Transactions of the Illinois State Academy of Science
(2015) Volume 108, pp. 47-52

received 4/30/15
accepted 7/16/15

# Range Expansions and New Drainage Records for Select Illinois Fishes

Jeremy S. Tiemann[1*], Christopher A. Taylor[1], Dan Wylie[1], Jim Lamer[2], Phil W. Willink[3], Frank M. Veraldi[4], Steven M. Pescitelli[5], Ben Lubinski[6], Trent Thomas[7], Randy Sauer[8], and Ben Cantrell[9]
[1]Illinois Natural History Survey, Prairie Research Institute, University of Illinois, 1816 South Oak Street, Champaign, IL 61820
[2]Department of Biological Sciences, Western Illinois University, 372 Waggoner Hall, 1 University Circle, Macomb, IL 61455
[3]Shedd Aquarium, 1200 S Lake Shore Drive, Chicago, IL 60605
[4]U.S. Army Corps of Engineers, 231 South LaSalle Street, Suite 1500, Chicago, IL 60604
[5]Illinois Department of Natural Resources, Division of Fisheries, 5931 Fox River Road, Plano, IL 60545
[6]Illinois Natural History Survey, National Great Rivers Research and Education Center, One Confluence Way, East Alton, IL 62024
[7]Illinois Department of Natural Resources, 301 S. Date Street, Gibson City, IL 60936
[8]Illinois Department of Natural Resources, Address Eldon Hazlet State Park, 20100 Hazlet Park Road, Carlyle, IL 62231
[9]North American Native Fishes Association, Peoria, IL 61614
[*]Correspondence: jtiemann@illinois.edu

## ABSTRACT

Fish surveys by university and natural resource agency staff and fish hobbyists in Illinois, and the acquisition of the former Northern Illinois University fish collection by the Illinois Natural History Survey, have documented significant new voucher records for 21 fish species in the state. We herein report on those records.

## INTRODUCTION

Illinois is home to 192 native fish species (Burr and Page 2009; Tiemann and Sabaj-Perez 2012). Of those, ten are considered extirpated (although the Illinois Department of Natural Resources stocked the Alligator Gar, *Atractosteus spatula*, into the Illinois River drainage), one is federally-endangered, 18 others are state-endangered, and 16 are state-threatened (Burr and Page 2009; IESPB 2015). A list of updated fish distribution records can assist natural resource agencies in management decisions, and can be achieved by publishing updated records of select fishes (e.g., Burr et al. 1988; Savitz et al. 1990; Burr et al. 1996; Page and Retzer 2002; Tiemann et al. 2004).

## METHODS

Museum specimens and field notes of Illinois fishes were compared to published literature (e.g., Smith 1979; Burr et al. 1988; Burr et al. 1996; Page and Retzer 2002; Retzer 2005). We included those species previously listed as extirpated in Illinois, those that had not been previously listed as extant in a particular drainage, and those that had been listed as extirpated in a specific drainage. Records are based on specimens deposited in the Illinois Natural History Survey (INHS) Fish Collection, Champaign (which includes the former Northern Illinois University Fish Collection, DeKalb, and the former Southern Illinois University at Carbondale (SIUC) Fish Collection), or documented with photographs that are housed at INHS. Species accounts include catalogue number (if assigned), locality, date, and number of specimens, and are organized within the general phylogenetic scheme presented by Page et al. (2013).

## SPECIES ACCOUNTS

***Lepisosteus oculatus* Winchell, Spotted Gar.** The Spotted Gar occurs in clear pools with abundant vegetation in streams, lakes, and swamps in lowland areas in southern Illinois and along the Illinois River near Havana, Mason County (Smith 1979). It has never been documented in the upper Illinois River drainage (e.g., Smith 1979).

Updated record: North Shore Channel (Chicago River – Des Plaines River drainage), Chicago, near Pratt Avenue, Cook County, 24 September 2014, one individual collected and returned alive (photo voucher).

***Anguilla rostrata* (Lesueur) American Eel.** The American Eel occurs sporadically throughout Illinois in large streams, and occurs in deep pools with mud substrates (Smith 1979). Its distribution has been reduced by impoundments (Smith 1979; Slawski et al. 2008), and it is listed as state-threatened in Illinois (IESPB 2015). The American Eel was considered extirpated from the Des Plaines River drainage (Slawski et al. 2008).

