ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of
Resource Conservation
Division of Fisheries

Region II Streams Office
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Evaluation of Fish Communities and Stream Quality in the Jackson Creek Watershed (Des Plaines River Basin).

September, 2003

August 2005

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Acknowledgments

Illinois Department of Natural Resources (IDNR) Region 2 Streams Office owes a debt of gratitude to numerous individuals for their assistance with this survey. Especially notable for his contribution was Mr. Bob Jankowski of the Natural Resources Conservation Service (NRCS, U.S. Department of Agriculture). Bob identified and assisted with landowner contacts, and participated in inspections of potential station locations during the reconnaissance phase. Both Bob and Traci Jungles (NRCS) participated in the survey.

Thanks also to Mr. Randy Berry, Joliet Military Training Area, for his considerable effort during the reconnaissance and station selection phase. Randy also provided assistance with the sampling. Mr. Karl Forge (U.S. Forest Service) made a considerable contribution to the survey both during the reconnaissance and survey. Mary Pat Holtschlag (Prairie Streams Watershed Committee) and Kent Taylor (Openlands Project) also provided valuable assistance during the survey.

A special thanks goes to Frank Veraldi (U.S. Army Corps of Engineers) who provided a second packback electrofishing unit and lead a team that sampled the two Manhattan Branch stations. Thanks to the IDNR personnel who participated in the fish survey; Jim Langbein, Rob Miller, Frank Jakubicek, and Scott Bartell.

We especially want to thank the landowners who graciously allowed us to access the stream on their property. Without their cooperation, this survey would not have been possible.

Front Cover: Jackson Creek, Station JC-1, S. Pescitelli

Summary

Jackson Creek is one of the largest tributaries to the Des Plaines River, covering 54.1 square miles within Will County in Northeastern Illinois. Unlike most urbanized areas in the Des Plaines River Basin, Jackson Creek watershed retains a relatively large percentage of agricultural landuse. Urban development has increased in recent years, raising concerns among watershed residents about the future health of the stream. During 2003, IDNR conducted fish community surveys at nine locations in the Jackson Creek watershed to determine current fish species distribution patterns and stream quality conditions. For all locations combined, a total of 4,675 fishes were collected, representing 35 species. Minnow species accounted for 65.8 % of the total abundance, overall. Sunfishes, the next most abundant family, represented 16.1 percent of the total, with all other families making up less than 5 % of the total. Although no threatened or endangered species were collected, several species of "Special Concern" were present. Other species which have limited distribution in the Des Plaines River Watershed as a whole, were present in Jackson Creek. Environmentally sensitive darter and sucker species were under-represented in 2003, and were less abundant compared to previous surveys, perhaps due to difference in water level and/or sampling season. Stream quality as indicated by the Index of Biotic Integrity (IBI), an index based on fish samples, was generally higher in the downstream areas of the watershed, where habitat and flow conditions were more favorable. Stations in the downstream areas were generally rated in the "B" range, whereas upstream areas ranked in the "C" range, using the Illinois Biological Stream Characterization (BSC). Smallmouth bass and Rock bass were the most abundant sportfishes present, with a higher abundance at the downstream stations. A wide range of sizes were present for both species indicating successful natural reproduction. As a tributary to the degraded Des Plaines River, stream quality and distribution of fishes in Jackson Creek may be affected by the lack of connection to a high quality river system. Although Jackson Creek is currently one of the higher quality streams in the Des Plaines River Basin, the lack of a diverse fish and mussel recruitment source may make Jackson Creek vulnerable to continued biological degradation as a result of natural events such as drought, and other impacts related to increased urbanization in the watershed. Continued monitoring, especially to determine the status of more sensitive fish species groups, is recommended.

Introduction

Jackson Creek is one of the largest tributaries to the Des Plaines River, located in the metropolitan region of Northeastern Illinois. Unlike most urbanized areas in the Des Plaines River Basin, the Jackson Creek watershed retains a relatively large percentage of agricultural landuse. In recent years, urban development has increased, raising concerns about the future health of the stream and its capacity to handle additional runoff. In an effort to address these environmental concerns, local citizens formed the Prairie Streams Watershed Committee, supported by the Illinois Department of Natural Resources (IDNR), the Natural Resources Conservation Service (NRCS), U. S. Forest Service, and Will County Forest Preserve District. The Prairie Streams Partnership includes many watershed residents, working in close association with IDNR Prairie Parklands Ecosystem Partnership.

During 2003, IDNR conducted a comprehensive fish community survey in the Jackson Creek watershed to document current species distribution, determine stream quality and support planning and educational efforts by the Prairie Streams Watershed Committee. Previous IDNR fish surveys in the watershed were limited to two locations. Additional sampling efforts by U.S. Army biologists included only the downstream area of Jackson Creek, within the Joliet Training Facility. The 2003 IDNR survey included a total of nine stations with locations throughout the entire watershed on all major tributaries. Information from this survey, combined with previous sampling efforts, will provide baseline conditions for biological communities, aquatic habitat, and stream quality in the Jackson Creek Watershed.

Watershed Characteristics

The Jackson Creek watershed encompasses approximately 34,650 acres/54.1 square miles (Will/South Cook Soil and Water Conservation District), including portions of six townships, all within Will County (Figure 1). The mainstem of Jackson Creek originates east of Route 45 in Frankfort Township, south of the Village of Frankfort. The Jackson Branch tributary arises in New Lenox Township, on the south side of the Village of New Lenox. The Manhattan Branch tributary originates east of Cedar Road in Manhattan Township, near the Village of Manhattan with most of its length east of the Village of Manhattan flowing in a buried drain tile. The Jackson Branch

tributary and Jackson Creek mainstem join a short distance south of Breen Road in Jackson Township. The Manhattan Branch tributary joins the mainstem less than two miles downstream at Route 53, also in Jackson Township (Figure 1) .

