

Asian Carp Invasion of the Upper Mississippi River System

by

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Five species of Asian carp now occur in the contiguous United States. These include grass carp (*Ctenopharyngodon idella*), common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*H. nobilis*) and black carp (*Mylopharyngodon piceus*). Common carp, brought to the United States from Europe in 1831, were soon propagated and distributed throughout waters of the Upper Mississippi River System (UMRS). Grass carp were imported from eastern Asia in 1963 to control submersed aquatic vegetation in aquaculture ponds and were first documented in the Mississippi River along Illinois in 1971. Silver carp and bighead carp were imported from China in 1973 to improve water quality of aquaculture ponds (initially in Arkansas). These species have

invaded our Midwestern rivers, through pond escapement or by deliberate introductions and were first documented in the UMRs as early as 1982. Reproducing populations of these four species are now present in the UMRs. Presently black carp, which are mollusk eaters, only exist in aquaculture ponds of Arkansas and Mississippi.

LTRMP documents the spread of Asian Carp Since initiating fish community sampling in 1990, the Long Term Resource Monitoring Program (LTRMP) has been collecting Asian carp from multiple aquatic habitats of

six reaches of the UMRs (Figure 1) and documenting changes in abundance and size structure of these potentially harmful fishes. Common carp were abundant throughout the UMRs long before the LTRMP began. The next species of Asian carp collected by the LTRMP was a 48-cm grass carp taken by electrofishing in September 1990 from the Illinois River, La Grange Reach. Bighead carp were first collected by the LTRMP in 1991 from Pool 26, and silver carp first appeared in our collections in 1998. No Asian carp other than the common carp have been collected from Pools 8 or 13.

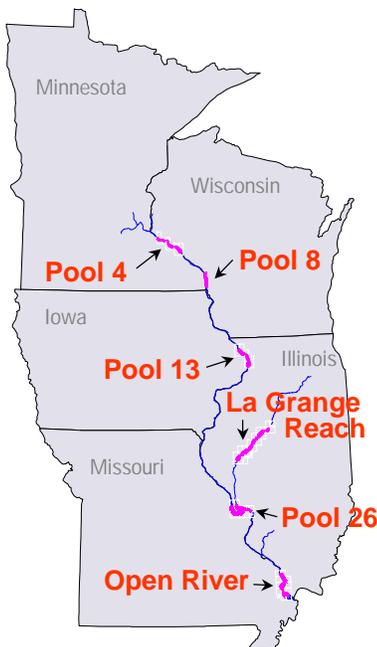


Figure 1. Upper Mississippi River System and locations of Long Term Resource Monitoring Program trend analysis areas.

