



Status of Fish Communities and Stream Quality In the Hickory Creek Watershed, June 2006

Division of Fisheries, Region 2 Streams Program

During June 2006, a fish community survey was conducted in the Hickory Creek Watershed as a collaborative effort between Office of Resource Conservation, Division of Fisheries and the Office of Water Resources. The goals of the study were: a). determine current status of fish communities and stream quality throughout the watershed; b). investigate existing factors limiting stream communities (i.e. habitat, water quality, migration barriers) for planning and management applications; and c). evaluate potential ecosystem impacts from planned flood control projects on Hickory and Spring Creeks.

Methods

A total of twelve stations were surveyed throughout the Hickory Creek watershed (Figure 1) using electric seine and backpack electrofishing. Stations were selected based on detailed reconnaissance, and represent the range of existing habitat and quality conditions within the stream system. Also included in the survey were stations located in segments previously modified for flood control, and areas proposed for future modifications. In addition to fish collections, observations on stream habitat were performed at each location.

Fish community data was used to calculate the Index of Biotic Integrity (IBI), a widely-used stream quality index. The IBI consists of ten metrics which are designed to evaluate a range of ecological attributes. Results for each metric are compared to reference streams of similar size and geographic region and given a score from 1 to 6 based on established ranking criteria. The sum of the ten metrics yields the total IBI score, which ranges from 0 to 60, higher scores representing higher stream quality.

Results

A total of 6,135 fish were collected for all stations combined (Table 1), with 35 native species and 3 non-native species present. Non-native species included the round goby, collected only at HC-01, the station closest to the Des Plaines River. This species is still expanding its range in Illinois. The other non-natives present were carp and goldfish. No threatened or endangered fish species were collected in Hickory Creek.

The highest number of species was found at HC-01, the station closest to the Des Plaines River. This station held seven native species not found in the area upstream of the newly constructed ramp at Fourth Street, including several migratory sucker species, and sport

species (channel catfish and sauger). Fantail darter was found only in Spring Creek at one location (SC-01); northern hogsucker, rosyface shiner, and redbfin shiner also had limited distributions. These species are intolerant and/or have very limited distributions in the Des Plaines River watershed as a whole.

Stream quality, based on IBI scores was highest at HC-02 and HC-05 (Figure 1), and ranged from 21 to 45 (Table 2). Habitat conditions were generally better in the mid section of Hickory Creek, between HC-02 and HC-05, which accounted for higher quality ratings. Most other stations, particularly those on smaller tributary streams, lacked many natural habitat features due to past channel modifications, combined with low gradient conditions.

Discussion

Species distribution appeared to be determined by several factors including: proximity to the Des Plaines River, the presence of migration barriers, and habitat availability. A total of 9 species (29% of total) were found only downstream of the Pilcher Park Dam, and 7 species were found only downstream of the Fourth Street ramp.

Stream quality as measured by the IBI was largely determined by habitat diversity and presence of past channel modifications. However, water quality can not be ruled out as a limiting factor.

Although species diversity was highest at HC-01 (Table 1), which is located in a segment modified for flood control, the IBI was only 32 (Table 2). The close proximity of HC-01 to the Des Plaines River (Figure 1) contributed to higher species diversity. Many individuals collected at HC-01 had external lesions, sores, or eroded fins and barbels. This condition is typical of fish in the lower Des Plaines, suggesting upstream migration into Hickory Creek. Many of the fish with external anomalies were large-bodied suckers, which are more far ranging than many other species, and likely migrated up from the Illinois and Kankakee Rivers. Despite the increased diversity at HC-01, marginal habitat, and perhaps water quality problems, combined to increase the proportion of tolerant and generalist species (93% of total), contributing to a lower IBI score (Table 2).

Stream quality at HC-02 (in the area proposed for future flood control modifications) was relatively high with an IBI of 44 (Table 2), apparently due to the presence of some natural habitat features. However, the sensitive, riffle-dependent darter species were very low in abundance at this station, possibly indicating habitat or water quality problems.

In contrast, darters were very abundant at SC-01 (also proposed for modification), including fantail darters, which were not found elsewhere in the watershed. This station had a moderate IBI score of 37, indicating some habitat recovery in this previously channelized area.