Four communities reside partially or fully within the watershed including, New Lenox, Frankfort, Manhattan, and Elwood. Waste Water Treatment Plants (WWTP) in three communities discharge effluent into the Jackson Creek system (Figure 1). The discharge for the Village of New Lenox enters Jackson Branch south of Laraway Road in Country View Park; the discharge from the Village of Manhattan goes into Manhattan Branch downstream of the community; and discharge from the Village of Elwood enters Jackson Creek mainstem approximately 1000 feet upstream of Baseline Road. In addition to the three municipal facilities, a small WWTP serving the Ranch Oaks sub-division on Jackson Creek is located on the west side of Route 52, north of the Village of Manhattan.

Four publicly-owned areas were identified on Jackson Creek (Figure 1). The Village of New Lenox operates two public parks on the Jackson Branch tributary. In the lower watershed, approximately 7.25 miles of Jackson Creek mainstem flows through the U. S. Army Joliet Training Area (JTA) and for a short distance through Midewin National Tall Grass Prairie (U.S. Forest Service). However, there is currently no public access to Jackson Creek on either Federal property.

The watershed landscape is predominately agricultural (CTAP 2003), with the headwaters of all three branches converting to urban landuse. Most of the headwater and middle reaches of the tributaries and upper mainstem have been channelized (ISIS) and contain finer substrate, comprised primarily of sand, silt and gravel. Stream channel stability, as indicated by bank and bed erosion is variable. Some previously channelized areas are reverting to naturalized stream morphology with riffle and pools present. Most of Jackson Creek, and some lower tributary segments have not been channelized, retaining a natural meandering pattern with numerous riffles and pools. Bottom substrate in these areas is composed of cobble, boulders, and exposed bedrock. Much of the riparian corridor in the lower reaches of the mainstem is flood plain, dominated by trees, shrubs, or grasses.

Methods

Fish community surveys were conducted at nine stations during September15 - 17, 2003. Five stations were located on the mainstem of Jackson Creek, and two stations were located on each of the two major tributaries, Manhattan Branch and Jackson Branch (Figure 1). Detailed station location information can be found in Table 2. Description of physical characteristics of each station are given in the Appendix. Sampling stations were selected following extensive field reconnaissance, and represent the full range of habitat types observed for Jackson Creek and its principal tributaries. The length of stream segment sampled was approximately 15-20 times the stream width, and included existing habitat features.

Three different fish sampling techniques were used, depending on width and depth of the stream at each location. Stations on Jackson Branch and Manhattan Branch were very narrow (< 15 feet) and were sampled utilizing a back-pack mounted electro-fishing unit, powered by a 110-volt generator. Three wadable, mainstem stations, JC-2, JC-4, and JC-5, ranging from 21 to 45 feet in width, were sampled utilizing an electric seine, consisting of a 30-ft. electrified cable powered by a single-phase, 1600-watt AC generator (Bayley et al. 1989). At electric seine locations, the upstream and downstream limits of each station was blocked by nets to prevent fish escapement and/or entry into the station during sampling. Station JC-1 on the mainstem of Jackson Creek, although wide enough for electric seine use, was sampled by backpack due to equipment access restrictions. Station JC-3 was too deep to wade and was sampled utilizing a boat-mounted, 4000-watt, three-phase electrofishing system. Sampling duration and station length varied based on complexity of the habitat and channel characteristics (see Appendix). Larger fish specimens, sportfish, and rare or unusual species were weighed, measured and returned to the stream, with the exception of voucher specimens kept for all species at each station. Many of the smaller fishes were preserved for later identification in the laboratory.

Index of Biotic Integrity (IBI; Smogor, 2004) values were calculated for each station. The IBI is a widely-used stream quality measurement based upon fish community characteristics, taking into account the number and type of fish species present, their food, habitat, and spawning preferences, and tolerance to degradation. These attributes are evaluated using ten parameters or metrics, based on comparison to established reference conditions for unmodified streams of similar

size and geographic region. Total IBI scores range from 0-60, with higher scores indicating higher quality. The IBI is the basis for determining the Stream's Biotic Class, or letter-based Biological Stream Characterization (BSC; Bertrand et al. 1996). The designated IBI ranges for each BSC Biotic Class are shown in Table 1. A simple correlation between individual IBI and metric an the total IBI score were ran to determine influence of individual metrics.

Table 1. Biological Classification of Illinois Streams

Resource Description--->	Unique Aquatic Resource	Highly Valued Aquatic Resource	Moderate Aquatic Resource	Limited Aquatic Resource	Restricted Aquatic Resource
Biotic Class -->	A	B	C	D	E
IB Range------>	51 - 60	41 - 50	31 - 40	21 - 30	$\leq$ 20

Detailed observation of stream channel and riparian area physical characteristics were made at each station (see Appendix). Stream channel information included notes on channel stability, substrate composition, stream morphology, percent fish cover provided by woody debris, undercut banks, aquatic vegetation and other features. Riparian area characteristics and condition were also noted. In addition to photographs, a detailed drawing of each station was also included.

