

ASSESSMENT OF THE SPOON RIVER BASIN FISH COMMUNITY



Spoon River at Seville (DJ-08) 8/25/2015

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INTRODUCTION

The Spoon River Basin was surveyed in 2015 as a joint effort of the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources, Division of Fisheries. Fish community, macroinvertebrate, habitat and water quality were sampled at 17 sites throughout the watershed (Table 1). Data collected from basin surveys are used to monitor the health of Illinois stream systems. This report is an assessment of the fish community. The 2015 sampling marked the fifth Spoon basin survey using the electric seine to sample smaller streams. Prior to joint IDNR-IEPA basin sampling, the Spoon basin was intensely sampled in 1975 by long time Fisheries Biologist Ken Russell. He used multiple methods for fisheries assessment including minnow seine sampling of smaller tributaries.

METHODS

A total of 17 locations, 5 mainstem Spoon River sites and 12 tributary sites, were sampled in 2015 (Table 1). Stations with an average depth >2 ft. were sampled with a 5000 watt pulse DC boat electrofisher. Wadable sites <2ft average depth, were sampled with a 30 ft. electric seine (Bayley et al. 1989, Day et al. 2003) powered by a 1- phase, 2000 watt AC generator. Larger fish specimens were identified to species, weighed, measured and returned to the stream. Smaller specimens were preserved and processed in the laboratory. Voucher specimens were transferred to the Illinois Natural History Survey fish collection in Champaign, Illinois.

The revised version (Smogor 2000) of the Index of Biotic Integrity (IBI) was used to assess stream quality based on the fish sample data. IBI scores may range from 0-60 with higher scores indicating higher stream quality. Smogor (2003) suggested five biological integrity classes: IBI score of 56-60 = moderately high, 46-55 = moderate, 31-45 = moderately low, 16-30 = low, and 0-15 = very low. Stream reaches that are outside the range of wetted widths or channel slopes used for the original IBI metric regressions received an “extrapolated IBI” score.

RESULTS AND DISCUSSION

Fish Species Composition

A total of 9,265 fish representing 57 species were collected during the 2015 Spoon River Basin survey (Table 2). Fish species dominating the samples numerically were red shiner, bluntnose minnow, central stoneroller, and sand shiner (Table 2). The red shiner, bluntnose minnow and sand shiner were collected at 16 of 17 sites and comprised 16.4%, 14.0% and 10.3% of the fish collected, respectively. The central stoneroller was collected at only 9 sites but comprised 11.7% of all fish collected. These species were among the dominant species in previous basin surveys.

Fifteen species were collected at only one or two locations in the drainage (Table 2). The silver chub, brook silverside, white bass, white crappie, and sauger were taken only from the Spoon mainstem. Emerald shiner and black buffalo were found only in the mainstem and in Tater Creek. Tater Creek, a direct tributary of the lower Spoon River, was sampled after a period of high water and those species likely migrated upstream during flooding. The orangespotted sunfish was found in the mainstem and East Fork Spoon River. The southern redbelly dace was only found in Camp Creek. The blacknose dace was only in the East Fork Spoon River and its tributary, Coopers Defeat Creek. The blackside darter was collected only in Tater Creek. The fantail darter was only found in Coopers Defeat Creek. The yellow perch collected in Court Creek are decidedly escapees that were stocked in a nearby lake.

Changes in Fish Distribution

A total of 83 fish species have been recorded from the Spoon River drainage by Illinois Natural History Survey scientists and IDNR fisheries biologists (Table 3). Changes in fish distributions since 1900 include the disappearance of four species. The gravel chub, steelcolor shiner, western sand darter and bluntnose darter have not been recorded from the Spoon River drainage since about 1900 (Forbes and Richardson 1908). After 1900 population declines in these species and many others in the state were attributed to water quality deterioration, excessive turbidity, sedimentation, wetland drainage, and increased variability of stream flows as a result of drainage alterations (Smith 1971, 1979). These factors are all evident in the Spoon River watershed. The bowfin, American eel, grass pickerel, silvery minnow and logperch were last recorded from the Spoon Basin in 1975 (Russell 1976). These species are generally still present throughout most of their historic ranges in Illinois. Their absence in Spoon Basin fish surveys since 1975 represent limited historic population sizes in the drainage as well as further population declines as a result of the factors cited above .

Species that appear to be somewhat rare, but persistent in the drainage include brook silverside, yellow bass, walleye, sauger, and fantail darter. The state endangered blacknose shiner was reported in 1908 (Forbes and Richardson 1908) but not observed again until 2010, when one was captured in a tributary of the East Fork Spoon River. This recent record indicates that the species does persist in small numbers. A targeted survey for that population in the East Fork watershed is warranted.

