



**Illinois Department of Natural Resources
Division of Fisheries
Aquatic Nuisance Species Program**

Bighead Carp in Illinois Urban Fishing Ponds



December 2011

Bighead Carp in Illinois Urban Fishing Ponds

The Illinois Department of Natural Resources (IDNR) fields many public reports of observed or captured Asian carp. All reports are taken seriously and investigated through phone/email correspondence with individuals making a report, requesting and viewing pictures of suspect fish, and visiting locations where fish are being held or reported to have been observed in the wild. In most instances, reports of Asian carp prove to be native gizzard shad or stocked non-natives, such as trout, salmon, or grass carp. Reports of bighead or silver carp from valid sources and locations where these species are not known to previously exist elicit a sampling response with boat electrofishing gear and trammel or gill nets. Typically, no bighead or silver carp are captured during sampling responses. However, this pattern changed recently when several very large bighead carp (>48 pounds) were captured by electrofishing and netting in Flatfoot Lake, an urban fishing pond located in Cook County.

Flatfoot Lake

Flatfoot Lake is a 19-acre borrow pit pond located in Beaubien Woods Forest Preserve on Chicago's south side. It has a maximum depth of 15.4 feet, although much of the pond is <5 feet deep. The south bank is 900-1,200 feet north of the Little Calumet River. A raised railroad track runs between the pond and river separating the two water bodies. A visual site inspection by IDNR and Forest Preserve District of Cook County (FPDCC) staff on 21 September 2011 indicated that no surface water connection exists between Flatfoot Lake and the Little Calumet River. Flatfoot Lake is in the IDNR Urban Fishing Program and it has been stocked with catchable-sized channel catfish and hybrid sunfish annually for more than a decade.

Responding to a report of very large fish suspected of being Asian carp, IDNR biologists sampled Flatfoot Lake with DC electrofishing gear and trammel nets on 20 September 2011. Over 3.5 hours of electrofishing and netting resulted in the capture of 14 bighead carp that measured between 46.4 and 50.9 inches total length and weighed over 48 pounds. All but one of the fish was caught by electrofishing. Four large grass carp also were captured and removed. Biologists observed three additional bighead carp that avoided capture during this initial removal effort.

The pond was again sampled with DC electrofishing gear and gill nets for 3.0 hours on 27 September. In this effort, an IDNR Asian carp crew and FPDCC biologists captured and removed two bighead carp that each weighed 76 pounds. A third bighead carp was observed, but not captured. On 29 September, IDNR and forest preserve biologists made another attempt to capture remaining bighead carp in the pond. Approximately 3.0 hours of gill netting and electrofishing caught no fish, but a single bighead carp was again sighted.

On 1 November 2011, the IDNR crew, forest preserve biologists, and a contracted commercial fishing crew electrofished and trammel netted in Flatfoot Lake for 30 minutes targeting remaining Asian carp. One bighead carp measuring 50.1 inches total length and weighing 80 pounds was captured and removed, as was a 65 pound grass carp. In total, 10.0 hours of DC electrofishing and trammel/gill netting over four days resulted in the capture and removal of 17 bighead carp and five grass carp from Flatfoot Lake. No additional bighead carp are thought to be present in the pond at this time based on combined sampling results from conventional gears.

Other Urban Fishing Ponds in the Chicago Region

Biologists from IDNR and FDDCC sampled two additional Cook County ponds included in the IDNR Urban Fishing Program on 28 September 2011. Cermak Quarry is a 3-acre reclaimed quarry pond that has a maximum depth of 18 feet and Schiller Pond is a 6-acre dug pond with a maximum depth of 6.3 feet. Both are located adjacent to the upper Des Plaines River, but outside of the 100 year flood designation. Neither pond has a direct connection or overflow to the river. Even if they did, they would not pose an immediate threat to the CAWS or Lake Michigan because the Des Plaines River confluence with the Chicago Sanitary and Ship Canal (CSSC) is in the Brandon Road Pool over 6 miles downstream from the Dispersal Barrier.