Results and Discussion

Species Distribution and Abundance. Fish community sampling for all stations combined resulted in the collection of 4,675 fishes, representing 35 species (Table 3). Individuals from the minnow family (Cyprinidae) accounted for 65.8 % of the total abundance, with striped shiner (*Luxilus chrysocephalus*) and hornyhead chub (*Nocomis biguttatus*) appearing at every station. Central stoneroller (*Campostoma anomalum*) and bluntnose minnow (*Pimephales notatus*) were also very abundant and widespread (Table 3). Sunfishes (Centrarchidae), the next most abundant family, represented 16.1 percent of the total, with longear sunfish (*Lepomis megalotis*) the most prevalent species. All other families made up less than 5 % of the total.

Although no threatened or endangered species were found in the 2003 survey, several species

of "Special Concern" (Chicago Wilderness 2005) were present, including southern redbelly dace *(Phoxinus erythrogaster*), slender madtom (*Noturus exilis*), and rainbow darter (*Etheostoma caeruleum*). Species of "Special Concern" have limited distribution within Northeastern Illinois, or are especially vulnerable to degradation associated with urbanization. In fact, no other recent records exist in the DNR database for the rainbow darter, southern redbelly dace, or slender madtom in the Des Plaines River watershed (FAS 2004). The 2003 Jackson Creek survey also produced the only known record of black redhorse (*Moxostoma duquesnei*) in the Des Plaines Watershed. Rainbow darter and black redhorse were represented by one individual at Stations JC-1 and JC-2, respectively. Southern redbelly dace (n=24) occurred only at MB-3, possibly indicating the presence of cooler groundwater input (Smith 1979). Slender madtom distribution was also limited, occurring only at the lower Jackson Creek Stations (Table 3). Longear sunfish and smallmouth bass (*Micropterus dolomieu*) were relatively abundant in Jackson Creek, but have very limited distribution within other areas of the Des Plaines River Basin, with the exception of the DuPage River (FAS 2004). Fantail darter, and orangethroat darter, also rare throughout the Des Plaines River watershed, were present, but relatively uncommon in Jackson Creek (Table 3). As a group, darters were very low in number in the 2003 survey, despite the availability of preferred habitats (riffles, cobble/gravel substrate), particularly in the downstream areas of Jackson Creek. Sucker species (Catostomidae) were another group that appeared to be numerically under-represented in Jackson Creek. With the exception of white sucker, Catostomids are generally considered an intolerant group (Smith 1979). Northern hogsucker (*Hypentilium nigracans*), one of the more-sensitive sucker species, were absent in the 2003 Jackson Creek collection, although they were present in previous sampling (see discussion below). Redhorse species (*Moxostoma spp.*), another sensitive sucker group, were also very low in abundance in 2003 with only two species collected, black and golden redhorse (*Moxostoma erythrurum*).

Jackson Creek empties into the lower Des Plaines River, which has relatively low fish diversity due to water quality problems originating in the Chicago Metro Area. The lack of connection to a high quality, large river habitat may affect recruitment of migratory species like the Catostomids and channel catfish, a common stream species which was absent in 2003 collections. Recent fish collection records from the Des Plaines River at I-55 bridge, which is 1.5 miles downstream of the

Jackson Creek confluence, show very low abundance of sucker species for a large river in Illinois, and also very sporadic channel catfish populations (FAS 2004).

Another possible factor influencing abundance of these, and other species is annual flow conditions. Jackson Creek is a relatively small watershed, and in some years may experience extended periods of low flow, influencing movement patterns of larger, more migratory species. Although Jackson Creek has no U.S. Geological Survey (USGS) stream gauge, flow records are available for Hickory Creek, an adjacent watershed, also in the Des Plaines Basin. Records from Hickory Creek show a period of below average flow during the winter of 2002 and spring of 2003 (Figure 2). During pre-survey reconnaissance on Jackson Creek in March of 2003, we observed very low water levels, causing fish mortality in upper areas of the watershed.

Comparison of 2003 fish community survey results to other previous studies was limited to the lower Jackson Creek mainstem. Survey station JC-4 was previously sampled by IDNR in 1997. Fish abundance was almost 2.5 times higher in 1997 with six more species present compared to 2003 results. Lower water levels during 2002 and 2003 may have affected results for this station. Fish were also collected by U.S. Army Biologists within the Joliet Training Area (John Noble pers. comm.; Figure 3) with four stations sampled in 1994, and three stations in both 1995 and 1999. IDNR sampled three stations within JTA in 2003, with one location common to both IDNR and Army surveys: IDNR Station JC-2 (Figure 1). Differences in sampling gear, station length, and flow conditions preclude direct station comparisons among the surveys, therefore, only species occurrences and relative abundances were evaluated. For this analysis, results for all Army stations and all IDNR stations within each sampling year were combined (Table 4).

Species composition and relative abundances were generally similar for the IDNR and U.S. Army samples, with 27 species common to both collections (Table 4). One notable discrepancy was the greater abundance of darters in the 1995 Army collection, compared to all other collections. The 1995 Army collection was made in March, during darter spawning season when fish may have been more active and vulnerable to capture. All other collections were made during the summer months. A State Endangered species, greater redhorse *(Moxostoma valenciennesi*), was reportedly collected by Army biologists in 1995 (Table 4). The last record of this species in the Des Plaines River Basin was for Salt Creek in 1901 (Smith 1979). Overall, Army collections yielded more sucker species,

although abundance was still relatively low. Northern hogsucker were collected in all previous U.S. Army samples but was not collected by IDNR in 2003. Conversely, populations of intolerant species such hornyhead chub and smallmouth bass have remained stable over the period since 1995. The absence of other intolerant species, such as northern hogsucker, and the apparent reduction in darter and redhorse abundance may be related to the sampling period or low flow conditions. The Jackson Creek Watershed, a tributary to the degraded Des Plaines River, is somewhat isolated from quality recruitment sources and is more vulnerable to local extirpations resulting from droughts, floods or water quality problems, therefore, routine monitoring of fish communities, and the sensitive species groups in particular, is recommended. Based on comparisons to IDNR collections in other Des Plaines River tributaries (FAS 2004), Jackson Creek has relatively high species diversity, supporting several species not found in other areas of the Des Plaines River watershed.