The common carp was one of the early exotic species established by stocking in ponds in the late 1800's. Common carp are now established in virtually all waters of Illinois. More recent additions to the ichthyofauna include three Asian carp species; grass carp (*Ctenopharyngodon idella*), bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*Hypophthalmichthys molitrix*). Grass carp were first recorded from the Spoon River in 2000. This species was followed by the silver carp in 2005 and the bighead carp in 2010 (Table 3). A fourth Asian carp, the black carp (*Mylopharyngodon piceus*) is present in the Mississippi and Illinois rivers but has not been documented in the Spoon River to date.

Index of Biotic Integrity

Stream quality was assessed with an Index of Biotic Integrity (IBI) (Smogor 2000) calculation for each sample (Tables 2, 4). IBI scores for the 2015 survey ranged from a low of 36 for the Spoon River at Seville (DJ-08) to a high of 57 for Court Creek (DJJ-04). The mean IBI score in 2015 was 47.4 (Table 4). This is similar to the mean IBI of 45.1 in 2010 and 46.4 in 1995 (Table 4). Two Spoon Basin survey years yielded much lower mean IBI scores. In 2000 and 2005 the mean IBI was 39.5 and 37.7, respectively (Table 4). One possible explanation is a difference in stream discharge. Stream gage readings are not readily available for early survey years, however the weather underground website gives precipitation records for Springfield, Illinois for the entire period. Looking at July and August rainfall amounts, the period of basin sampling as well as June amounts, just prior to sampling, there were two years of lower precipitation amounts – 2000 and 2005. Mean rainfall for the three month period in 2000 was 4.02 inches. For 2005 there was even less precipitation with a mean of 2.31 inches. The years of higher mean IBI scores received mean rainfall amounts of 7.46 in 1995, 5.55 inches in 2010 and 4.96 inches in 2015. In 2015 the most rain fell in June with a total of 9.14 inches. Streamflows were high throughout the scheduled sample period (Figure 1), and resulted in a decrease in the number of sites that were sampled. The flows dropped by late August but other sampling commitments and staff shortages did not allow late season basin sampling. It seems reasonable that more water would result in higher fish numbers and diversity. However, stream surveys historically have been scheduled during times of lowest flows (base flows) in order to increase sampling efficiency. Fish are likely concentrated in shallower water and water clarity allows more efficient netting. This assumption may need to be reassessed.

Comparison of individual sample IBI between sample periods revealed several notable changes that appear to be more than variation in sampling efficiency. Cedar Fork (DJFD-01) decreased by 9 IBI points from the 2010 sample. A comparative look at the sample results showed that a decrease in number of species from 25 to 17. Most notably was a decline in sucker species from 7 to 4 species and benthic invertivores from 9 to 4 species. Sucker species absent in 2015 were river carpsucker, shorthead redhorse and silver redhorse. The two redhorse species are also benthic invertivores. The other benthic invertivores absent from the 2015 sample were bigmouth shiner, stonecat and freckled madtom. This decline in biotic integrity could be due to habitat or water quality deterioration. The sample of Cedar Fork in 2000 also resulted in lower IBI while samples in 1995, 2005 and 2010 all scored an IBI over 50. An agricultural manure release caused a fish kill in the watershed in 2015 and this sample may reflect the effects of that disturbance on the fish community. The sample in 2000 produced 23 species including most of the species absent in 2015. The reason for a lower IBI in that case involved relative proportions of fish species groups due to very high numbers of the ecologically tolerant red shiner and bluntnose minnow in the sample. That decline may have represented ecological stress due to drought conditions.

On the other extreme the Court Creek (DJJ-04) sample received a 13 point IBI point increase in 2015 compared to the previous sample in 2010. A total of 28 species were collected compared to 19 in 2010. A diverse fauna of native minnows and suckers, as well as a high number on native invertivores were present in 2015. Most of those were also present in the 2005 sample. Secondly, five species of sunfish were captured in 2015, including black crappie. The unusual presence of yellow perch was attributed to escape from Oak Run Lake. Perhaps the crappie was

also an escapee. I attribute this large IBI increase to a relatively poor sample in 2010 (high water and turbidity were noted that year) and perhaps faunal additions from a nearby lake. Court Creek does however support a diverse fish fauna and a good sport fishery particularly for smallmouth bass and channel catfish.