Approximately 1.0 hour of gill netting and electrofishing at Cermak Pond caught no bighead or silver carp, nor were any observed during sampling. In contrast, three bighead carp were caught and removed from Schiller Pond after 2.0 hours of gill netting and electrofishing. These carp all were large adults that weighed 56, 60, and 62 pounds. No additional bighead or silver carp were seen during sampling and none are thought to be present in either pond based on conventional sampling.

As a further response to the bighead carp in Flatfoot Lake and Schiller Pond, IDNR reviewed Asian carp captures in all urban fishing lakes located in the Chicago Metropolitan area (Figure 1). Of the 21 urban fishing lakes in the program, five have verified captures of bighead carp either from sampling, pond rehabilitation with piscicide, or natural die offs; two had reported sightings of Asian carp that were not confirmed by sampling (Table 1). The distance from urban fishing ponds to Lake Michigan ranged from 0.1 to 25.7 miles. The distance from ponds to Chicago Area Waterway System (CAWS) waterways upstream of the Dispersal Barrier ranged from 0.01 to 5.1 miles. Although some ponds are located near to Lake Michigan or CAWS waterways, most are isolated and have no surface water connection to the Lake or CAWS upstream of the Dispersal Barrier (Table 1). Lagoons in Gompers Park, Jackson Park, and Lincoln Park are the exceptions. The Lincoln Park South Lagoon is no longer a potential source of Asian carp because the fish population was rehabilitated in 2008, after which it was dropped as a Chicago urban stocking site. Gompers Park Lagoon and Jackson Park Lagoon have never had a report of Asian carp, nor have any been captured or observed during past sampling events. Nevertheless, fishing ponds close to CAWS waterways (Gompers Park Lagoon) or Lake Michigan (Jackson Park Lagoon, Washington Park Lagoon) should be examined for the presence of Asian carp as soon as possible because of the increased likelihood of human transfers of fish between waters within close proximity to one another.

Otolith Microchemistry and Aging

Otolith microchemistry analysis uses stable isotopes and strontium:calcium ratios (Sr:Ca) from fish otoliths (inner ear bones) and ambient water to provide insights into the environmental history of fish (Whitledge 2009). Because fish deposit calcium and associated minerals from ambient water on otoliths as they grow, these structures can provide a record of the type of water that the fish has been residing in over time. Beginning in 2010, we removed heads from bighead carp obtained from Chicago area urban fishing ponds and transferred them to Dr. Gregory Whitledge at Southern Illinois University Carbondale (SIUC) for otolith microchemistry analysis. Heads were removed from three bighead carp from Columbus Park Lagoon, one from Garfield Park Lagoon, 14 from Flatfoot Lake, and three from Schiller Pond. In addition, we

removed post-cleithra bones from all carp, except one each from Columbus and Garfield parks, and forwarded them to SIUC for age determination. To date, results of Sr:Ca analysis are available for fish from the Columbus Park and Garfield Park lagoons and aging has been completed for the Columbus Park fish. Stable isotope analysis for these fish and complete otolith analysis and aging of Flatfoot Lake and Schiller Pond fish are on-going.

Dr. Whitlege (personal communication) reports that all of the fish examined to date showed a decline in Sr:Ca from initially high values in the otolith core (800-1200 $\mu\text{mol/mol}$; within 50-150 microns of the otolith center) to a stable $\sim 600 \mu\text{mol/mol}$ thereafter out to the edge of the otolith. Otolith Sr:Ca of 600 $\mu\text{mol/mol}$ is consistent with what would be expected for a resident fish in these lagoons based on their water Sr:Ca (1.73 mmol/mol). These data indicate that the fish spent their early life in water(s) with higher Sr:Ca ratios and the remainder of their life as residence of the lagoons. The small proportion of the otolith with higher Sr:Ca ratios near the otolith center suggests these fish were transferred into the lagoons during age-0 or age-1. In addition, Dr. Whitlege found that the otolith core Sr:Ca values were too high to represent fish of Illinois River origin or other sites previously examined in northern Illinois (Whitlege 2009).