Stream Quality. Based on the Index of Biotic Integrity (IBI), stream quality was generally higher in the downstream reaches of Jackson Creek, compared to the upper watershed tributaries (Table 5, Figure 3). Four Jackson Creek mainstem stations downstream of Jackson Branch (Figure 1) had IBI values of 40 or greater on a scale of 0 to 60 (Table 5). The two downstream stations JC-1 and JC-2 (Figure 1) had the highest quality ratings, scoring 45 and 46 respectively, and placing them in the "B" range, designated as a "Highly Valued Aquatic Resource" (BSC, Bertrand et al, 1996, Table 1). Higher scores at these stations was apparently due to presence of diverse habitat with abundant riffle areas and coarse substrate (Table 6). Habitat was less diverse at JC-3 and JC-4 which both had very little riffle development, resulting in lower IBI scores of 40 and 41 (Table 5). The other tributary stations produced IBI scores ranging from 31 to 38, in the BSC "C- range" designated as a "Moderate Aquatic Resource". Stations JC-5 and JB-2 had the lowest ratings (Table 5) found in the survey. These two locations were composed mostly of fine substrate and exhibited poor channel stability (Table 6). All five upstream, tributary stations were influenced by lack of diverse habitat as a result of past channel modifications. Low IBI metric scores for intolerant species and benthic invertivore metrics at the upstream sampling stations (Table 5) may indicate effects of poor habitat, and reduced, or variable water levels, resulting from drought conditions in 2002 and 2003. One exception appeared to be MB-2, which was located downstream of the Manhattan Waste Water Treatment Plant (Figure 1). Effluent from this plant may have reduced the effect of low water

as suggested by several IBI metrics, which were higher at this station compared to other upstream tributary locations (Table 5, Figure 3).

In evaluating stream quality results for all stations, two individual IBI metrics, Benthic Invertivore Species and Intolerent Species, had the highest correlation to the total IBI score with correlation coefficients > 0.80 (Table 7). Three IBI metrics, Number of Native Species, Number of Minnow Species, and % Coarse Substrate Spawners metrics had correlation coefficients ranging between 0.60 and 0.80. All other metrics provided little predictive value regarding the total IBI score, particularly the Sunfish Species metric, which showed little change across all sampling stations (Figure 3), with a correlation coefficient of 0.01 (Table 7).

Sportfish. Smallmouth bass and rock bass (*Ambloplites rupestris*) were the principal game species collected during the 2003 Jackson Creek survey. The four lower mainstem stations (Figure 1) on Jackson Creek yielded all 57 rock bass and 95 of the 96 smallmouth bass collected (Table 3). Higher quality habitat in this lower section, including abundant coarse substrate (Table 6) and deeper pools accounted for the greater abundance of these sport species. Station JC-1, the station closest to the Des Plaines River, had the highest abundance of smallmouth bass, with 45% of total for the entire survey. Smallmouth bass ranged in length from 2.0 to 15.3 inches (51 - 389 mm). A total of 10 fish greater than 12 inches (305 mm) were collected, indicating good potential angling opportunities. A wide distribution of sizes, and many younger fish were present, indicating recent successful reproduction (Figure 4). Rock bass were most abundant at station JC-4 (Figure 1) and overall, ranged in length from a 1.2 to 9.8 inches (29- 250 mm). Length frequency distribution for rockbass also indicates a reproducing population with a range of sizes present (Figure 4). A total of 25 largemouth bass (*Micropterus salmoides*) were collected with all fish less than 10 inches (250 mm, Figure 4). Bluegill sunfish (*Lepomis macrochirus)*, were relatively abundant (n=118, Table 3), but the population was composed predominantly of small juveniles in the 3 to 4 inch range (76 - 102 mm, Figure 4). Small streams do not typically provide optimal growth conditions for these species which commonly prefer lake, pond, or backwater habitats.

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Table 2. Jackson Creek fish community survey station locations (Latitude and Longitude from Illinois Stream Information System)

Station #	Stream Name	Station Location	T. R. Sec	Latitude (N)	Longitude (W)	County
JC-1	Jackson Creek	Midewin property. Sample started approx 1000' E of Baseline Rd, and ended at bridge remnants W of the 'brown circle' area.	T.34N R.9E 24	41° 24' 36.0"	88° 04' 14.0"	Will
JC-2	Jackson Creek	Joliet Training Area. Sampled from ds (N) of ford in Unit 5N, across and upstream of ford.	T.34N R.10E 18SE	41° 25' 16.3"	88° 07' 13.3"	Will
JC-3	Jackson Creek	Brandon Road. Sampled upstream (E) of the Brandon Road bridge behind residences. Elwood WWTP outfall location.	T.34N R.10E 17SW	41° 25' 22.3"	88° 06' 33.0"	Will
JC-4	Jackson Creek	Rowell Road. Sampled downstream (W) of Rowell Road. Historic station #GC-03	T.34N R.10E 10SE	41° 26' 19.8"	88° 03' 36.3"	Will
JC-5	Jackson Creek	Cherry Hill Rd bridge. N of Manhattan Rd, and S of Baker Rd. Sampled upstream of Cherry Hill Rd bridge.	T.34N R.11E 7SW	41° 26' 25.9"	88° 01' 12.8"	Will
MB-1	Manhattan Branch	E of Rt 53/Arsenal (Manhattan) Rd. intersection. Sampled upstream (S) of Arsenal Rd. Historic station #GCA-01.	T.34N R.10E 15SW	41° 25' 46.1"	88° 04' 38.4"	Will
MB-2	Manhattan Branch	East of Manhattan at intersection of Brown Rd and Cherry Hill Rd. Sampled upstream (W) of Cherry Hill Rd bridge.	T.34N R.11E 19NW	41° 25' 13.8"	88° 01' 8.75"	Will
JB-1	Jackson Branch	Bernhard Rd bridge, E of Cherry Hill Rd and W of Ridge Rd.. Sampled ds (S) of the Bernhard Rd bridge.	T.34N R.10E 1SW	41° 27' 33.1"	88° 02' 0.3"	Will
JB-2	Jackson Branch	New Lennox, S of Laraway Rd. Sampled in Country View Park, ds of New Lennox WWTP outfall.	T.34N R.11E 32NW	41° 28' 40.4"*	88° 59' 49.8"	Will