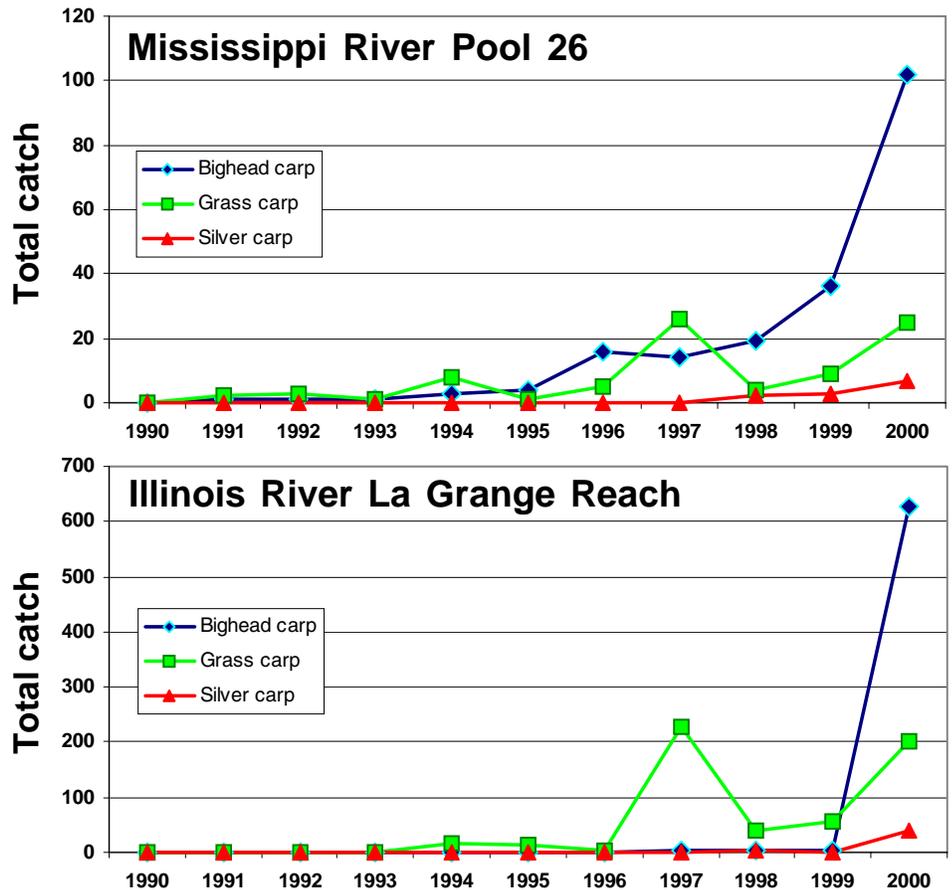


Figure 2. Annual catch of Asian carp collected by the Long Term Resource Monitoring Program from pool 26 of the Mississippi River and La Grange Reach of the Illinois River, 1990-2000. Monitoring during 1990-1999 occurred during June 15 – October 31 of each year. Monitoring in 2000 was done from June 15 to September 15.

Table 1. Total catch and percentage (%) of Asian carp collected by the Long Term Resource Monitoring Program in aquatic habitats of the Upper Mississippi River System, 1990–1999.

Habitat	grass carp		silver carp		bighead carp		all Asian carp	
	Count	%	Count	%	Count	%	Count	%
contiguous backwater open	4	1%	0	0%	59	21%	63	8%
contiguous backwater shoreline	99	21%	1	14%	20	7%	120	16%
impounded open	1	0%	0	0%	12	4%	13	2%
impounded shoreline	7	1%	0	0%	2	1%	9	1%
main channel border unstructured	229	48%	2	29%	74	26%	305	40%
main channel border wing dam	5	1%	1	14%	22	8%	28	4%
side channel border	91	19%	2	29%	53	19%	146	19%
tributary mouth	17	4%	0	0%	33	12%	50	7%
tailwater zone	17	4%	1	14%	1	0%	19	2%
other	3	1%	0	0%	6	2%	9	1%
Total catch 1990 1999	473		7		282		762	

Since 1990, standard and research monitoring (June 15–October 31 annually) by the LTRMP has documented variation and increases in total catch of three recently invading Asian carp species (Figure 2). The total catch of grass carp in 1997 was 26 from Pool 26 and 229 from the La Grange Reach. During June 15–September 15, 2000, we collected 25 grass carp from Pool 26 and 200 from the La Grange Reach. Fewer silver carp have been caught. The catch of silver carp increased from two in 1998 to seven in 2000 at Pool 26, and from two in 1998 to 39 in 2000 in the La Grange Reach. Bighead carp catches from Pool 26 steadily increased from one specimen per year in 1991–1993 to 102 fish during our first two sampling efforts in 2000. In contrast, bighead carp catches from La Grange Reach remained relatively low (0–3 fish per year) through 1999 and then sharply increased to 627 in 2000. Most of these were young-of-the-year or juvenile fish, indicating that this species is reproducing in this reach of the UMRS.

To some extent, we have also noticed species-specific habitat preferences. Catch of all species was highest in unstructured main channel borders (Table 1). However, grass carp catches

were also relatively high along contiguous backwater shorelines. Bighead carp catches were also relatively high in contiguous backwater open habitats.

Asian carp are not readily caught with some sampling gears. For example, they are often seen breaking the water surface many meters ahead and along the sides of our electrofishing boats. Asian carp have often entered our boats without the use of dip nets. In fact, many of our staff members have been hit multiple times by large jumping fish. From 1990 to 1999, 69% of Asian carp shorter than 20 cm were collected by mini-fyke netting (Table 2). Asian carp 20 to 60 cm were primarily collected by day electrofishing (49%) and hoop netting (15%). Asian carp larger than 60 cm were primarily collected by hoop netting (42%). These results indicate that multiple sampling gears may be needed for assessing the abundance and size structure of Asian carp populations in our large rivers.

Adverse Effects of Asian Carp Asian carp are becoming abundant and persistent residents of the lower reaches of the UMRS and the Illinois River. We may soon learn whether these large,

Table 2. Percentage of all Asian carp collected by standard and experimental LTRMP gear, 1990–1999

Gear	Total Length (mm)		
	<200	200–599	>600
Day electrofishing	5%	49%	17%
Experimental trawl	13%	0%	1%
Fyke netting	1%	10%	6%
Gill netting	0%	7%	23%
Hoop netting (large)	0%	15%	42%
Mini-fyke netting	69%	2%	1%
Night electrofishing	0%	9%	3%
Seining	11%	1%	0%
Other	1%	9%	7%

prolific invaders affect other species and the environmental quality of this river system. On the basis of past experiences (e.g., with common carp), a failure to address the exotic species problem will likely result in more introductions and potential harmful effects to native biota. Monitoring by the LTRMP will be crucial for documenting forthcoming changes to our native riverine fishes because these recent Asian carp invaders are increasing in population and expanding in range.



This report is a product of the Long Term Resource Monitoring Program.

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November 2000

PSR 2000-05

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