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When Invasions Collapse

The rapid spread of Bighead and Silver Carp is a reminder of how invasive species can begin with a bang. However, some invasions fade with a whimper.

In the late 1800s, Common Carp (*Cyprinus carpio*) were intentionally introduced in Illinois to provide more harvestable fish. Their spread was characteristic of many successful invasive species. Within a few decades, they were the most abundant fish in the commercial harvest in the Illinois River.

Data from the commercial harvests in the early twentieth century provide a fairly good index of their abundance. Consistently high harvests point to a fairly sustained population. When the Illinois Natural History Survey initiated the Long Term Illinois River Fish Monitoring Program, or LTEF, in the late 1950s, it provided a more robust method to monitor trends in fish populations.

Common Carp were still consistently abundant in the LTEF surveys in the middle of the century, more than six decades after rising to their highest levels. Although some invasions experience dramatic swings, with sharp increases followed by precipitous declines, Common Carp avoided this situation. With populations that had been steadily high for decades, they seemed to be an example of a successful invader that avoided boom/bust cycles.

Quietly, things began to change. In the 1970s, Common Carp populations began to decline. These declines were common through-

ABOVE Alan Ignoffo holds a Common Carp caught in the Fox River Photo by Matthew Ignoffo

out the Illinois River, not just in isolated patches. Falling catch rates continued in the 1980s. The LTEF surveys showed that the declining trends were strong and incontrovertible.

By the 1990s, levels of Common Carp were substantially lower than they had been at any times since the standardized monitoring began in the 1950s. The change was substantial: there was roughly an order of magnitude fewer carp being caught than in the previous decades.

This collapse of Common Carp happened somewhat gradually. Across two decades, their population fell by more than 90% in some areas, but it was more of a linear decline than an abrupt collapse.

A quarter century after they crashed, Common Carp have shown no signs that they are increasing again.

Some invaders overshoot their carrying capacity and collapse, but this doesn't appear to be the case for Common Carp. Body size has increased in recent decades, suggesting the carp that survive are in good condition, and the abundance and richness of other fish species have increased notably since the 1970s.

ABOVE Illinois River Biological Station technicians Ryan Ward and Liz Dix hold up two Common Carp from the Mississippi River Photo by Jason DeBoer

ABOVE Common Carp from the Illinois River

Common Carp are generally considered one of the most invasive freshwater fish species, and there has been a considerable amount of energy expended to reduce their populations in invaded areas. However, most of these efforts report low success: once Common Carp are established, it is difficult to eradicate them or keep their populations under control. It is therefore quite interesting that carp populations have plunged in the absence of a concerted, long-term effort to reduce their numbers.

An intriguing possibility is that disease caused the decline of Common Carp. In the 1990s, populations of Common Carp in aquaculture ponds began to experience high mortality. Viruses in the herpes family were identified as the causes of these disease outbreaks, and two viruses that affected Common Carp were described for the first time.

Since the 1990s, outbreaks of cyprinid herpes viruses have been observed in Common Carp around the world, from the Great Lakes states to Japan. Notably, Common Carp are highly susceptible to these viruses, while virtually all other fish species do not appear to be vulnerable.

Although we cannot confirm the role of cyprinid herpes virus in historic data from Illinois, it's an important possibility to consider. Australia is currently considering intentionally introducing a cyprinid herpes virus to reduce the threat Common Carp pose to the native fish assemblage. If a cyprinid herpes virus caused a 90% reduction of Common Carp without affecting native species in Illinois, it may have a similarly strong effect in Australia.

As we continue to investigate the rise and fall of invasive species in Illinois, Common Carp remind us that disease may play an even stronger role than any of our own efforts.

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