bubble curtains or strobes are emplaced (Pegg and Chick 2002), attempts

Linking Adult Reproduction and Larval Density of Invasive Carp in a Large River

Kelly L. DeGrandchamp* James E. Garvey†
Laura A. Csoboth‡

ment of these species will be coupled with food availability, probably enhanced by inputs from the floodplain.

In many species, rapid early development of embryos and larvae improves survival and eventually recruitment to the adult population (Miller et al. 1988). Asian carp offspring follow this pattern by rapidly developing into free-swimming larvae at 1 d posthatch and exogenously feeding after 72 h posthatch (Soin and Sukhanova 1972; Murty et al. 1986). River regulation and flooding patterns also should influence larval success. High recruitment is likely in riverine environments when rising temperatures and river stage are coupled (Junk et al. 1989). However, the impact of a flood pulse on recruitment also may be a function of flood pulse predictability and the duration and area of inundation, where rapidly developing species with general spawning requirements are most successful (King et al. 2004). Asian carp larvae seem well adapted for recruiting in river floodplain habitats.

the Illinois River during the low water year, there is still some speculation about adequate flow (i.e., 0.7 m/s) being the driving force behind successful reproduction. Kolar et al. (2005) cited an instance in which bighead carp eggs were inadvertently sampled in a sediment study, and the eggs, although covered in mud, hatched and survived for 4 d. Our group also found recently hatched Asian carp larvae in an isolated, unconnected backwater of the Illinois River (Garvey et al. 2005). Furthermore, the lower Illinois River, characteristic of a low-gradient stream, rarely meets 0.7 m/s throughout the spring and summer; only during times of high flooding does it exceed this velocity. Even during the relatively high water of 2004 (compared with 2005), water velocities approached 0.7 m/s only during 1 week in June, although larvae were present during several months (May–August). Thus, high river stage may augment egg and larval survival but may not be critical for reproductive success.

Save Our Native Species Inc.

S.O.N.S. of Lake Erie Fishing Club

A 501 C (3) not for profit organization

Working To Improve the Fishery for Thirty Years 1981-2011

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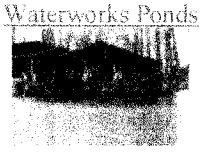

Updated 12-17- 2010

S.O.N.S. Web Cam-overlooking Presque Isle Bay (click here)

Who Are The S.O.N.S. of Lake Erie?

The S.O.N.S. (Save Our Native Species) of Lake Erie Fishing Club is an active organization of nearly 2000 members. Established in 1981, we are dedicated to the improvement of fishing on Lake Erie and its Pennsylvania tributaries. The organization has acted as a lobbyist for regulations supporting the growth of the Lake Erie fishery. We are a member of the Cooperative Nursery Branch of the Pennsylvania Fish and Boat Commission. Through this alliance we have established a fish hatchery that annually produces and stocks approximately 1 million Walleye and 2 million Yellow Perch into Presque Isle Bay. Steelhead and Brown Trout are also produced in the hatchery. The S.O.N.S. also participate in the P.F.B.C. adopt-a-stream program. We were active in the clean up and stocking of Cascade creek, a previously polluted stream which was a receptor of industrial out fall. The Club, partnered with the P.F.B.C., has annually built and placed appropriate structures in the waters of Presque Isle Bay which provide habitat for the fish that call these waters their home.

The S.O.N.S. have stood in the forefront to support free public access to the waters of Presque Isle Bay and Lake Erie. As a result of the clubs encouragement, ordinances and regulations have been enacted in the City of Erie that provide for free public access in all new developments on Presque Isle Bay.

The S.O.N.S. are always looking for more members and support. Please tour our web site for more information on how to become a member and for details on our current and past projects.

Click here for PDF of SONS History

The General Membership Meetings are held at 7:30 PM At the Polish Falcon's Club 431 East 3rd St. Erie, PA on the fourth Monday of the month (unless in conflict with a national holiday or the first day of deer hunting season). We do not meet during June, July and August **(Gone Fishing!)** .

S.O.N.S. Membership Campaign in High Gear

P.F.B.C. Executive Director John Arway Addressed the S.O.N.S.

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Leech Lake walleyes continue to improve, DNR extends current slot limits.