Updated records: Tampier Lake (Des Plaines River drainage), Orland Park, Cook County, July 2014 (no date given), one individual collected and returned alive (photo voucher). Lockport Pool of the Chicago Area Waterway System, Lockport, Cook County, 1 April 2013, one individual collected and returned alive (photo voucher). Des Plaines River, Willow Springs, Columbia Woods Forest Preserve, Cook County, 24 May 2015, one individual caught and returned alive (photo voucher).

***Hybognathus nuchalis* Agassiz, Mississippi Silvery Minnow.** The Mississippi Silvery Minnow is almost statewide in distribution, but is rare in the northeastern corner of Illinois (Smith 1979). It occurs in large streams with clear water and sandy bottoms (Smith 1979). The range of the Mississippi Silvery Minnow has declined due to desiccation during drought periods eliminating its preferred habitat (Smith 1971). Retzer (2005) considered the minnow extirpated from the upper Rock River drainage.

Updated record: INHS 102524, Rock River, Sterling, 12th Avenue bridge, Whiteside County, 21 August 2008, seven individuals.

***Hybopsis amnis* (Hubbs and Green), Pallid Shiner.** Once found throughout Illinois, the Pallid Shiner is now known from three regions in Illinois: lower Kankakee River

in Will County, Illinois River in Grundy County, and Mississippi River in Rock Island County (Warren and Burr 1988; Page and Retzer 2002). It prefers pools of larger rivers with sand or silt substrates (Page and Retzer 2002; Willink and Veraldi 2009). Jelks et al. (2011) listed the Pallid Shiner as "Vulnerable" (=in imminent danger of becoming threatened throughout all or a significant portion of its range) due to destruction, modification, or reduction of habitat. It is state-endangered in Illinois (IESPB 2015). Much of the Pallid Shiner's preferred habitat has been eliminated through siltation, pollution, channelization, and impoundments (Smith 1971; Smith 1979; Warren and Burr 1988; Page and Retzer 2002). The shiner was collected in the Des Plaines River drainage near Berwyn, Cook County, in 1900 (Warren and Burr 1988); however, it has not been reported in the drainage since (e.g., Page and Retzer 2002; Retzer and Batten 2005; Willink and Veraldi 2009) and was considered extirpated (Slawski et al. 2008).

Updated record: INHS 105381, Des Plaines River, 1.5 mi SE Channahon, I-55 bridge, Will County, 12 July 2012, one individual.

***Rhinichthys cataractae* (Valenciennes), Longnose Dace.** In Illinois, the Longnose Dace occurs along the pebble beaches of Lake Michigan and in several gravelly, boulder-strewn streams in the northwestern corner of the state (Smith 1979). Tiemann et al. (2012) examined the distribution of the dace in the Wisconsin Driftless Area in Illinois and failed to find evidence of it in the Apple River drainage. Never common in Illinois, the species is threatened by unrestricted livestock access, removal of riparian areas, and nutrient enrichment of streams (Tiemann et al. 2012).

Updated record: INHS 106531, Apple River, Hanover, downstream of the lowhead dam, Jo Davies County, 25 September 1976, one individual (specimen formerly in the Northern Illinois University fish collection).

***Cycleptus elongatus* (Lesueur), Blue Sucker.** In Illinois, the Blue Sucker is sporadic in the Ohio and Mississippi rivers and lower reaches of their major tributaries (Smith 1965), and in high abundance in the Wabash River (Broadway et al. 2015). Jelks et al. (2011) listed the sucker as "Vulnerable" due to destruction, modification, or reduction of its habitat, as well as other natural or anthropogenic factors that jeopardize its existence. This large river species is often collected in swift water over rocky substrates, but has been declining in abundance in Illinois for decades due, in part, to dams on navigable rivers (Smith 1979; Burr et al. 1996). The Blue Sucker has not been reported from the Embarras River drainage (e.g., Smith 1971; Smith 1979).

Updated records: INHS 64198, Embarras River, 2.5 mi SE Charleston, Illinois Route 130, Coles County, 12 July 1988, one individual. INHS 94462, Embarras River, Lawrenceville, Illinois Route 1, Lawrence County, 15 July 1997, one individual.

