

# White Perch Occurrence, Spread, and Hybridization in the Middle Illinois River, Upper Mississippi River System

Kevin S. Irons, Timothy M. O'Hara, Michael A. McClelland, and Mark A. Pegg  
Illinois River Biological Station, Illinois Natural History Survey  
704 N. Schrader Ave.  
Havana, IL 62644

Email: kiron@staff.uiuc.edu

## ABSTRACT

White perch (*Morone americana*) first gained access and spread throughout the Great Lakes in the mid 1900's, eventually invading the Upper Mississippi River System (UMRS) through an artificial connection between the Illinois River and Lake Michigan. Since first detecting white perch in 1991, we have monitored its increasing population in La Grange Reach, Illinois River through 2001, with total abundance rising to over 50 fish per year in annual standardized sampling. Potential impacts of white perch on native fishes include competition for food resources, predation, and hybridization with other, native *Morone* species. In the later case, we document white perch-yellow bass hybrids (*Morone americana* x *M. mississippiensis*) in the Illinois River.

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## INTRODUCTION

Canals have contributed to human mediated range expansions of aquatic species, including white perch (*Morone americana*, Scott and Christie 1963). Beginning in the 1820's, the New York canal system, including the Erie Canal, connected Lake Ontario (Great Lakes drainage) to the east coast (Atlantic Ocean). Shortly afterward, in 1848, the Illinois and Michigan Canals connected the Illinois River, and ultimately the Upper Mississippi River System (UMRS), to the Great Lakes, creating a direct shipping route through the central United States. At the turn of the century, the connection between Lake Michigan and the Illinois River was widened and deepened, in part through the deliberate reversal of the Chicago River. This diversion of water was vital for the health of Chicago residents, who were experiencing disease due to open sewers and an unsanitary water supply. The length of the Illinois River, Des Plaines River, canals, and other tributaries connecting the Mississippi River to Lake Michigan are collectively called the Illinois Waterway (Figure 1). From a connectivity standpoint, fish and other aquatic organisms can enter drainages, basins, and ecosystems where they were not historically endemic because many canals connect water bodies from the east coast to the midwest.

White perch first appeared in Lake Ontario circa 1950 as a result of the canal system in New York (Scott and Christie, 1963). Direct stocking of white perch may have been an alternate mechanism of initial dispersal; Daniels (2001) suggested that poor water quality in these canals during the early 1900's might have prevented white perch from spreading through the canals on their own. However, the canals almost certainly were responsible for white perch dispersal either by providing direct access or human transportation for stocking. White perch have since expanded from their first appearance in Lake Ontario in 1952 (Christie 1973), to Lake Erie (1954; Larsen, 1954), Lake Huron (1983; Ver Duin, 1984), Lake Superior (1986; Johnson and Evans, 1990), and Lake Michigan (1988; Cochran and Hesse, 1994; Savitz et al. 1989). In 1988, white perch were documented from the near shore waters of Lake Michigan near Chicago (Savitz et al., 1989). This proximity to the Illinois Waterway eventually led to white perch movements into the UMRS.

A concern with white perch population expansion is their impact on native fauna. White perch compete with native fish for food, and prey upon native fishes and their eggs (Parish and Margraf, 1994; Schaeffer and Margraf, 1987; Madenjian et al., 2000). Understandably, establishment of white perch in the UMRS is a concern (Cochran and Hesse, 1994).

Our objectives were to document the establishment of white perch, their current population trends and expansion, and to assess their potential impacts in the middle Illinois River.

## METHODS

Data from three independent monitoring programs conducted through the Illinois Natural History Survey's Illinois River Biological Station (IRBS; Havana, Illinois) were used to document white perch in the Illinois River. First, The Long-Term Illinois River Population Monitoring Program, or Long Term Electrofishing Project (LTEF) has monitored fish populations on the Illinois Waterway since 1957 (McClelland and Pegg, 2001). The LTEF collects fish data annually at 27 fixed sites using three phase – AC boat electrofishing. The project records all species collected at sites that cover the Illinois River from its mouth (RM 0.0) to Dresden Reach on the Des Plaines River (Illinois Waterway, RM 279.8).