Table 3. Summary of the 2003 IDNR Jackson Creek fish survey results.

Common Name	Scientific Name	Total	09/15/03 JC-1	09/15/03 JC-2	09/16/03 JC-3	09/16/03 JC-4	09/17/03 JC-5	09/17/03 MB-1	09/17/03 MB-2	09/17/03 JB-1	09/17/03 JB-2
Gizzard shad	*Dorosoma cepedianum*	4	0	0	4	0	0	0	0	0	0
Carp	*Cyprinus carpio*	6	0	0	2	0	0	0	0	0	4
Southern redbelly dace	*Phoxinus erythrogaster*	24	0	0	0	0	0	0	24	0	0
Creek chub	*Semotilus atromaculatus*	74	1	1	0	2	0	8	20	17	25
Hornyhead chub	*Nocomis biguttatus*	459	70	58	26	125	2	36	29	81	32
Central stoneroller	*Campostoma anomalum*	672	137	43	18	108	0	170	22	121	53
Striped shiner	*Luxilus chrysocephalus*	944	88	69	31	203	48	2	46	336	121
Redfin shiner	*Lythrurus umbratilus*	101	2	15	50	21	2	0	1	10	0
Spotfin shiner	*Cyprinella spiloptera*	83	28	15	30	3	5	2	0	0	0
Fathead minnow	*Pimephales promelas*	4	1	0	0	0	0	0	2	1	0
Bluntnose minnow	*Pimephales notatus*	606	123	21	103	104	0	0	64	161	30
Bigmouth shiner	*Notropis dorsalis*	19	0	0	0	0	0	1	0	17	1
Sand shiner	*Notropis ludibundus*	90	42	9	28	1	0	0	0	8	2
Spottail shiner	*Notropis hudsonius*	1	1	0	0	0	0	0	0	0	0
Quillback	*Carpiodes cyprinus*	2	0	0	2	0	0	0	0	0	0
White sucker	*Catostomus commersoni*	220	2	13	27	67	27	1	33	10	40
Black redhorse	*Moxostoma duquesnei*	1	0	1	0	0	0	0	0	0	0
Golden redhorse	*Moxostoma erythrurum*	25	0	0	24	0	1	0	0	0	0
Yellow bullhead	*Ameiurus natalis*	237	2	3	1	20	0	2	7	1	201
Black bullhead	*Ameiurus melas*	1	0	0	0	0	0	0	0	0	1
Tadpole madtom	*Noturus gyrinus*	2	0	1	0	1	0	0	0	0	0
Slender madtom	*Noturus exilis*	29	15	12	2	0	0	0	0	0	0
Blackstripe topminnow	*Fundulus notatus*	227	10	9	2	130	46	0	5	10	15
Rock bass	*Ambloplites rupestris*	57	5	8	6	34	0	4	0	0	0
Largemouth bass	*Micropterus salmoides*	25	1	2	2	3	1	0	0	2	14
Smallmouth bass	*Micropterus dolomieu*	96	43	16	18	18	0	0	0	0	1
Green sunfish	*Lepomis cyanellus*	64	5	1	4	1	0	0	0	4	49
Bluegill x Green sunfish hybrid	*Lepomis macrochirus x cyanellus*	4	0	0	0	0	3	0	0	0	1
Bluegill	*Lepomis macrochirus*	118	0	6	20	12	2	0	0	2	76
Longear sunfish	*Lepomis megalotis*	301	24	30	38	82	95	8	23	0	1
Orangespotted sunfish	*Lepomis humilis*	92	2	4	55	1	13	1	0	0	16
Blackside darter	*Percina maculata*	22	4	12	0	6	0	0	0	0	0
Johnny darter	*Etheostoma nigrum*	60	2	4	2	8	0	0	39	0	5
Rainbow darter	*Etheostoma caeruleum*	1	1	0	0	0	0	0	0	0	0
Orangethroat darter	*Etheostoma spectabile*	1	0	0	0	0	0	0	1	0	0
Fantail darter	*Etheostoma flabellare*	3	0	0	0	2	0	1	0	0	0
	Total fish	4,675	609	353	495	952	245	236	316	781	688
	Total species	35	23	23	23	22	11	12	14	15	19
	IBI		45	46	40	41	31	37	38	34	32
	BSC		B	B	C	B	C	C	C	C	C

Table 4. Comparison of U.S. Army and IDNR fish sampling result in Lower Jackson Creek with the U. S. Army Joliet Training Area. n = number of sampling stations collected in each year.