***Ictiobus niger* (Rafinesque), Black Buffalo.** The Black Buffalo occurs sporadically in most parts of the state in medium- and large-sized rivers and their marginal lakes (Smith 1979). Smith (1979) considered it extirpated in Lake Michigan. Savitz et al. (1996) failed to collect the Black Buffalo during their work of Lake Michigan harbors, and Retzer and Batten (2005) did not report it from the Lake Michigan drainage.

Updated records: Lake Michigan, Chicago, Northerly Island, Cook County, 24 October 2014, 20 individuals (photo voucher).

***Minytrema melanops* (Rafinesque), Spotted Sucker.** The Spotted Sucker is sporadically distributed in clear, firm-bottomed creeks and small rivers across most of Illinois (Smith 1979). It is less widespread and common than formerly distributed, probably due to siltation (Smith 1979). Smith (1979) doubted the occurrence of the Spotted Sucker in northeastern Illinois, and did not report it from the upper Rock River drainage (e.g., Pecatonica River drainage). Mullen (1992) did not report the sucker from Winnebago County, and Becker (1983) did not include it from the upper Rock River drainage in Wisconsin.

Updated records: INHS 43401, East Fork Raccoon Creek (Pecatonica River drainage), 4.2 mi NE Shirland, Winnebago County, 2 November 1997, one individual. INHS 53026, unnamed tributary to Pecatonica River, Shirland, Winnebago County, 5 October 1999, one individual. INHS 53168, Dry Creek (Rock River drainage), 2 mi SE Rockton, Winnebago County, 4 October 1999, one individual.

***Labidesthes sicculus* (Cope), Brook Silverside.** The Brook Silverside occurs statewide, but is usually associated with large rivers in marginal areas and clear, quiet backwaters (Smith 1979). Its range has declined because excessive siltation has degraded its preferred habitat (Smith 1979). Retzer (2005) considered the Brook Silverside extirpated from the Vermilion River drainage (Wabash River drainage).

Updated records: INHS Fish Collection has 17 lots, most with multiple specimens, from the Vermilion River drainage (Wabash River drainage) since 1990, including three lots from the Salt Fork, five lots from the Middle Fork, three lots from the North Fork, and four lots from the Vermilion River mainstem.

***Fundulus catenatus* (Storer), Northern Studfish.** The Northern Studfish occurs in shallow margins of pools in clear, moderate to high gradient streams of all sizes with permanent flow and silt-free sand and gravel substrates (Pfleiger 1995). It has been recorded from only one location in Illinois: the Mississippi River at river mile 48 in Alexander County (Heidinger 1974). According to Pfleiger (1995), the Northern Studfish is somewhat tolerant of stream disturbances, including channelization, destabilization of the riparian corridor, and overgrazing.

Updated record: SIUC 72781, West Fork Richland Creek (Kaskaskia River drainage), 3 mi. N of Hecker, Skaer Road, St. Clair County, 10 July 2007, one individual.

Remarks: This specimen represents the first record of Northern Studfish from an interior Illinois stream. The 3-inch specimen is likely an immature female as adults are documented over 6 inches in length (Pfleiger 1995). It is unknown whether the fish was a bait bucket / aquarium release, or from an undocumented native population. Further sampling in West Fork Richland Creek and other Kaskaskia tributaries has not yielded additional specimens.

***Fundulus diaphanus* (Lesueur), Banded Killifish.** The Banded Killifish occurs in clear, vegetated, glacial lakes in Lake and Cook counties, Illinois, but also formerly

occurred in McHenry and McLean counties (Smith 1979). Destruction and general deterioration of natural lakes are responsible for its decline in the state (Smith 1979). The Banded Killifish is state-threatened in Illinois (IESPB 2015). Rivera et al. (2013) reported two individuals from Mill Creek (Rock River drainage) in Rock Island County, which is the first record from western Illinois. The Banded Killifish has not been reported from the Illinois portion of the Mississippi River (e.g., Steuck et al. 2010).