The second data set used came from the Long Term Resource Monitoring Program (LTRMP). The LTRMP is part of the Environmental Management Program (EMP), a cooperative effort between the five UMRS states (MN, IA, WI, IL, MO), U.S. Geological Survey, and the U.S. Army Corps of Engineers (USGS, 1999). The IRBS is one of six field stations monitoring the UMRS for a variety of environmental parameters including fish communities (Gutreuter et al. 1995). Data presented are from La Grange Reach, Illinois River collected from 1990 through 2001. La Grange Reach is the portion of the Illinois River between La Grange Lock and Dam (L&D, RM 80.0) and Peoria L&D (RM 157.8; Figure 1). Gears used included electrofishing, hoop netting, seining, fyke netting, trawling, gill netting, and trammel netting. The LTRMP sampling currently utilizes about 550 random collections from June 15 to October 31 each year.

The third data set comes from the Peoria Lake Habitat Rehabilitation and Enhancement Project (HREP) where fisheries information was collected around special features within Upper Peoria Lake using LTRMP methods. This project monitored fisheries response to a constructed island and associated features on the Illinois River in the vicinity of Chillicothe, Illinois (RM 178.6 to RM 183.4) at 10 fixed sites from 1991-1992, and 1997-1998 (Irons and O'Hara, 1999). The HREP sites are within Peoria Reach, Illinois River, approximately 20 miles north (upstream) of La Grange Reach.

## RESULTS AND DISCUSSION

White perch were first detected in Peoria Reach in 1991 from RM 170.3 to RM 180.6, by both the HREP and LTEF sampling efforts. In addition, white perch were found further downstream the following year in LTRMP sampling (Peoria Lock and Dam, RM 157.8, Figure 2). There have been stockings in Nebraska (1964) that could have seeded the Missouri River drainage from reservoirs but there is little evidence that these populations have spread in the Missouri River (Burr et al. 1996, Hergenrader 1980). It is most likely that white perch have entered the UMRS from the Great Lakes, as the chronology and downstream progression from the initial occurrence in Lake Michigan to the most recent in the lower Illinois River suggests (Savitz et al., 1989, Savitz et al., 1996, Burr et al., 1996).

Previous studies suggest white perch may not be able to maintain populations in lotic environments (Hergenrader, 1980). However, since white perch were first collected in La Grange Reach, LTRMP catches have increased each year from seven white perch in 1992, to 54 in 1999 (Figure 3). Further, the distribution of white perch has rapidly progressed downstream extending beyond La Grange Reach as indicated by LTRMP data from Pool 26 on the Mississippi River where a single white perch was collected in 2000 (LTRMP, unpublished data).

As white perch spread throughout the Illinois River and further into the Mississippi River basin, negative interactions with native species may occur. These interactions may be realized initially with native species that utilize similar habitats and life strategies. Field collections have shown that in general, yellow bass and white perch are found in similar habitats and the chance for interaction could be high. One of the first interactions observed has been confirmation of white perch-yellow bass (*Morone americana* x *M. mississippiensis*) hybrids that were collected by LTRMP sampling in 2000 (INHS collection 89904), with an additional 32 hybrids collected in 2001. The yellow bass has a native range confined to the Mississippi River drainage and has experienced a general decline in abundance within La Grange Reach over the past 43 years (Figure 4). Because yellow bass populations are already depressed and share similar habitats, they may be more susceptible to competition with white perch. Interactions between the two species may include increased resource competition (i.e., direct competition for food resources, egg predation; Schaeffer and Margraff, 1987, and energy expended on hybrid production). Further impacts on other *Morone* species such as white bass *M. chrysops* may be expected as white perch populations persist.

Although Lake Erie has a commercial fishery for white perch, it is unlikely that one would develop on the Illinois River. White perch are believed to have habits similar to

protected native sport fish such as white bass, sauger (*Stizostedion canadense*), and various Centrarchids that would complicate commercial fishing with large bi-catch issues (R. Maher, Illinois Department of Natural Resources, pers. comm.). It is also likely that white perch will not be highly valued as a sport fish in the Illinois River, due to its diminutive size compared to white bass.

Based on information presented here, it is likely that white perch will continue to disperse into the Mississippi River, expanding its range both upstream and downstream through locks or with angler assistance. Further, construction and modification of habitat, such as canals, has assisted in the spread of white perch into the Illinois River. Jude and DeBoe (1996) warn that other habitat enhancements, in particular those that add revetment (riprap), could further assist non-native species by offering suitable or even preferred habitats within riverine systems. White perch do appear at higher concentrations below the Peoria Lock and Dam near revetment than in other habitats within La Grange Reach. With many habitat projects and restoration efforts planned within the UMRS, river managers should be careful to consider potential side effects, before planning modifications as it is unclear to what extent these modifications would benefit white perch or other non-native fish in exploiting riverine environments.

