

Invasive carp FAQs

Why are invasive carp a serious threat to Minnesota's ecosystems, fisheries and economy?

- Invasive carp out-compete native fish for food
- They can produce over a million eggs per fish per year so their population can grow quickly
- Based on their success in states south of MN, invasive carp will thrive here and—if allowed in numbers sufficient to reproduce—will eventually replace a significant portion of our native fish population, decimating native fisheries
- Invasive carp grow large and jump, threatening and so deterring recreational boaters
- *Other than preventing invasive carp from moving north in MN waters and reproducing, there is currently no method to control them—action is needed now, before it is too late*
- If invasive carp can't be controlled, Minnesota (like many other states) can soon expect to spend several million dollars a year on carp removal simply to maintain status quo.

Where are these carp now?

- Large numbers of adult silver carp are breeding in Mississippi River Pool 16 in Iowa, 150 miles south of the MN border
- Many dozens of mature silver carp are captured annually in Pool 8, south of Winona, with increasing numbers caught each year. Carp in Pool 8 have proven unremovable, and there are enough of them that they could breed at any time—so silver carp are now present in MN waters
- However, while adult carp are occasionally caught north of Pool 8 (in Lake Pepin) capture rates are very low and have not increased notably over the past 20 years, and these carp have not reproduced. *Most of Minnesota's waters can still be protected if breeding numbers of adult invasive carp can be prevented from moving upstream of Pool 8.*

What is this bill trying to achieve?

- Its primary goal is to implement a 3-part strategy to prevent enough adult invasive carp from entering Lake Pepin that they can reproduce there and invade the rest of the state—at least for the foreseeable future, or until new technologies to control these species are developed
- A secondary goal is to enhance native fish abundance at this location
- The proposed actions would last at least 5 years so that their efficacy can be evaluated and improved over time if needed

What would this bill fund?

The bill would fund the MN DNR for at least 7 years (long enough to gauge the strategy's success) to:

- 1) install and operate a Bioacoustic Fish Fence (BAFF) carp deterrent system in the lock at LD5
- 2) increase carp removal rates both above and below this location (in Pools 5A and 5)
- 3) implement other measures to monitor and control carp and
- 4) work with the University of Minnesota and its collaborators to adjust LD5's spillway gate settings to further reduce adult carp passage as well as install a fish elevator to pass native fish.

How critical is the timing of this action?

It is critical. If increasing numbers of adult invasive carp pass LD5 and breed above it, there is no other opportunity to stop them from establishing large breeding populations in Lake Pepin and the St. Croix River. Fish are moving north at a rate that suggests large breeding populations could be established in about 5 years—the time it will take to install the carp deterrent at LD5 *if work is funded this year.*

What happens if no new action is taken to stop carp?

Based on existing trends, we can expect invasive carp to pass north of Lock and Dam 5 in about 5-10 years, establish breeding populations that cannot be controlled, and then infest most of the state.

What if significantly less is done because the bill is not fully funded?

The proposed strategy cannot work unless both a BAFF is installed and carp are removed. Reductions in scope would prevent it from succeeding.

It has been estimated that some locks and dams already stop about 80-85% of these carp, and the number approaches 95% if locks and dams are considered as pairs. Isn't that enough?

The strategy proposed by the bill is to prevent a critical number of adult carps from passing upstream of LD5 and then breeding. Scientists estimate that, in some locations, *the number of adult females required to do this could be as low as a few dozen.* If and when the population of carp below LD5 reaches about 1000 (it's still well below that), a blockage rate of 98-99% will be required to prevent establishment of a breeding population. Given the consequences of failing to stop invasive carp at LD5, the higher the blockage rate the better—which is why the proposed strategy uses several approaches to stopping them there.

What is a BAFF? Why use this technology?

Only two commercially available, proven options exist to deter carp from entering locks: 1) electrical systems and 2) the Bioacoustic Fish Fence or BAFF. Commercially available systems like these can be installed rapidly and maintained. Electrical systems have been evaluated twice for possible use in Minnesota waters by the MN DNR and Barr Engineering Co. and are considered too dangerous. A BAFF is safe, efficient, and proven (see below). In a BAFF, sound is projected into a stream of bubbles positioned downstream of a lock, amplifying and focusing it in a way that deters and directs carp away from it because of their excellent sense of hearing. Strobe lights are typically also used in BAFF, further enhancing activity.

How effective would a BAFF combined with enhanced carp removal be? Is that enough to protect Lake Pepin, the St Croix River, and the rest of the Mississippi River?