Tater Creek (DJZA-01) had much higher IBI scores in 2010 (36) and 2015 (42) than in 2000 (27) and 2005 (22). The higher IBI scores are likely a reflection of stream flows, which were lower in the two early surveys and higher in the last two. This small stream is a direct tributary of the lower Spoon River. During high flows species that typically inhabit larger streams often move upstream into smaller tributaries. Examples of this in the 2015 sample were emerald shiner, black buffalo and silver redhorse. Also, recolonization by species typical of small streams is enhanced by proximity to the Spoon River as a population source. Perhaps Tater Creek fauna suffers a decline in species diversity during drought periods but can recover rather quickly during wetter periods. In 2016 a concentrated animal feeding operation was proposed in the Tater Creek watershed. Such systems can be detrimental to streams not only with catastrophic failure of the waste storage facility, but with chronic water quality deterioration from waste application to fields in the watershed. If this facility is eventually put into operation baseline water quality and fish data will be available to assess changes in the conditions.

Channel Catfish and Flathead Catfish

Channel catfish are the primary sport fish in Illinois streams and the Spoon River is a good stream for channel and flathead catfish. Russell (1976) set small hoop nets (fiddler nets) and basket traps in 14 Spoon River sites for catfish population assessment. At that time relatively few individual channel catfish (5.8% of those captured) reached 12 inches total length. A repeat of those methods in 1995 (IDNR Fisheries 1996) found 22.8% of channel catfish catch were 12 inches or larger, 17.8% reached 16 inches and 0.4% reached 24 inches.

Electrofishing was the only sampling method used in the Spoon River mainstem in 2015. Samples at five locations produced a total of 51 channel catfish, 67% of which exceeded 12 inches. The largest individual was 24 inches long and weighed 5.5 pounds. Catch-per-unit-effort (CPUE) in the Spoon mainstem was 12.4 channel catfish per hour. That is comparable to the 11 channel catfish per hour from electrofishing samples in 1995 (IDNR Division of Fisheries 1996). From these data it appears that the channel catfish population of the Spoon River is stable and has maintained the improved size structure that was documented 1995.

Of the tributary streams sampled, Cedar Creek produced the highest numbers of channel catfish, totaling 48. This converts to a CPUE of 120 channel catfish per hour. They were mostly between 11 and 16 inches with 6 fish (12.5%) exceeding 16 inches. Those larger channel catfish averaged 2 pounds. Shaw Creek, Haw Creek and East Fork Spoon River also produced fair numbers of channel catfish.

Flathead catfish collections in the 2015 samples totaled 21 individuals, 16 of which were from the Spoon River mainstem. Electrofishing produced 3.5 flathead catfish per hour in the Spoon River in 2015. This is comparable to the 1995 electrofishing samples where the CPUE averaged

3.44 fish per hour (IDNR Division of Fisheries 1995). Electrofishing is not an efficient method for catfish so not much interpretation can be derived by electrofishing catch rates. Spoon River samples in 2015 produced 13 flathead catfish over 11 inches total length. Five of those were between 16 and 24 inches. The largest flathead catfish from the survey was a 33 inches and weighed 16.6 pounds. It was captured from the Spoon River at Wolf Covered Bridge (DJ-34). There are undoubtedly larger flatheads in the Spoon River. Put Creek (DJD-02) was the only tributary site that produced flathead catfish, producing 5 juveniles under 11 inches.

Smallmouth Bass

Smallmouth bass are widespread and locally abundant in the Spoon River Basin. They were encountered in all but 3 of the 17 sites sampled in 2015. The highest numbers of smallmouth bass were from the upper Spoon River (DJ-06), East Fork Spoon River (DJN-02), Cedar Fork (DJFD-01), Haw Creek (DJH-01) and Court Creek (DJJ-04). The East Fork Spoon produced the two largest smallmouth bass, one 17.4 inches long weighing 1.9 pounds and one 14.7 inches and 2.2 pounds. The smallmouth bass capture rate was the highest there as well at 60 fish per hour. Cedar Fork produced 39 smallmouth bass per hour but they were smaller, with a maximum weight of 1 pound. Fewer smallmouth bass were captured at Court Creek and Haw Creek with CPUE equaling 25 per hour and 30 per hour, respectively. In Haw Creek three of the smallmouth bass were around 15 inches long, with the largest weighing 1.6 pounds.

Fish Contaminant Advisories

Common carp and channel catfish flesh samples were taken from three Spoon River sites for contaminants analysis by Illinois EPA. Smallmouth bass flesh samples were taken at two of those sites. The results are not available at this time. Contaminant sampling over many years has not warranted the issuance of a contaminant advisory in the Spoon River or any of its tributaries.

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Figure 1. Daily mean discharge of the Spoon River at Seville, June 1 to August 31, 2015).

USGS 05570000 SPOON RIVER AT SEVILLE, IL