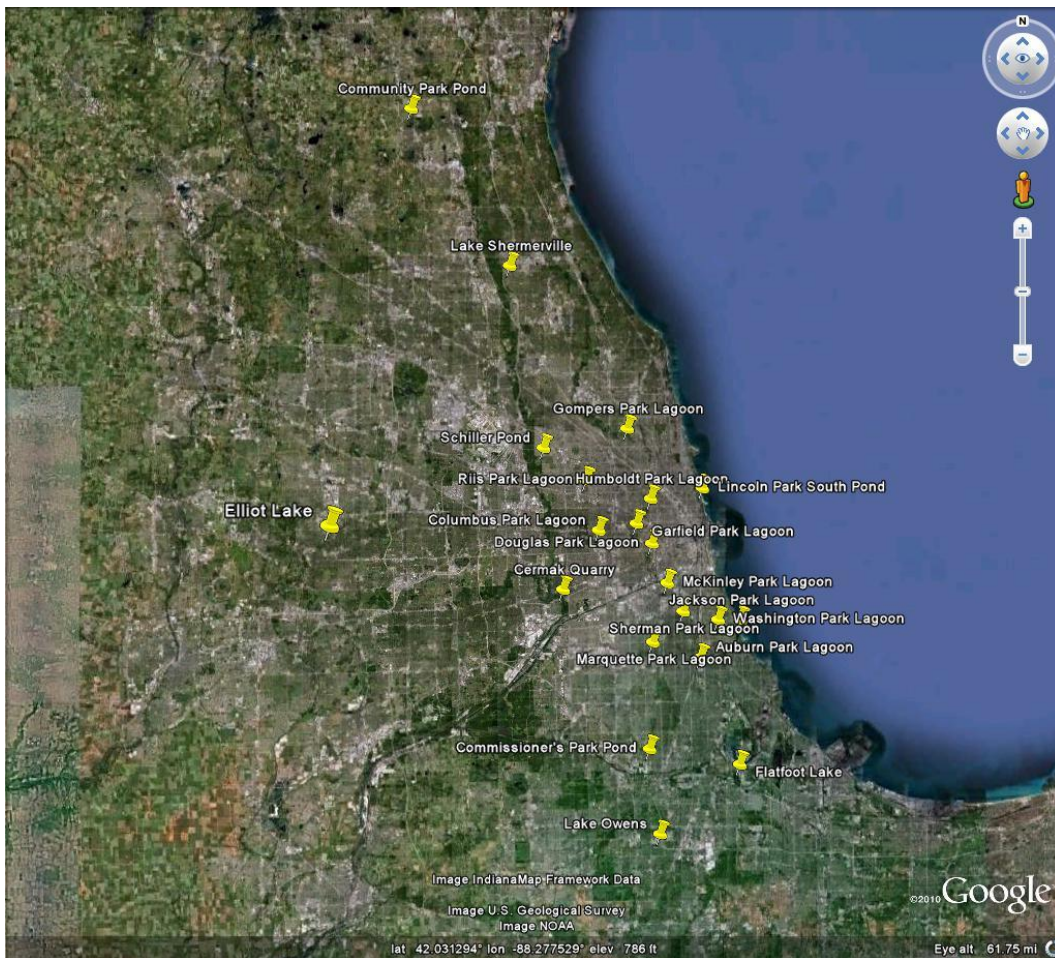


Figure 1. Locations of urban fishing ponds in the Chicago region.

Table 1. A list of Chicago area urban fishing ponds, reported and verified occurrence of bighead carp (all were large adults removed by indicated methods), proximity to Lake Michigan (LM) or the Chicago Area Waterway System (CAWS), and surface water connection to LM and CAWS. Silver carp have not been captured in any urban fishing ponds. Lincoln Park South Lagoon was dropped as an urban stocking site after 2008 pond rehabilitation. NR indicates none reported or observed/captured during routine AC electrofishing samples. DCEL is DC electrofishing and TN/GN is trammel/gill net. Waterways are: LM=Lake Michigan; CALSC = Cal-Sag Channel; CALR = Calumet River; CSSC = Chicago Sanitary and Ship Canal; NBCR = North Branch Chicago River; LCALR = Little Calumet River; Channel; BUBCR = Bubbly Creek; NSC = North Shore; DH = Diversey Harbor; and JH = Jackson Harbor.