Updated records: INHS 106490, Coon Creek (Rock River drainage), Prophetstown, Starr Road, Whiteside County, 22 July 2013, seven individuals collected (two preserved). INHS 106939, Mississippi River, Pool 19, 1.3 mi SSE Nauvoo, in Nauvoo Flats, Hancock County, 1 July 2013, five individuals collected (two preserved). INHS 106940, Mississippi River, Pool 20, 1.9 mi NE Warsaw, side channel at head of Mud Island, Hancock County, 29 July 2013, one individual collected. Sandy Creek (Illinois River drainage), 1 mi SE Henry, Putnam County, 22 March 2015, one individual collected and returned alive (photo voucher)

***Aphredoderus sayanus* (Gilliams), Pirate Perch.** The Pirate Perch is often collected in swamps and muck-bottom pools of low-gradient streams in the southern half of Illinois, but has a few scattered populations in the northern half of the state (Smith 1979). Smith (1979) suggested the fish does not occur west of the Illinois River, but Steuck et al. (2010) reported it as occurring in Pool 19 "at some time in the distant past."

Updated record: INHS 94247, Mississippi River, Pool 19, in Blackhawk Bottoms, a contiguous backwater 0.25 mi north of the Skunk River confluence, Des Moines County, Iowa, 30 July 2014, one individual collected

***Cottus bairdii* Girard, Mottled Sculpin.** In Illinois, the Mottled Sculpin occurs along the shoreline of Lake Michigan, as well as in springs, spring-fed seeps, and clear, swift creeks in the northeastern portion of the state (Smith 1979). Smith (1979) reported its habitats are rapidly being destroyed by stream alterations but did not provide specific causes. Retzer (2005) considered the Mottled Sculpin extirpated from the Des Plaines River drainage, and absent in the Vermilion River drainage (Wabash River drainage).

Updated records: INHS 53886, Black Partridge Creek (Des Plaines River drainage), 2.2 km NW Lemont, Bluff Road, Cook County, 28 Oct 1999, two individuals. INHS 68040, Willow Creek (Vermilion River drainage), Forest Glen County Preserve, Vermilion County, 7 November 1984, one individual. INHS 101099, Whippoorwill Branch (Vermilion River drainage), 4 mi E Georgetown, County Road 2100E, Vermilion County, 13 June 2006, 15 individuals. INHS 105827, Grape Creek (Vermilion River drainage), 2.4 mi NE Westville, Twin Hills Road, Vermilion County, 15 August 2011, two individuals.

***Morone chrysops* (Rafinesque), White Bass.** The White Bass occurs in schools in large and medium-sized rivers, floodplain lakes, and large reservoirs with clear water and firm substrates, but is absent in most of the smaller streams within the interior of the state (Smith 1979). Retzer (2005) considered it extirpated from the Des Plaines River drainage.

Updated record: INHS 97339, Chicago Sanitary & Ship Canal (Des Plaines River drainage), Lockport, 16th Street, Will County, 2 November 1999, one individual.

***Lepomis humilis* (Girard), Orange Spotted Sunfish.** The Orange Spotted Sunfish occurs statewide in almost all habitat types except swiftly flowing streams (Smith 1979). Smith (1968) reported the species to be declining in the Wabash River drainage (e.g., Vermilion and Embarras rivers), and Retzer (2005) considered it extirpated from the Vermilion River drainage.

Updated records: INHS 46506, Middle Fork Vermilion River, 2.5 mi ENE Collison, County Road 2600N ford, Vermilion River, 22 May 1998, two individuals. INHS 56460, Wall Town Drainage Ditch (Middle Fork Vermilion River drainage), 2 mi WSW Roberts, County Road 1400N bridge, Ford County, 25 July 2000, three individuals. INHS 95841, Middle Fork Vermilion River, 4 mi N Penfield, County Road 3500N bridge, Champaign County, 14 August 2001, one individual. INHS 96510, Bluegrass Creek (Middle Fork Vermilion River drainage), 1.25 mi N Potomac, County Road 3175N bridge, Vermilion County, 27 August 2001, one individual.

***Crystallaria asprella* (Jordan), Crystal Darter.** Jordan (1878), Forbes and Richardson (1920), and Smith (1979) reported the Crystal Darter from the following locations in Illinois: a rocky creek of the Mississippi bluffs in Hancock County (type locality); Mississippi River at East Dubuque in Jo Daviess County; Rock River at Erie in Whiteside County, Cleveland in Henry County, and Milan in Rock Island County; Little Wabash at Effingham in Effingham County; and Wabash River near Vincennes in Knox County, Indiana, and New Harmony in Posey County, Indiana. The darter is particularly vulnerable to habitat altering activities such as channelization, dredging, and impoundment (Page 1983). Its distribution has been substantially reduced in areas of human overdevelopment and it now is absent in large areas where it formerly occurred (Page 1983). Jelks et al. (2011) listed the Crystal Darter as "Vulnerable" due to destruction, modification, or reduction of habitat. The darter was considered extirpated in Illinois (Smith 1979). However, fieldwork conducted over the past 15 years has shown that the Crystal Darter is extant but rare in the Mississippi River bordering Illinois. One Crystal Darter was collected from a side channel of the river between river miles 77.7 and 79.5, Union County, on 6 June 1998, and another individual was collected from the river at Picayne Chute, Alexander County, on 9 June 2004 (Stewart et al. 2005).