		U.S. ARMY			IDNR
		n=4	n=3	n=3	n=3
Common name	Scientific name	1994	1995	1999	2003
Gizzard shad	Dorosoma cepedianum	0	0	8	4
Grass pickerel	Esox americanus	1	0	0	0
Goldfish	Carassius auratus	3	0	0	0
Carp	Cyprinus carpio	12	38	12	2
Carp x Goldfish hybrid	Cyprinus carpio x C. auratus	0	1	0	0
Creek chub	Semotilus atromaculatus	69	3	2	2
Hornyhead chub	Nocomis biguttatus	44	20	50	154
Central stoneroller	Campostoma anomalum	120	568	730	198
Suckermouth minnow	Phenacobius mirabilis	6	31	2	0
Striped shiner	Luxilus chrysocephalus	98	156	156	188
Redfin shiner	Lythrurus umbratilus	3	6	46	67
Spotfin shiner	Cyprinella spiloptera	25	28	15	73
Fathead minnow	Pimephales promelas	5	8	0	1
Bluntnose minnow	Pimephales notatus	74	211	186	247
Bigmouth shiner	Notropis dorsalis	0	9	0	0
Sand shiner	Notropis ludibundus	3	16	96	79
Spottail shiner	Notropis hudsonius	0	0	0	1
Quillback	Carpiodes cyprinus	0	0	0	2
White sucker	Catostomus commersoni	5	39	2	42
Northern hog sucker	Hypentelium nigricans	9	7	6	0
Greater redhorse	Moxostoma valenciennesi	0	4	0	0
Shorthead redhorse	Moxostoma macrolepidotum	5	0	4	0
Black redhorse	Moxostoma duquesnei	0	3	0	1
Golden redhorse	Moxostoma erythrurum	14	22	3	24
Channel catfish	Ictalurus punctatus	0	0	7	0
Yellow bullhead	Ameiurus natalis	22	20	4	6
Black bullhead	Ameiurus melas	0	3	0	0
Tadpole madtom	Noturus gyrinus	0	0	0	1
Slender madtom	Noturus exilis	6	0	15	29
Blackstripe topminnow	Fundulus notatus	0	2	2	21
Rock bass	Ambloplites rupestris	24	12	12	19
Largemouth bass	Micropterus salmoides	0	0	36	5
Smallmouth bass	Micropterus dolomieu	6	16	32	77
Green sunfish	Lepomis cyanellus	139	70	73	10
Bluegill	Lepomis macrochirus	0	2	11	26
Longear sunfish	Lepomis megalotis	168	7	35	92
Orangespotted sunfish	Lepomis humilis	0	5	24	61
Blackside darter	Percina maculata	2	29	8	16
Johnny darter	Etheostoma nigrum	7	100	16	8
Orangethroat darter	Etheostoma spectabile	0	58	12	0
Fantail darter	Etheostoma flabellare	1	93	0	0
Rainbow darter	Etheostoma caeruleum	0	0	0	1
	Total fish	871	1587	1605	1457
	Total species	37	37	37	30

Table 5. Individual IBI[1] metric scores and BSC[2] values at each Jackson Creek sampling station, September 2003 IDNR fish community survey.

Station Code	JC-1		JC-2		JC-3		JC-4		JC-5		MB-1		MB-2		JB-1		JB-2	
Sample Date	9/15/03		9/15/03		9/16/03		9/16/03		9/17/03		9/17/03		9/17/03		9/17/03		9/17/03	
Metric (Criteria)	# or %	score	# or %	score	# or %	score	# or %	score	# or %	score	# or %	score	# or %	score	# or %	score	# or %	score
Number of native fish species	23	5	23	5	22	5	22	5	11	2	12	3	14	4	15	4	18	4
Number of native minnow species	10	6	8	5	7	4	8	4	4	2	6	3	8	4	9	5	7	4
Number of native sucker species	1	2	2	2	3	3	1	2	2	3	1	3	1	3	1	2	1	2
Number of native sunfish species	6	6	7	6	7	6	7	6	4	6	3	6	1	3	3	6	6	6
Number native benthic invertivore	4	3	5	4	3	2	4	3	1	1	2	2	2	2	1	1	2	2
sp	4	4	4	4	3	3	2	2	1	1	1	1	2	3	1	1	2	2
Number of native intolerant species	4	2	8	3	6	2	2	1	0	1	0	1	13	5	0	0	1	1
% specialist benthic invertivores	48	6	43	6	61	5	46	6	34	6	7	6	62	5	73	4	80	3
% generalist feeders	57	6	63	6	35	5	54	6	22	3	90	6	39	4	70	6	30	3
% coarse substrate spawners	26	5	22	5	23	5	23	6	9	6	25	6	36	5	40	5	33	5
% tolerant species																		
IBI total score [1]	45		46		40		41		31		37		38		34		32	
BSC[2]	B		B		C		B		C		C		C		C		C	
Average Stream Width (ft)	32		45		45		25		21		10		10		15		15	

1. Index of Biotic Integrity (IBI) (Smogor, 2000)
2. Biological Stream Characterization Rating (Bertrand, et al, 1996)

Table 6. Habitat characteristics at Jackson Creek fish collection stations

Station #	Stream Name	% POOL	% RIFFLE	% RUN	% Course Substrate	% Fine Substrate	% Instream Cover	Channel Modifi-cation	Channel Stability
JC-1	Jackson Creek	40	40	20	100	0	20	no	good
JC-2	Jackson Creek	50	40	20	100	0	30	no	good
JC-3	Jackson Creek	95	5	0	100	0	15	yes	fair
JC-4	Jackson Creek	95	5	0	55	45	30	yes	fair
JC-5	Jackson Creek	40	0	60	0	100	10	yes	poor
MB-1	Manhattan Branch	33	33	33	100	0	30	yes	good
MB-2	Manhattan Branch	35	25	40	60	40	5	yes	fair
JB-1	Jackson Branch	30	15	55	15	85	40	yes	fair
JB-2	Jackson Branch	5	5	90	10	90	40	yes	fair/poor

Table 7. Correlation matrix for individual IBI metrics at all stations and total IBI score (See Table 4 for full metric description).