Urban Fishing Pond	County	Town	Presence of bighead carp (number-year)	Distance to LM (miles)	Distance to CAWS (miles-waterway)	Surface water connection to LM and CAWS upstream of Dispersal Barrier
Commissioner's Park Pond	Cook	Alsip	NR	9.7	0.9-CALSC	None
Auburn Park Lagoon	Cook	Chicago	NR	3.7	5.1-CALR	None
Columbus Park Lagoon	Cook	Chicago	3 winterkill-2011	7.8	4.1-CSSC	None
Douglas Park Lagoon	Cook	Chicago	NR	4.2	1.8-CSSC	None
Garfield Park Lagoon	Cook	Chicago	1 summerkill-2010	5.0	3.2-NBCR	None
Gompers Park Lagoon	Cook	Chicago	NR	4.1	0.01-NBCR	Overflow to NBCR
Humboldt Park Lagoon	Cook	Chicago	Reported, none sampled	3.8	2.2-NBCR	None
Jackson Park Lagoon	Cook	Chicago	NR	0.1	4.7-CALR	Overflow to JH
Lincoln Park South Lagoon	Cook	Chicago	3 pond rehab-2008	0.1	1.3-NBCR	Overflow to DH
Marquette Park Lagoon	Cook	Chicago	NR	6.3	4.2-CSSC	None
McKinley Park Lagoon	Cook	Chicago	Reported, none sampled	3.8	0.9-CSSC	None
Sherman Park Lagoon	Cook	Chicago	NR	3.6	1.9-BUBCR	None
Washington Park Lagoon	Cook	Chicago	NR	1.7	3.3-BUBCR	None
Riis Park Lagoon	Cook	Chicago	NR	7.7	4.8-NBCR	None
Flatfoot Lake	Cook	Dolton	15 DCEL-2011 2 TN/GN - 2011	5.0	0.2-LCALR	None
Lake Owens	Cook	Hazelcrest	NR	12.2	4.8-LCALR	None
Cermak Quarry	Cook	Lyons	None sampled	10.7	1.3-CSSC	None
Lake Shermerville	Cook	Northbrook	NR	6.6	4.8-NBCR	None
Schiller Pond	Cook	Schiller Park	3 DCEL-2011	10.1	7.1-NBCR	None
Elliot Lake	DuPage	Wheaton	NR	25.7	14.5-CSSC	None
Community Park Pond	Lake	Mundelein	NR	9.2	22.7-NSC	None

Post-cleithra analysis indicated the two bighead carp from Columbus Park Lagoon were age-6. These fish ranged in total length from 44.5-45.3 inches. Growth of these fish was rapid compared to growth trajectories of bighead carp from other waters (Schrank and Guy 2002; Nuevo et al. 2004; Irons et al. 2011). Rapid growth may have occurred because food resources were abundant and the density of bighead carp was low in Columbus Park Lagoon. However, recent information suggests that ages of very large (and likely old) Asian carp may be underestimated with post-cleithra bones and that vertebrae may be a more accurate structure for aging large Asian carp (Duane Chapman, personal communication). Based on this information, we plan to include sectioned vertebrae in future age analyses of large Asian carp.

Sources of Bighead Carp in Ponds

The source of bighead carp in urban fishing ponds has not been confirmed to date and identifying a specific source may prove impossible. However, there is building evidence that young bighead carp may have been unintentionally stocked in urban fishing ponds with shipments of desirable

fish species. To date, potential suppliers of contaminated shipments of fish have been found to be out of business or unreachable, although anecdotal evidence has identified occurrences of bighead carp in shipments reaching other parts of Illinois. From his analysis of otolith microchemistry data, Dr. Whitley concluded that Sr:Ca data from bighead carp in Chicago area ponds were not consistent with transplanted adult fish or bait bucket introductions of juveniles from nearby rivers. The most plausible explanation for these data is that the fish were contaminants in shipments of other fish stocked in the lagoons. Furthermore, there may have been contaminated shipments from multiple sources because a higher otolith core Sr:Ca was found in one carp compared to the others.