Updated records: INHS 102953, Mississippi River, 3 miles N Cordova, river mile 506.5, Rock Island County, 8 October 2009, one individual. INHS 106605, Mississippi River, 5 mi W Columbia, river mile 165, Monroe County, 11 July 2013, one individual.

Additionally, the Missouri Department of Conservation (MDC) reported collecting two individuals from the Mississippi River between Missouri and Illinois in recent years (Dave Herzog, MDC, personal communication): one specimen from river mile 48, across from Alexander County on 10 June 2010, and one from river mile 78, across from Union County on 3 April 2009.

Remarks: Six specimens captured in a 450

mile stretch of the Mississippi River along Illinois' border in the past 15 years strongly suggests that these individuals are not waifs from tributary populations (e.g., Meramec River in Missouri or Wisconsin River in Wisconsin). The likelihood of capturing those few waif individuals is extremely low given the species' low detectability. Rather, it is likely that the Crystal Darter persists at some unknown level in the Mississippi River along the Illinois border.

***Etheostoma asprigene* (Forbes), Mud Darter.** The Mud Darter commonly inhabits bottomland lakes, sloughs, oxbows, and quiet areas of large streams throughout most of the state (Cummings et al. 1984). It was documented in the Pecatonica River (Rock River drainage) before 1908 and in the Sugar River (Pecatonica River – Rock River drainage) in Wisconsin in the 1930s, but has not been documented since (Smith 1979; Becker 1983; Mullen 1992). Within the last century, the range of the Mud Darter has been reduced due to desiccation during drought periods eliminating its preferred habitat (Smith 1968; Smith 1971). Retzer (2005) considered the darter extirpated from the Salt Creek basin (Sangamon River drainage) and absent in the upper Rock River drainage.

Updated records: INHS 52387, Salt Creek (Sangamon River drainage), 3 mi S Clinton, U.S. Highway 51, DeWitt County, 21 September 1999, nine individuals. INHS 102125, Coon Creek (Rock River drainage), Prophetstown, Starr Road, Whiteside County, 19 August 2008, three individuals.

***Etheostoma exile* (Girard), Iowa Darter.** The Iowa Darter occurs in clear, well-vegetated lakes, sloughs, and low gradient streams in northern Illinois (Smith 1979; Burr and Stewart 2003). It is state-threatened in Illinois (IESPB 2015). Much of the Iowa Darter's preferred habitat has been eliminated through drainage of natural lakes, sloughs, and marshes (Smith 1971). Retzer (2005) considered the Iowa Darter extirpated from the Des Plaines River drainage.

Updated records: INHS 50999, Mill Creek (Des Plaines River drainage), 1.5 mi SW Wadsworth, Dilleys Road, Lake County, 26 May 1999, one individual. INHS 98812, unnamed tributary of the Des Plaines River, 3 mi N Libertyville, junction of Illinois Route 120 and Illinois Route 21, Lake County, 27 August 2004, one individual. INHS 104652, Middle Fork North Branch Chicago River, 1.1 mi NE Deerfield, Deerfield High School, Lake County, 16 August 2011, one individual. INHS 108290, unnamed tributary of the North Branch Chicago River, Lake Middlefork Savanna County Forest Preserve at railroad crossing, Lake Forest, Lake County, 17 June 2015, two individuals. North Branch Chicago River, Middlefork Savanna County Forest Preserve at railroad crossing, Lake Forest, Lake County, 18 June 2015, 42 individuals (none vouchered). INHS 108291, North Branch Chicago River, Rondout at railroad crossing, Lake County, 17 June 2015, 11 individuals. INHS 108332, North Mill Creek (Des Plaines River drainage), 5 mi N Lindenhurst, Edwards Road, Lake County, 15 July 2015, one individual.