	Native Species	Minnow Species	Sucker Species	Sunfish Species	Ben Invr Species	Intolnt Species	% Ben Invr	% Gen Feeders	% Crs Sub Spw	% Tolnt Species	TOTAL IBI
Native Species	1.00										
Minnow Species	0.80	1.00									
Sucker Species	-0.55	-0.70	1.00								
Sunfish Species	0.04	0.04	-0.40	1.00							
Ben Invr Species	0.71	0.53	-0.46	0.09	1.00						
Intolnt Species	0.74	0.67	-0.26	-0.20	0.77	1.00					
%Ben Invr	0.26	0.16	0.30	-0.82	0.39	0.67	1.00				
% Gen Feeders	-0.02	-0.12	0.24	0.08	0.42	0.22	0.19	1.00			
% Crs Sub Spw	0.54	0.57	-0.36	0.28	0.49	0.23	-0.13	0.43	1.00		
% Tolnt Species	-0.55	-0.71	0.32	0.25	-0.17	-0.61	-0.39	0.53	0.00	1.00	
TOTAL IBI	0.77	0.66	-0.31	0.02	0.88	0.83	0.43	0.55	0.69	-0.27	1.00

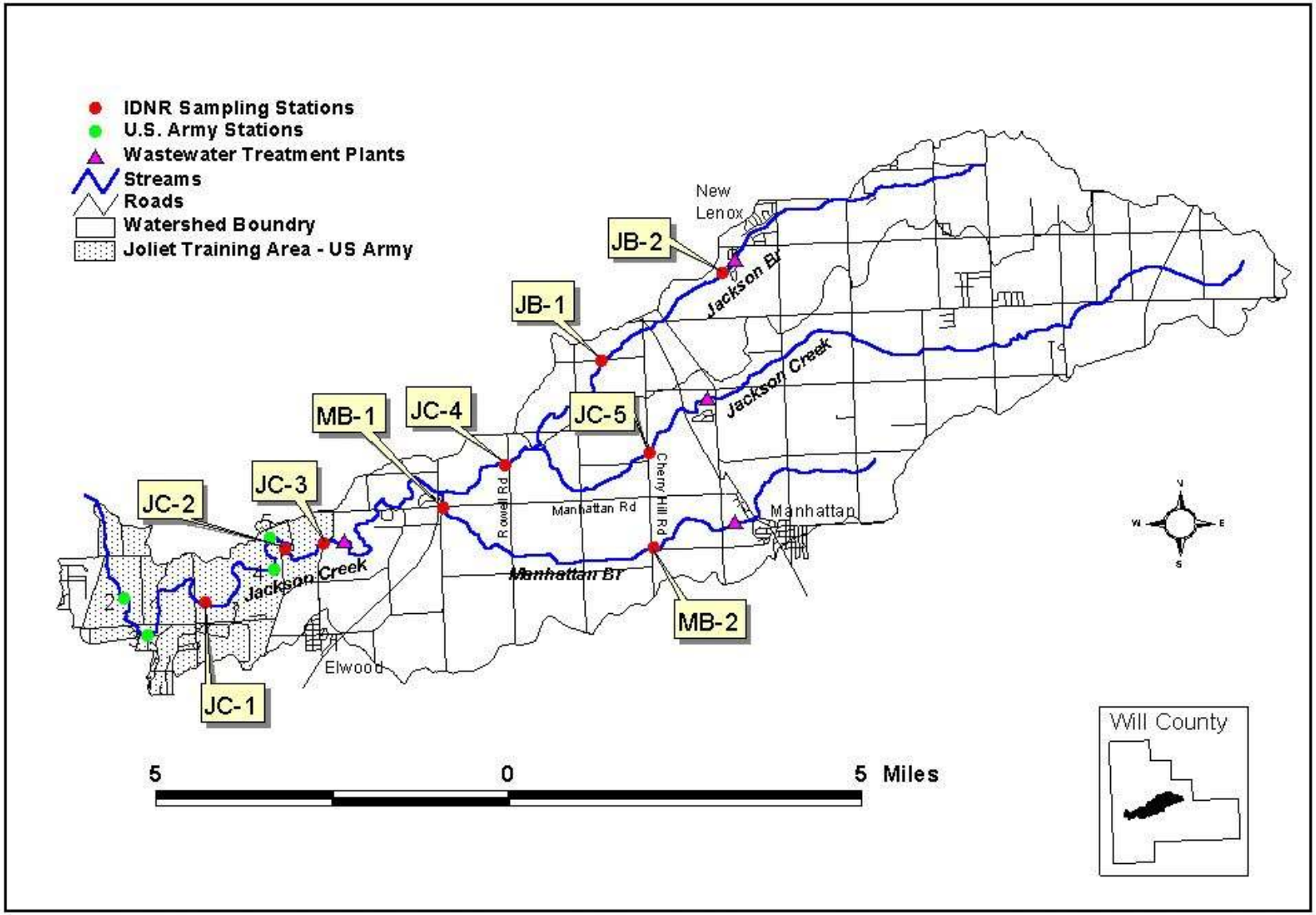


Figure 1. Jackson Creek Watershed showing 2003 fish sampling stations and other watershed features.