Our good friend and business partner Tom Johnson is an active member of the Leech Lake walleye task force. He sends us this update via Doug Schultz, big lake specialist for the MN DNR:

"As outlined in the attached Leech Lake Update to be circulated to the general public later today the Leech Lake walleye regulation review process has been completed. We will continue with the 18-26" protected slot limit, bag of 4, one over 26", during the next five years. However, if population metrics, particularly spawner biomass, indicate a more liberal regulation is warranted a 20-26" PSL, bag of 4, one over 26" will be considered for implementation at that time based on the available information."

We support Tom's plan to change the one over 26" regulation to one over 18" as we'd rather keep one fish to eat than a trophy fish, but overall have no real complaints, **fishing was *great* again this year on Leech.**

So good even my wife can catch one...

http://dnr.state.il.us/fish/Walleye_SaugerStatus.htm 1/23/2011

DISTRICT 7: LAKE COUNTY

FOX CHAIN O' LAKES - Walleye have been collected in the Chain by IDNR staff since 1954. Fry stockings were initiated in 1978 to supplement natural reproduction help develop the fishery. Since 1984 brood stock from the Fox Chain O' Lakes have been used by the State Hatchery System for walleye production. Trap net catches during spawning peak can exceed 21 fish per trap net night. Overall catch rates can exceed 8 fish per trap net night over the spring netting period. Both catch rates exceed management objectives of 2.5 fish per trap net night.

The slot limit established to on the Chain O' Lakes in 1996 appears to be doing its job of protecting female walleye while allowing harvest of more abundant male walleye. The average female collected in 2004 was 21.3 inches long and the average male was 15.2 inches, both averages fit nicely into the protective slot limit on the Chain.

Since the Chain is a "brood-lake," it is important to continue to protect female walleye with the slot limit. The walleye regulation on the Chain O' Lakes allows the harvest of 2 fish between 14" and 18" and 1 over 24". This regulations protects female walleye of high quality reproductive age yet allows for harvest of trophy fish and the more abundant male walleye. In 2004, 7,755,000 eggs were collected and 5.0 million fry and 244,077 (1.3" to 1.4" fingerlings) were stocked in the Chain.

Minnesota - DNR expands walleye slot limit for Lake Mille Lacs

2/20/2004

Although it will allow more harvest, the new slot limit will still protect future fishing opportunities. "The majority of our spawning stock biomass - large, mature fish - remains protected under this regulation," Ron Payer, DNR fisheries chief, said.

Michigan Department of Natural Resources
Fisheries Special Report 41, 2007

Ecology, Management, and Status of Walleye, Sauger, and Yellow Perch in Michigan

James C. Schneider[1], Richard P. O'Neal[2], and Richard D. Clark, Jr.[1]

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The key feature of walleye biology in Michigan is their narrowly defined spawning habitat requirements. They can spawn in large streams connected to lakes or within a lake on clean substrates of rock, cobble, or gravel from 1 to 4 feet deep. Such habitat provides the best chances for survival of eggs and fry but is absent, of poor quality, or in limited supply in much of Michigan. Thus, the abundance and distribution of naturally reproducing walleye populations in Michigan are primarily limited by the quantity and quality of this type of spawning habitat.

Walleyes spawn once a year, beginning when spring water temperatures reach the upper 40s °F. Females lay many small eggs (27,000 per pound of female) over a life span of many years. No parental care is given, so eggs and fry tend to have low average survival rates. For self-sustaining populations the high abundance of eggs offsets their low survival. For populations unable to sustain themselves by natural reproduction, survival of eggs and fry is so low that insufficient numbers of fingerlings and adults are produced over the long term. Typically, the Great Lakes and larger inland lakes have the largest and best walleye populations, and support the best fisheries. These waters are more likely to have a wind-swept shoal or a tributary suitable for walleye spawning, plus forage fishes of favorable types and abundance.

populations with slower average growth rates tend to mature at a later age, and visa versa. The abundance of mature females and their eggs, rather than the abundance of males and sperm, is the first population-level constraint on reproductive success. Environmental factors (above) then act to determine the survival of eggs and fry and ultimate recruitment to older ages. Food supply for fry is often weather related.