***Etheostoma microperca* Jordan and Gilbert, Least Darter.** The Least Darter occurs in the shallow margins of heavily vegetated, low-gradient water bodies, including small to large streams and natural lakes in northeastern Illinois (Burr and Page 1979). According to Smith (1979), there is no clear evidence of reduction in the distribution or abundance of the species in Illinois. However, Retzer (2005) considered the Least Darter extirpated in the Des Plaines River drainage.

Updated record: INHS 42871, unnamed tributary of the DuPage River (Des Plaines River drainage), 1 mi N Plainfield, Illinois Route 59, Will County, 15 September 1997, six individuals.

***Percina maculata* (Girard), Blackside Darter.** The Blackside Darter is most abundant in firm-bottomed pools of creeks and small rivers, and is more generally distributed in the eastern half of Illinois than in the western part (Smith 1979). It has experienced considerable decline in Illinois during the past several decades (Smith 1979). According to Steuck et al. (2010), the Blackside Darter occurred in Pool 19 "at some time in the distant past," but has not been reported from the Illinois portion of the Mississippi River (e.g., Smith 1971; Smith 1979).

Updated record: INHS 108152, Mississippi River, Alton, just downstream of the U.S. Highway 67 bridge near Ellis Island, Madison County, 6 September 2013, one individual.

***Percina shumardi* (Girard), River Darter.** In Illinois, the River Darter is generally distributed in the Mississippi River and lower reaches of its tributaries, and is sporadic in the Illinois, Ohio, and Wabash rivers (Smith 1965). It inhabits large streams over mixed sand and gravel in areas with moderate current (Smith 1979). According to Thomas (1979), the River Darter occurred in the Kaskaskia River exclusively downstream from New Athens, St. Clair County, and was extirpated from the Carlyle (Clinton County) and Vandalia (Fayette County) areas. The species was considered extirpated from the lower Kaskaskia River by Smith (1979) and upper Kaskaskia River drainage by Retzer (2005).

Updated record: INHS 98726, Kaskaskia River, Shelbyville, below Shelbyville Dam, Shelby County, 28 April 2004, one individual.

## DISCUSSION

Several of the species mentioned in this paper are not commonly encountered in Illinois, potentially as a result of being rare in Illinois and difficult to collect, not sampling their preferred habitats with proper gear, or misidentifying specimens. Small-bodied benthic fishes that occur in wide, deep rivers, such as the Crystal Darter, Mud Darter, and River Darter, are more difficult to capture with traditional gear types than larger fishes (Smith 1979; Stewart et al. 2005). They are more tolerant of electrical gradient fields and/or stay submerged when electroshocked, and their small body size makes them immune to capture with mesh sizes most commonly used in most hoop or gill nets. Other species, such as the Blue Sucker, are difficult to collect because their preferred habitat (e.g., deep channels) makes it challenging to survey (Smith 1979). Some fishes, such as the Banded Killifish or Iowa Darter, often go unnoticed because their preferred habitats are infrequently sampled. The Iowa Darter, for example, can be routinely collected in small (<10 feet wide and <6 inches deep), intermittent, headwater streams through-

out the Kishwaukee River drainage with a dip-net (J.S. Tiemann, unpublished data), which are areas not normally sampled and methods not generally utilized by natural resource agencies. Other species, such as the Least Darter, are often overlooked or misidentified because of their small sizes (Smith 1979).

Continued sampling, especially targeted surveys (e.g., sampling specific habitats with particular gears), and vouchering specimens will provide important information on species distributions and natural history that can be used to promote the understanding, conservation, and management of these organisms and their habitats. Resulting data will aid natural resource managers in decisions to downgrade or delist certain species, and are useful in identifying areas with unique habitats that can be prioritized for protection.

