

INVASIVE SPECIES

Biologists Rush to Protect Great Lakes From Onslaught of Carp

With Asian carp poised to invade Lake Michigan, wildlife managers are urgently trying to figure out how many of the voracious 1.5-meter-long fish have already slipped past electric fish barriers in a waterway near Chicago—and they are scrambling to shore up defenses. A new plan, released by federal agencies and other groups last week, aims to improve coordination among agencies dealing with the immediate threat and divvies up \$78.5 million for control and research. Meanwhile, scientists and advocacy groups are pushing with renewed effort for what they say is the only

barrier within a key choke point—the Chicago Sanitary and Ship Canal (*Science*, 11 July 2003, p. 157). After testing started in 2002, a second, full-scale barrier was added to help repel any fish that try to swim upstream through it. From monitoring the canal and the Illinois rivers, wildlife managers believed that the invasion front was still 25 to 30 kilometers south of the barriers.

But last year, they got a rude shock. David Lodge, an invasive species biologist at the University of Notre Dame in Indiana, began testing water samples for Asian carp DNA.

catch at low density,” cautions biologist Duane Chapman of the U.S. Geological Survey (USGS) in Columbia, Missouri. “The chances of getting all of them are close to nil.” Still, he says, the more fish kept out of the Great Lakes, the better the chance of preventing an established population.

The strategic plan also includes \$13 million for the corps to speed completion of a third electrical barrier, now expected by October. Another \$13.2 million would accelerate construction of physical barriers on the Des Plaines River and a canal to prevent fish from moving through with floodwaters. Additional funds would go toward developing selective “bubble” barriers to keep fish from spawning areas in the Chicago-area waterways or, if necessary, in the Great Lakes. There’s also \$1.5 million for USGS to work on formulating fish poison that targets only Asian carp and \$1 million to study pheromones that might help trap or deter carp.

The surest way to prevent carp from getting established, scientists say, is to achieve “ecological separation” by permanently closing the locks in Chicago and creating physical barriers to water flow in the other entry points to Lake Michigan. That might pose problems for the 50,000 or so recreational and commercial boats that pass through the Chicago River Lock each year. One option, say advocates, is to lift the boats over, but the American Waterways Operators opposes any substantial changes. In December, Michigan’s attorney general sued the state of Illinois, demanding that the canal locks be closed, but the U.S. Supreme Court declined to hear the case.

Lodge and others says that an investment in separating the waterways would pay off by also preventing other invasive species, such as the northern snakehead fish, from reaching the Great Lakes—and reducing the odds that any of the more than 180 invaders in the lakes will travel inland via rivers. “It’s far more expensive to always be reacting” to invasions, he says.

As part of the new plan, the Army Corps has moved up the deadline for its comprehensive study of how to prevent the movement of invasive species between the Great Lakes and the Mississippi River Basin to 2012. That’s not fast enough for Gaden and others. “We don’t have the time,” he says. There will be quicker action, according to the strategic plan: By 30 April, the corps could begin modifying Chicago River Lock operations—opening it for only a few days a week, for example—to reduce the chance of carp getting through.

—ERIK STOKSTAD



Pressing onward. DNA tests indicate silver and bighead carp (left) have passed electric barriers.

long-term solution: severing the connection between the Great Lakes and the Mississippi River Basin, a proposal that doesn’t sit well with the barge industry.

The two invasive species—bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*)—are native to China and were introduced for aquaculture in the southern United States in the 1970s. After escaping, the fast-growing, fecund fish moved up the Mississippi River and its tributaries. In some places, the carp have caused a 90% decline in crustacean zooplankton and are apparently outcompeting two native fish species, the gizzard shad and bigmouth buffalo. In addition, silver carp jump high out of the water when startled and have caused broken bones and concussions in boaters. Although eaten around the world, Asian carp have too many bones for the taste of most U.S. anglers.

Worried about the threat to the \$7 billion recreational fishing industry in the Great Lakes from this and other invasive fish, Congress authorized the U.S. Army Corps of Engineers in 1996 to build a prototype electric fish

Working with The Nature Conservancy, the team discovered DNA from silver and bighead carp several places above the barriers. Fish biologist Phil Moy of Wisconsin Sea Grant in Manitowoc believes the carp may have passed through the barriers a few years ago either during a power outage or when they were down for maintenance.

Most alarming, in December, Lodge’s team found bighead and silver carp DNA in the mouth of the Calumet River—suggesting that some fish could already be in Lake Michigan. “That’s what really lit a fire under everybody’s seat,” says Marc Gaden, legislative liaison of the Great Lakes Fishery Commission in Ann Arbor, Michigan. Soon, wildlife biologists netted a bighead and a silver carp where they found DNA.

The most immediate eradication measures are admittedly a stopgap. Over the next few weeks, the U.S. Fish and Wildlife Service and partners in Illinois will put more than 20 staff in up to nine boats for electrofishing and netting the carp, to the tune of \$2.6 million. It won’t be easy. “They are very difficult fish to