Even within a good self-sustaining walleye population, variations in weather during the reproductive stage can cause very large annual variations in spawning success, year class strength, and recruitment rate of juvenile fish to adulthood. The more age groups present in the adult population, the less these annual fluctuations in juvenile production affect the overall population abundance, but some level of annual fluctuations in adult walleye abundance and fisheries are the norm. Healthy walleye populations contain 10 or more age groups. The presence of a high proportion of older adults and the opportunity for a female to spawn more than once per lifetime are biological safety factors that help buffer a population from environmental instability and help insure perpetuity of the population.

Based on a review of North American walleye literature, we offer the following criteria to help define a "good" walleye lake and fishery. First, "good" walleye lakes have population densities of greater than three adult walleyes per acre. Of 27 Michigan lakes with walleye population estimates (Table 2), 22% achieve that level. Second, "good" walleye fisheries sustain yields of greater than 1.0 walleyes per acre with a harvest rate of greater than 0.100 walleyes per hour. Of 59 inland and Great Lakes waters for which these harvest statistics are available, 32% are in the "good" range based on at least one of these fishery statistics. Of 32 inland lakes and reservoirs with harvest statistics, 25% yielded "good" walleye harvest per acre and 16% had "good" walleye harvest per hour. Only 6% of the fisheries would be considered "good" based on both criteria (see tables in **Status** sections for statistics on individual lakes).

Yellow Perch

Distinguishing characteristics of yellow perch are its yellowish sides with seven blackish bars (Figure 1). Like walleyes, they have two dorsal fins, one spiny-rayed and one soft-rayed. They have no canine teeth.

The key feature of yellow perch biology is their ability to adapt to a wide variety of conditions. Unlike walleye, yellow perch have such broad spawning habitat requirements that perch abundance and distribution in Michigan are not limited by the availability of spawning habitat. Predation by other species is often the most constraining factor on yellow perch populations.

The abundance of mature females and their eggs, rather than the abundance of males and sperm, is the first population-level constraint on potential reproductive success. Variations in weather during fry stages and predation during juvenile stages often cause large (factor of 100 times of more) annual variations in year class strength and recruitment rate of juvenile fish. As with walleyes, the more age groups present in the adult population the less these annual fluctuations in juvenile production affect

Healthy yellow perch populations contain seven or more age groups. The presence of a high proportion of older fish and the opportunity for a female to spawn more than once per lifetime are biological characteristics that help buffer a population from environmental instability and serve to insure the perpetuity of each population. However, yellow perch populations show remarkable resiliency due to their high reproductive capacity and may persist under high stress. In a small experimental lake, as few as 1.5 mature females per acre were able to maintain adequate recruitment in the face of intensive mortality from anglers and walleye predation (Schneider 1997).

Management Objectives

Herein, we will suggest specific objectives that could be used under the broader goals to manage walleye, sauger, and yellow perch populations in Michigan. Our proposed objectives could be applied to large regions or individual water bodies. Some are overlapping and some are conflicting, so not all are applicable everywhere. Also, many of these objectives are already being used informally or implicitly by managers across the state.

More specific management objectives applicable to almost any fishery have been suggested by Colby et al. (1994). They include prevention of five types of overfishing:

1) Prevent recruitment overfishing. That is, prevent collapse of a population, due to excessive harvest, to the point where adequate broodstock, reproduction, and recruitment cannot be maintained. A decreasing trend in population numbers and a series of abnormally weak year classes are the usual indicators of a problem. In extreme circumstances, a population becomes extinct. The minimum sustainable size for a fish broodstock is difficult to predict because

2) maintain abundance of adult walleyes so that optimal natural reproduction is likely to be assured in virtually all self-sustaining walleye waters in all years;
3) conservatively regulate fishing and harvest rates to avoid recruitment, growth, and quality overfishing, yet maximize opportunities for participation and distribute the harvest equitably;
4) restore depleted populations; and
5) create or maintain new walleye fishing opportunities with stocking by striking a balance among public demand and constraints imposed by environments, resources, and economics.

For Lake Michigan waters, the continued low abundance of yellow perch in the southern half is a concern that merits more study. The bag limit has been reduced to 35 perch per day to conserve brood stock. Possible effects of exotic species such as alewife and zebra mussels on yellow perch fry are suspected as contributing factors (Clapp and Dettmers 2004).