## ACKNOWLEDGEMENTS

Partial support for fieldwork was provided by the Illinois Department of Transportation, the Illinois State Toll Highway Authority, and the Long-term Fish Population Monitoring Program (F-101-R), which is supported by the Federal Aid in Sport Fish Restoration Act (P.L. 81-6814, Dingell-Johnson/Wallop-Breaux). C. Anderson (WIU), B.M. Burr (SIUC), S. Butler (INHS), D.A. Carney (IDNR), K.S. Cummings (INHS), S.G. Dennison (Metropolitan Water Reclamation District of Greater Chicago), M.J. Dreslik (INHS), E. Gittinger (INHS), D.W. Greenfield (Northern Illinois University), J. Haas (Exelon Corporation), R. Haun (WIU), D. Herzog (MDC), F. Jakubicek (IDNR), A.R. Kuhns (INHS), E. Lamp (WIU), M. Mounce (IDNR), L.M. Page (INHS), C.A. Phillips (INHS), E. Ratcliff (INHS), K. Rivera (IDNR), M.H. Sabaj (INHS), J.L. Sherwood (INHS), A.J. Stites (INHS), S.J. Baker-Wylie (INHS), and others assisted in fieldwork, shared their records, and deposited specimens at INHS. C.A. Mayer (INHS) and R.M. Vinsel (INHS) assisted with the curation of specimens. C. Feng, B. Tiemann, and three anonymous reviewers offered constructive criticism to improve this manuscript.

## LITERATURE CITED

Becker, G.C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

Broadway, K.J., M. Pyron, J.R. Gammon, and B.A. Murry. 2015. Shift in a large river fish assemblage: body-size and trophic structure dynamics. PLoS ONE 10(4): e0124954. doi: 10.1371/journal.pone.0124954.

Burr, B.M. and L.M. Page. 1979. The life history of the Least Darter, *Etheostoma microperca*, in the Iroquois River, Illinois. Illinois Natural History Survey Biological Notes 112:1-15.

Burr, B.M., M.L. Warren, Jr., and K.S. Cummings. 1988. New distributional records of Illinois fishes with additions to the known fauna. Transactions of the Illinois State Academy of Science 81:163-170.

Burr, B.M., K.M. Cook, D.J. Eisenhour, K.R. Piller, W.J. Poly, R.W. Sauer, C.A. Taylor, E.R. Atwood, and G.L. Seegert. 1996. Selected Illinois fishes in jeopardy: new records and status evaluations. Transactions of the Illinois State Academy of Science 89:169-186.

Burr, B. M. and J. G. Stewart. 2003. Status survey of the Iowa Darter, *Etheostoma exile* (Pisces: Percidae), an endangered species in Illinois. Final Report submitted to the Illinois Endangered Species Protection Board, Springfield, IL. 27 pp.

Burr, B.M. and L.M. Page. 2009. Illinois fish communities: more than a century of change. Pp 147-162 in C.A. Taylor, J.B. Taft, and C.E. Warwick, editors. Canaries in the catbird seat: the past, present, and future of biological resources in a changing environment. Illinois Natural History Survey Special Publication 30, Champaign. 306 pp.

Cummings, K.S., J.M. Grady, and B.M. Burr. 1984. The life history of the Mud Darter, *Etheostoma asprigene*, in Lake Creek, Illinois. Illinois Natural History Survey Biological Notes 122:1-16.

Forbes, S.A. and R.E. Richardson. 1920. The fishes of Illinois. 2nd edition. Illinois State Laboratory of Natural History, Urbana. 357 pp.

Heidinger, R.C. 1974. First record of the Northern Studfish, *Fundulus catenatus* (Cyprinodontidae, Pisces), in Illinois. Transactions of the Illinois State Academy of Science 67:364-365.

Illinois Endangered Species Protection Board. 2015. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp. Published online at http://www.dnr.state.il.us/espb/index.htm

Jelks, H.L., S.J. Walsh, N.M. Burkhead, S. Contreras-Balderas, E. Diaz-Pardo, D.A. Hendrickson, J. Lyons, N.E. Mandrak, F. McCormick, J.S. Nelson, S.P. Platania, B.A. Porter, C.B. Renaud, J.J. Schmitter-Soto, E.B. Taylor, and M.L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33:372-407.

Jordan, D.S. 1878. A catalogue of the fishes of Illinois. Illinois State Laboratory of Natural History Bulletin 2:37-70.

Mullen, E.M. 1992. The fishes of Winnebago County, Illinois. Winnebago County Forest Preserve District, Rockford, Illinois. 110 pp.

Page, L.M. 1983. Handbook of Darters. TFH Publications, Inc., Neptune, New Jersey. 271 pp.

Page, L.M. and M.E. Retzer. 2002. The status of Illinois' rarest fishes and crustaceans. Transactions of the Illinois State Academy of Science 95:311-326.