The fact that all bighead carp obtained from Chicago area ponds to date have been very large fish of similar size and age also points towards stocking as a potential source. These demographics indicate that stocking probably occurred during a limited number of events sometime before 2005 and likely before the State of Illinois banned transport of live bighead carp in 2002-2003. This corresponds to a time when bighead carp were raised for market in ponds with channel catfish in certain regions of the U.S. (Kolar et al. 2007). Shipments of channel catfish may be the most likely source of contamination in Illinois urban fishing ponds because catchable-sized catfish are stocked frequently and extensively in these waters throughout the State (IDNR 2010).

Examination of urban fishing program stocking records by IDNR has indicated that channel catfish have been purchased from in-state and out-of-state suppliers over the years. Any producers rearing catfish and carp together in culture ponds could be a potential source of bighead carp in Chicago area urban fishing ponds, as well as in ponds from other states that purchased catchable-sized channel catfish from suppliers that practiced catfish/carp polyculture. Indeed, records of bighead carp in lakes, ponds, and lagoons exist across the state of Illinois, and are not just limited to the Chicago area (Table 2).

Regulations preventing live transport of bighead carp in Illinois and nationally (2011) appear to have had the desired effect of reducing the spread of invasive carp by unintentional stocking, at least in the case of Illinois urban fishing ponds. The capture of only very large adults in these ponds and results of otolith microstructure analysis of captured carp to date are consistent with introductions from years ago when live transport of bighead carp was permitted. Similarly, an absence of young bighead carp in recent samples from Chicago urban fishing ponds may reflect the prevention of live transport after the Illinois law was enacted in 2002-2003. The 2011 Lacey Act listing of bighead carp may have further reduced the threat of introduction by preventing live transport across state borders, which had the effect of preventing legal use of these fish in live fish markets throughout the U.S. and Canada. With live fish markets inaccessible, catfish farmers from at least one state are no longer rearing bighead carp in ponds with channel catfish (Anita Kelly, personal communication). If widespread, this change in catfish farming would eliminate one possible source of bighead carp from stocked fishing ponds in Illinois and elsewhere.

Future Monitoring and Removal Plans

We have identified Chicago area urban fishing ponds as a possible source of live bighead carp or bighead carp eDNA in CAWS waterways, Lake Michigan, and the upper Des Plaines River.

Table 2. A list of urban fishing ponds in Illinois located outside of the Chicago Metropolitan Area and reported occurrence of bighead carp (all were large adults removed by indicated methods). Silver carp have not been captured in any urban fishing ponds. NR indicates none reported or observed/captured during routine sampling.

Urban Fishing Pond	Region	County	Town	Presence of bighead carp (number-year)
Lovings Lake	Northwest	Winnebago	Rockford	NR
Belvidere Park District Pond	Northwest	Boone	Belvidere	NR
Boone County Conservation District Pond	Northwest	Boone	Belvidere	NR
Riverside Park Lagoon	Northwest	Rock Island	Moline	NR
Glen Oak Park Lagoon	Northwest	Peoria	Peoria	NR
Crystal Lake	Central	Champaign	Urbana	NR
Kaufman Lake	Central	Champaign	Champaign	NR
Washington Park Lagoon	Central	Sangamon	Springfield	15-20 AC electrofishing - 2004
Dreamland Pond	Central	Macon	Decatur	2 pond draining - 2004
Miller Park Pond	Central	McLean	Bloomington	NR
Holiday Park Pond	Central	McLean	Bloomington	NR
North Point Park Pond	Central	McLean	Bloomington	NR
Moore Community Park Pond	Southern	Madison	Alton	NR
LeClair Pond	Southern	Madison	Edwardsville	NR
Jones Lake	Southern	St. Clair	East St. Louis	NR
St. Ellen Park Pond	Southern	St. Clair	O'Fallon	NR
SIUC Campus Lake	Southern	Jackson	Carbondale	NR
SIUC Touch of Nature Pond	Southern	Jackson	Carbondale	NR
Veteran's Park Lake	Southern	Jefferson	Mt. Vernon	1 AC electrofishing 1997
Foundation Park Lake	Southern	Marion	Centralia	NR
Eldon Hazlet State Park Pond	Southern	Clinton	Carlyle	NR

Recent sampling and examination of pond location and hydrology relative to targeted waters suggest the present threat of Asian carp contamination from these ponds is low. Regardless, the following actions will be taken to further evaluate contamination in these urban fishing ponds, eliminate any present risk of contamination, and prevent future contamination from occurring.