In addition to the existing habitat problems and possible water quality limitations, Hickory Creek is also affected by the lack of connection to a high quality large river recruitment source. The lower Des Plaines River is water quality impaired and has reduced fish diversity compared to unimpaired rivers in the region (e.g. Kankakee River). As a result, Hickory Creek has fewer species than many similar sized watersheds, with only 4 intolerant species present.

Hickory Creek has been impacted by extensive habitat modifications and urbanization, however, some areas still maintain high quality habitat features and a few intolerant species remain, including smallmouth bass, rosyface shiner, fantail darter, and northern hogsucker. Efforts should be made to maintain populations of these and other more sensitive species, which would be difficult to replace given the current impaired condition of the Des Plaines River and the presence of existing migration barriers in Hickory Creek.

Despite the current water quality problems in the lower Des Plaines River, conditions have improved and larger-bodied migrants are moving up the system from higher quality downstream areas. The presence of sucker and sport species at HC-01 in the lower Hickory Creek (some of which are considered intolerant), demonstrates that the Des Plaines River does offer some level of support for these migrants, although as noted, many had external anomalies.

Presence of these fish in lower Hickory Creek emphasizes the need to improve the connectivity within the Hickory Creek system to help restore and maintain resident fish communities. Allowing upstream access for sport species like channel catfish, large-bodied suckers (eg. shorthead redhorse, silver redhorse), and others, will not only help restore Hickory Creek, but will allow these species to take advantage of higher quality habitat conditions in upper stream segments, which will in turn have overall benefits for the Des Plaines River Basin.