Both laboratory and field tests show that the BAFF can be expected to be about 60-80% effective at blocking carp in the lock, which comprises about 3% of the surface area of this LD. LD5's spillway gates (which comprise 97% of this dam) are expected to block about 85% of all passages and 97% when LD4 and LD5 are both considered—resulting in what is calculated to be a 98-99% block if some level of carp removal is also conducted. This is more than adequate to protect the Upper Mississippi above Lake Pepin for at least a few decades if the number of carp do not rise into the thousands in Pool 8 (carp removal continues at this location). This conclusion is strongly supported by observations at LD19 in

Iowa, which lacks any spillway gates and where the unprotected lock slowed the carp invasion enough that they did not pass in numbers sufficient to create a breeding population for about a decade. Had there been a deterrent at LD19 that was 50% effective, this rate would have been slowed by at least half and likely much longer because wild carp typically only live 10-20 years, meaning that those carp that pass likely would have died before reproducing.

Is the BAFF carp deterrent proven to work?

Yes. Three published tests in the laboratory using carp have shown efficiency of 95-99%. An ongoing multi-million dollar test financed by the USFWS in KY is describing efficiencies of 61% in deep water but the percentage increases greatly in water less than 20 feet deep, as is the case at LD5.

Is Lock and Dam 5 the best location to stop carp in Minnesota?

Yes—for 4 reasons:

- Its spillway gates, which span the largest expanse across the river, rarely open (just 2% of the year) and LD5 lacks bypasses—meaning that fish must pass via the lock
- Its lock is suitable for a BAFF
- The pool above LD5 is short, making it suitable for carp removal and unsuitable for carp reproduction
- It is positioned at the leading edge of the carp invasion.

How do we know that Lock and Dam 5 has great promise?

We know this from a half-dozen published scientific studies of fish passage at locks and dams that show when spillway gates do not open fully, carp cannot and do not pass through them.

Are there potential downsides to installing a BAFF at LD5?

Yes, a BAFF will reduce native fish passage at LD5, although we do not know how much. To remediate this, a fish elevator is proposed for LD5's auxiliary lock. This elevator would also remove carp.

Is there an alternative plan to stop carp in Minnesota?

No. The MN Department of Natural Resources has not developed an alternative solution for invasive carp. Further, the DNR's ongoing efforts to catch and remove invasive carp in Pool 8 are not showing success; often more carp jump over their nets than are caught in them.

Are there other carp deterrent systems?

Yes, the USGS has been experimenting with sound and CO₂, as has the U of MN. Peer-reviewed published data have not yet suggested promise for such systems but new systems and technologies are always being developed. Their efficacy is not yet known nor are the costs to build, install and maintain them. They might be tried if a leased BAFF does not work as well as hoped in 5 years. Right now, time is of the essence.

Is it really possible that native fish health and fisheries can be improved at the same time?

Yes, because native fish passage at LD5 is already known to be low, it is very possible that a fish elevator at this location will increase levels to above present values. This bill explores that.

Has this plan been vetted by professionals in the field?

Yes, this plan has been published in the peer-reviewed scientific literature and by Barr Engineering Co., which has produced a feasibility report and held stakeholder meetings with the MN DNR, US Army Corps of Engineers, and general public. No fatal flaws were identified in these reviews.

Is this a permanent solution for carp?

Reducing carp movement through LD5 and aggressively managing carp in that vicinity should be viewed as a measure to protect Minnesota's resources for next few decades until a better solution can be developed. *Because eradication is not possible, this management strategy is critical.*

Would this plan be acceptable to agencies?

Stakeholder meetings held by Barr Engineering Co. with the US Army Corps of Engineers, MN DNR, WI DNR and USFWS all found that these agencies would accept this opportunity to control carp and did not identify any fatal flaws.

How long will this plan take to implement?

Based on its feasibility study, Barr Engineering Co. estimates the earliest date that a BAFF could be installed and function would be the winter of 2026—*if funding were received in 2023 and there were no delays* (ex. competitive bidding, permitting). **Given the rate of the carp invasion and time it will take to install a BAFF, it is imperative to fund the work this year for this project to succeed.**

How much will this plan cost to implement?

Based on its feasibility study, Barr Engineering Co. estimates it will cost between \$11 and \$22 million (30% range, \$18 million being the most likely cost) to install and run a leased BAFF for 5 years (purchase would be less costly but it would have unknown maintenance costs). In addition to the BAFF, about \$1 million is needed to run the program and investigate the fish elevator.