#### **ACKNOWLEDGEMENTS**

Funding was provided by the Rock Island District, U.S. Army Corps of Engineers through the Upper Midwest Environmental Sciences Center of the Biological Resources Division, U.S. Geological Survey as part of the Long Term Resource Monitoring Program and the Habitat Rehabilitation and Enhancement Projects; Illinois Natural History Survey, Illinois Department of Natural Resources, and the Long-term Illinois River Fish Population Monitoring Program (F-101-R) funded by the Federal Aid in Sport Fish Restoration Act (P.L. 81-681, Dingell-Johnson/Wallop-Breaux). The views expressed in this report are those of the authors. We are indebted to many who assisted in lab and field-work over the years.

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Figure 1. Map of the Illinois Waterway. The Illinois Waterway includes the Illinois River, Des Plaines River, and navigable channels that connect these with Lake Michigan. La Grange Reach is an eighty mile reach of the Illinois River in central Illinois, located between the La Grange Lock and Dam (L&D, RM 80.0) and Peoria L&D (RM 157.8).



Figure 2. Progressive occurrences of white perch in La Grange Reach, Illinois River from LTRMP collections (1992–2001). Each circle represents a location where white perch were collected during a given year.

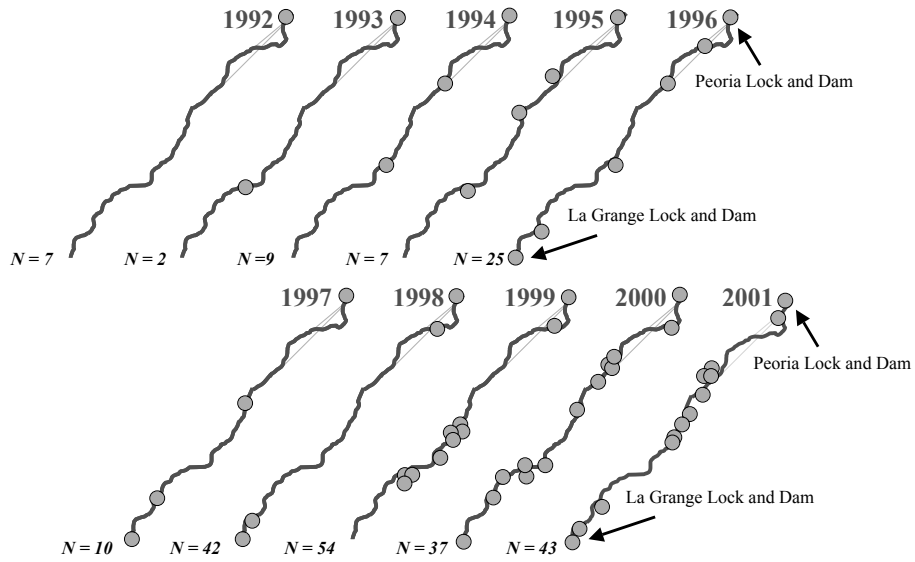


Figure 3. White perch total catch (all gears) in La Grange Reach, Illinois River from LTRMP collections (1990-2001).

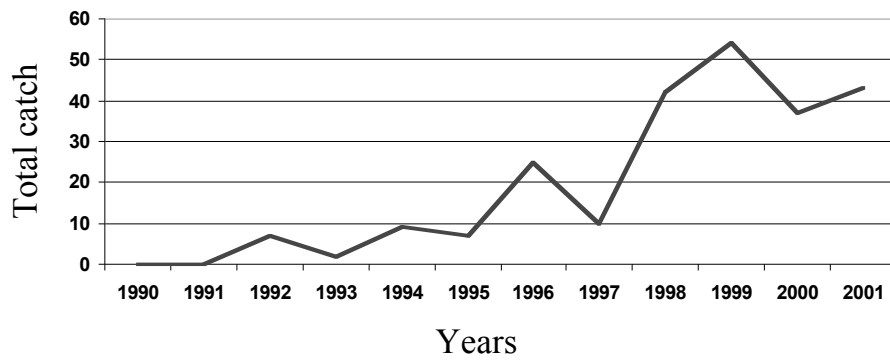


Figure 4. Yellow bass total catch in La Grange Reach, Illinois River from the Long Term Illinois River Fish Population Monitoring (LTEF) Project collections (1959-2000).