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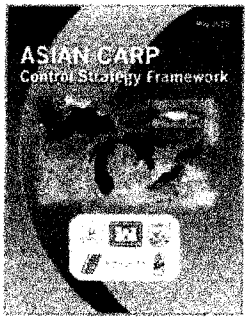
Updated Asian Carp Control Strategy Framework



rivers to the carps by erecting barriers prohibiting upstream movement to spawn. This strategy might even be used to control or eradicate Asian carps from the Great Lakes, should they become problematic there. In any case, eradication of any established population of Asian carps would be extremely difficult and expensive if possible at all. Effective management of established invasive species that cannot be eradicated usually employs Integrated Pest Management (IPM). IPM involves implementing as many feasible methods of control available for a given species into one management and control plan, each focused at the appropriate life stage and each applied most appropriately in time and space to achieve the desired level of control while minimizing economic costs and environmental risk.

• Do Asian carps have any predators? Back to top
In the Yangtze River of China, there were historically many large predators that presumably fed on Asian carps. These include the Chinese paddlefish, which, unlike the North American paddlefish, was a fish-eating fish with large teeth, and possibly the world's largest freshwater fish, achieving lengths of up to 23 feet. The Yangtze River also was home to two species of freshwater dolphin, which could presumably prey on adult Asian carps. There are no North American fishes large enough to eat an adult Asian carp. White pelicans and eagles, however, have been seen feeding on juvenile or smaller adult Asian carps. Largemouth bass have often been observed feeding on small juvenile Asian carps, and many other native predators probably also feed on them before they grow too large. In aquaculture, juvenile Asian carps are perceived to avoid predators poorly and grass carp stocked for vegetation control must be stocked at a fairly large size to protect them from predation. However, Asian carps produce many offspring which grow quickly and if conditions are good, they rapidly become too large to be eaten by North American predators. Juvenile Asian carps are also known to move into very shallow water where they are inaccessible to many large predators.

• What factors contribute to the sustainable population of Asian carp in the Great Lakes? Back to top
The establishment of a sustainable population of an exotic species, like the Asian carp, in a new ecosystem depends on many variables. Most important of these include predator-prey interactions between the invading species and those in the new ecosystem, food availability, temperature, growth rates, predation, and spawning habitat availability are also important factors. Primary factors limiting the range of Asian carps will be access to rivers of the required length, size, and water flow rate for successful spawning, as well as access to nursery habitat (shallow areas with slower-moving water) for survival of young.

Asian carp (bighead and silver) are filter feeders and need algae to sustain larger populations; they may not be able to survive in larger numbers in deeper, colder lakes. Lake Erie, parts of the other Great Lakes (e.g. shallow bays, rivers, inlets), and smaller inland lakes and rivers within the basin, could be heavily impacted by the carp, destroying fishing and recreation opportunities.

If Asian carp do get into the Great Lakes, there is also the potential that they adapt to the local food system and availability, shorter rivers for spawning, and other detrimental behavior as yet unforeseen.

• How can we determine if there is a sustainable population of Asian carp in Lake Michigan? Back to top
Repeated capture of both juvenile and adult Asian carp would be a good indication of a sustainable population, including young-of -the-year Asian carp to provide evidence of a successful spawn, juvenile fish to provide evidence the young-of-the-year fish are surviving, and adult fish of varying ages. Because environmental DNA (eDNA) sampling cannot give an indication of fish age or abundance, and because there have been no captures of Asian carp in Lake Michigan (juvenile or adult), we currently have no evidence of a sustainable population in Lake Michigan.

• Where are the Asian carp now? Back to top
During 2002 monitoring efforts, Asian carp were detected in the upper Illinois River, just 60 miles from Lake Michigan. In 2009, by using a new method called (eDNA) testing, Asian carp DNA was detected considerably closer, within the Lockport Pool (Des Plaines River, and Illinois & Michigan Canal Since then, Asian carp eDNA has been detected in several areas of the Chicago Waterway System. Maps with locations of eDNA detections are available on the U.S. Army Corps of Engineers website at www.lrc.usace.army.mil. While these tests indicate the possibility of live fish in the area where positive tests have been found, no live Asian carp have been found above the electrical Barrier system.

• Have Asian carp been found in Lake Erie? Back to top
Five Bighead carp have been individually collected between 1995 and 2003 in western Lake Erie. Since 2004, the Fish and Wildlife Service has monitored western Lake Erie in