Sample Ponds for Asian Carp eDNA – Collecting water samples from urban ponds and analyzing them for Asian carp eDNA may be a quick method of determining presence of bighead or silver carp. Chris Jerde of University of Notre Dame has an ongoing study monitoring eDNA in Chicago area fishing ponds. Samples were taken in fall 2010 and spring/summer 2011. Results are pending and may be available in January 2012.

Sample Ponds with Conventional Gear – All fishing ponds supported by the urban fishing program will be sampled with DC electrofishing gear and trammel or gill nets during fall 2011 and spring 2012. Sampling will begin with ponds in closest proximity to Lake Michigan and CAWS waterways upstream of the Dispersal Barrier, followed by those that have had reports of Asian carp in the past. The first seven ponds to be targeted will be Gompers Park Lagoon, Commissioners Park Pond, Jackson Park Lagoon, Washington Park Lagoon, Garfield Park Lagoon, McKinley Park Lagoon, and Humboldt Park Lagoon. Other ponds with positive detections of bighead or silver carp eDNA will be given highest priority.

Otolith Microanalysis and Aging-We will continue to work with SIUC to obtain additional life history information on any Asian carp captured from urban fishing ponds or waters upstream of

the Dispersal Barrier. Heads, vertebrae, and post-cleithra will be removed and sent to SIUC for otolith microchemistry analysis and aging. Disposition of samples will be tracked with chain-of-custody forms as outlined in the 2011 Asian Carp Monitoring and Rapid Response Plan (MRRWG 2011).

Future Fish Purchases – IDNR will formalize a policy to ensure that future fish contracts for the urban fishing program will be made only with producers that can guarantee that no Asian carp are stocked in rearing ponds for channel catfish or other species.

Urban Fishing Programs in Other States – We recommend that other states evaluate urban fishing ponds for the presence of Asian carp, especially if channel catfish or other species are known to have been purchased from producers that practice(d) catfish/carp polyculture. States with urban fishing ponds located within the Great Lakes basin require immediate attention. Pay fishing lakes where stockings may have occurred from co-mingled populations of catfish and Asian carps should also be evaluated throughout the Great Lakes and Mississippi River basins.

Literature Cited

IDNR. 2010. Illinois Urban Fishing Program Division of Fisheries fiscal year 2010 annual report. Illinois Department of Natural Resources, Springfield.

http://www.ifishillinois.org/programs/Urban/10URBAN_FISHING_ANNUAL_REPORT.pdf

Irons, K.S., G.G. Sass, M.A. McClelland, and T.M. O’Hara. 2011. Bigheaded carp invasion of the La Grange Reach of the Illinois River: insights from the Long Term Resource Monitoring Program. Invasive Asian Carps in North America. American Fisheries Society Symposium 74, Bethesda, Maryland.

Kolar, C. S., D. C. Chapman, W.R. Courtenay, Jr., C. M. Housel, J. D. Williams, and D. P. Jennings. 2007. Bigheaded carps: a biological synopsis and environmental risk assessment. American Fisheries Society, Special Publication 33, Bethesda, Maryland.

Monitoring and Rapid Response Work Group (MRRWG). 2011. Monitoring and rapid response plan for Asian carp in the upper Illinois River and Chicago Area Waterway System. Asian Carp Regional Coordinating Committee, Washington, D.C.

<http://asiancarp.org>

Nuevo, M. R., R. J. Sheehan, and P. S. Wills. 2004. Age and Growth of bighead carp *Hypophthalmichthys nobilis* (Richardson, 1845) in the middle Mississippi River. *Archive for Hydrobiology* 160:215-230.

Schrank, S. J., and C. S. Guy. 2002. Age, growth, and gonadal characteristics of adult bighead carp, *Hypophthalmichthys nobilis*, in the lower Missouri River. *Environmental Biology of Fishes* 64:443-450.

Whitledge, G. W. 2009. Otolith microchemistry and isotopic composition as potential indicators of fish movement between the Illinois River drainage and Lake Michigan. *Journal of Great Lakes Research* 35:101-106.