Page, L.M., H. Espinosa-Pérez, L.T. Findley, C.R. Gilbert, R.N. Lea, N.E. Mandrak, R.L. Mayden, and J.S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico. 7th edition. American Fisheries Society Special Publication 34. 243 pp.

Pfleiger, W.L. 1997. The fishes of Missouri. Missouri Department of Conservation, Jefferson City. 372 pp.

Retzer, M.E. 2005. Changes in the diversity of native fishes in seven basins in Illinois, USA. American Midland Naturalist 153:121-134.

Retzer, M.E. and B. Batten. 2005. Fishes of the Chicago region: a review of the Dennison and Illinois Natural History Survey collections. Transactions of the Illinois State Academy of Science 98:63-73.

Rivera, K.D., R.L. Haun, C.A. Anderson, and S.P. Romano. 2013. New distribution record for *Fundulus diaphanous* (LeSueur), family Fundulidae in Illinois. Transactions of the Illinois State Academy of Science 106:57.

Savitz, J., S. Arango, L.G. Bardygula, and L. Scoma. 1990. The first records of three fish species in Illinois waters of Lake Michigan: Longear Sunfish (*Lepomis megalotis peltastes*), Black Crappie (*Pomoxis nigromaculatus*), and the Channel Catfish (*Ictalurus puncatus*). Transactions of the Illinois State Academy of Science 83:114-115.

Savitz, J., L.G. Bardygula, and L. Scoma. 1996. Fish species in Chicago harbors of Lake Michigan, 1988 to 1990, as determined by electrofishing and creel surveys. Journal of Freshwater Ecology 11:469-474.

Slawski, T.M., F.M. Veraldi, S.M. Pescitelli, and M.J Pauers. 2008. Effects of tributary spatial position, urbanization, and multiple low-head dams on warmwater fish community structure in a Midwestern stream. North American Journal of Fisheries Management 28:1020-1035.

Smith, P.W. 1965. A preliminary annotated list of the lampreys and fishes of Illinois. Illinois Natural History Survey Biological Notes 54:1-12.

Smith, P.W. 1968. An assessment of changes in the fish fauna of two Illinois rivers and its bearing on their future. Transactions of the Illinois State Academy of Science 61:31-45.

Smith, P.W. 1971. Illinois streams: a classification based on their fishes and an analysis of factors responsible for disappearance of native

species. Illinois Natural History Survey Biological Notes 76:1-14.

Smith, P.W. 1979. The Fishes of Illinois. University of Illinois Press, Urbana. 314 pp.

Steuck, M.J., S. Yess, J. Pitlo, A. Van Vooren, and J. Rasmussen. 2010. Distribution and relative abundance of Upper Mississippi River fishes. Upper Mississippi River Conservation Committee, Onalaska, WI. 21 pp.

Stewart, J.G., V.A. Barko, D.B. Henry, D.P. Herzog, J.W. Ridings, A.F. Kelley, and J.E. Wallace. 2005. New records of the Crystal Darter (*Crystallaria asprella*) in the Middle Mississippi River. American Midland Naturalist 154:471-473.

Thomas, D.L. 1970. An ecological study of four darters of the genus *Percina* (Percidae) in the Kaskaskia River, Illinois. Illinois Natural History Survey Biological Notes 70:1-18.

Tiemann, J.S., M.E. Retzer, and B.L. Tiemann. 2004. Range expansion of the state-endangered Bigeye Chub *Hybopsis amblops* (Rafinesque) in Illinois. Transactions of the Illinois State Academy of Science 97:255-257.

Tiemann, J.S. and M.H. Sabaj-Perez. 2012. Illinois status survey of the Redside Dace *Clinostomus elongatus*: The newest addition to the state's native fish fauna. Transactions of the Illinois State Academy of Science 105:145-152.

Tiemann, J.S., C.A. Taylor, and J.H. Knouft. 2012. Conservation review of the Longnose Dace *Rhinichthys cataractae* (Valenciennes) in northwestern Illinois. Transactions of the Illinois State Academy of Science 105:57-64.

Warren, M.L., Jr. and B.M. Burr. 1988. Reassessment of the Illinois ranges of the Bigeye Chub, *Hybopsis amblops*, and the Pallid Shiner, *Notropis amnis*. Ohio Journal of Science 88:181-183.

Willink, P.W. and F.M. Veraldi. 2009. The fishes of Will County, Illinois. Fieldiana Zoology 115:1-61.