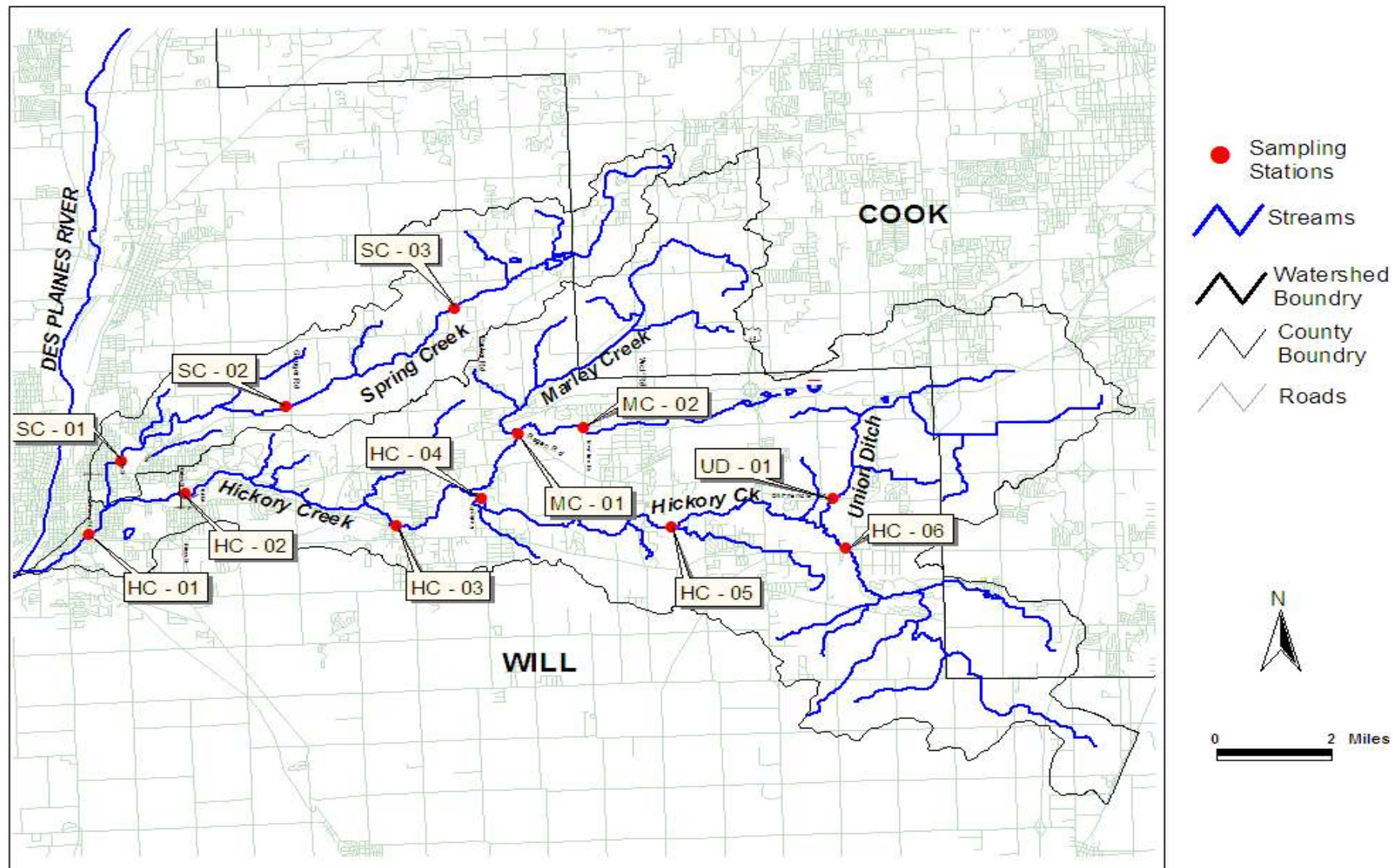


Figure 1. Hickory Creek Watershed with locations of fish community sampling stations

Table 1. Total number of fish collected at each station for the Illinois Department of Natural Resources Hickory Creek Watershed Survey, June 2006.

Common name	Scientific name	Total	Hickory Creek						Spring Creek			Marley Creek		Union Ditch	
			Richard St.	Ingalls WWTP	Vine St.	Marley Rd.	Hickory Ck	FP	Rt. 30	EJE RR Yard	Gouger Rd.	Mess. Woods FP	Regan Rd	Townline Rd	St. Francis Rd
			HC-01	HC-02	HC-03	HC-04	HC-05	HC-06	SC-01	SC-02	SC-03	MC-01	MC-02	GGC-03	
Longnose gar	Lepisosteus osseus	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gizzard shad	Dorosoma cepedianum	21	13	8	0	0	0	0	0	0	0	0	0	0	0
Goldfish	Carassius auratus	20	10	1	0	0	0	0	0	6	2	0	0	1	
Carp	Cyprinus carpio	90	51	21	2	0	0	1	5	0	0	0	0	10	
Carp x Goldfish hybrid	Cyprinus carpio x Carassius auratus	1	0	1	0	0	0	0	0	0	0	0	0	0	
Creek chub	Semotilus atromaculatus	256	0	0	0	34	33	0	72	13	2	2	97	3	
Hornyhead chub	Nocomis biguttatus	581	18	32	88	199	79	2	114	0	1	14	32	2	
Central stoneroller	Campostoma anomalum	1239	2	16	19	118	222	5	654	3	6	56	135	3	
Striped shiner	Luxilus chrysocephalus	1024	0	22	185	428	368	9	0	0	0	6	5	1	
Redfin shiner	Lythrurus umbratilis	5	0	2	0	0	0	1	0	0	0	2	0	0	
Spotfin shiner	Cyprinella spiloptera	61	46	12	0	0	0	0	3	0	0	0	0	0	
Fathead minnow	Pimephales promelas	7	1	0	0	0	3	0	2	0	0	1	0	0	
Bluntnose minnow	Pimephales notatus	660	219	45	10	108	86	7	44	5	0	38	77	21	
Rosyface shiner	Notropis rubellus	93	0	6	0	48	38	0	0	0	0	0	1	0	
Bigmouth shiner	Notropis dorsalis	183	73	0	0	0	0	0	37	0	0	8	65	0	
Sand shiner	Notropis ludibundus	324	258	2	0	5	36	0	0	0	0	5	12	6	
Quillback	Carpoides cyprinus	33	32	1	0	0	0	0	0	0	0	0	0	0	
Smallmouth buffalo	Ictiobus bubala	1	1	0	0	0	0	0	0	0	0	0	0	0	
White sucker	Catostomus commersoni	308	27	23	23	32	13	2	122	0	6	17	32	11	
Northern hog sucker	Hypentelium nigricans	8	0	6	2	0	0	0	0	0	0	0	0	0	
Shorthead redhorse	Moxostoma macrolepidotum	3	3	0	0	0	0	0	0	0	0	0	0	0	
Golden redhorse	Moxostoma erythrurum	5	2	3	0	0	0	0	0	0	0	0	0	0	
Silver redhorse	Moxostoma anisurum	1	1	0	0	0	0	0	0	0	0	0	0	0	
Channel catfish	Ictalurus punctatus	63	63	0	0	0	0	0	0	0	0	0	0	0	
Yellow bullhead	Ameiurus natalis	24	1	2	8	2	0	0	2	0	0	0	1	8	
Black bullhead	Ameiurus melas	4	0	0	0	0	0	2	0	2	0	0	0	0	
Blackstripe topminnow	Fundulus notatus	50	0	4	7	2	10	1	0	0	0	12	0	14	
Black crappie	Pomoxis nigromaculatus	1	0	0	0	0	0	0	0	0	0	1	0	0	
Rock bass	Ambloplites rupestris	126	0	18	40	45	21	0	2	0	0	0	0	0	
Largemouth bass	Micropterus salmoides	22	8	2	0	0	3	2	0	0	0	5	1	1	
Smallmouth bass	Micropterus dolomieu	82	11	13	28	24	1	0	4	0	0	1	0	0	
Green sunfish	Lepomis cyanellus	212	1	8	3	12	18	4	69	1	0	53	21	22	
Bluegill x Green sunfish hybrid	Lepomis macrochirus x L. cyanellus	11	0	0	0	0	0	0	8	0	0	1	2	0	
Bluegill	Lepomis macrochirus	176	23	5	3	28	13	4	26	2	0	55	10	7	
Sauger	Stizostedion canadense	3	3	0	0	0	0	0	0	0	0	0	0	0	
Johnny darter	Etheostoma nigrum	288	0	2	1	19	148	0	9	1	2	22	80	4	
Orangethroat darter	Etheostoma spectabile	122	0	0	0	7	29	0	79	1	0	0	6	0	
Fantail darter	Etheostoma flabellare	10	0	0	0	0	0	0	10	0	0	0	0	0	
Freshwater drum	Aplodinotus grunniens	2	2	0	0	0	0	0	0	0	0	0	0	0	
Round goby	Neogobius melanostomus	14	14	0	0	0	0	0	0	0	0	0	0	0	
Total fish		6135	884	255	419	1111	1121	40	1262	34	19	299	577	114	
Total species		38	25	23	14	16	17	12	17	9	6	17	15	15	

Table 2. Individual metric values and total Index of Biotic Integrity (IBI) scores for each each station in the Hickory Creek Watershed Survey, June 2006. Total IBI range is 0 to 60 points with higher scores indicating higher biotic integrity based on fish community samples.

IBI Metrics	HC-01	HC-02	HC-03	HC-04	HC-05	HC-06	SC-01	SC-02	SC-03	MC-01	MC-02	GGC-03
Native fish species	23	21	13	16	17	11	16	8	5	17	15	13
Native minnow species	7	8	4	7	8	5	7	3	3	9	8	6
Native sucker species	6	4	2	1	1	1	1	0	1	1	1	1
Native sunfish species	4	5	4	4	5	3	4	2	0	5	3	3
Benthic invertivore species	5	3	2	2	2	0	4	2	1	2	3	1
Intolerant species	2	4	3	3	3	1	2	0	1	2	2	1
Prop. specialist benthic invertivores	0.01	0.04	0.01	0.02	0.16	0	0.08	0.06	0.11	0.07	0.15	0.04
Prop. generalist feeders	0.93	0.6	0.56	0.58	0.51	0.75	0.3	0.85	0.53	0.63	0.55	0.79
Prop. mineral-substrate spawners	0.05	0.46	0.86	0.78	0.68	0.42	0.68	0.12	0.37	0.26	0.31	0.05
Prop. tolerant species	0.26	0.24	0.38	0.31	0.29	0.36	0.44	0.38	0.4	0.29	0.33	0.46
Total IBI Score	32	44	35	36	45	27	40	21	25	37	40	26