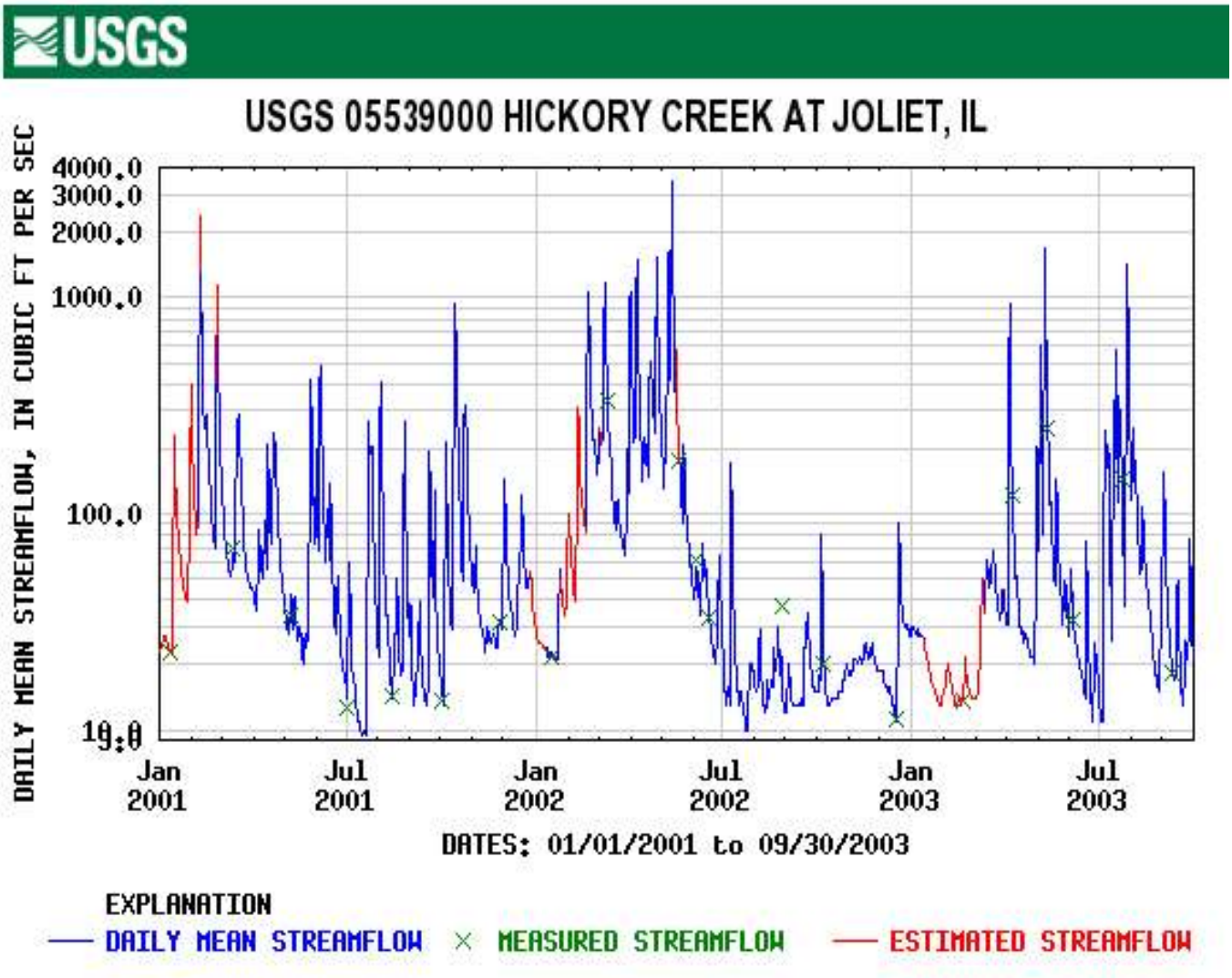
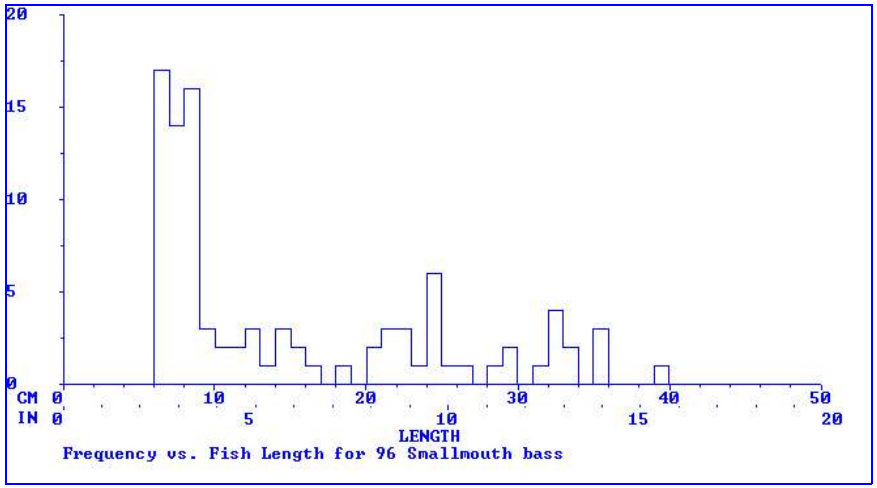
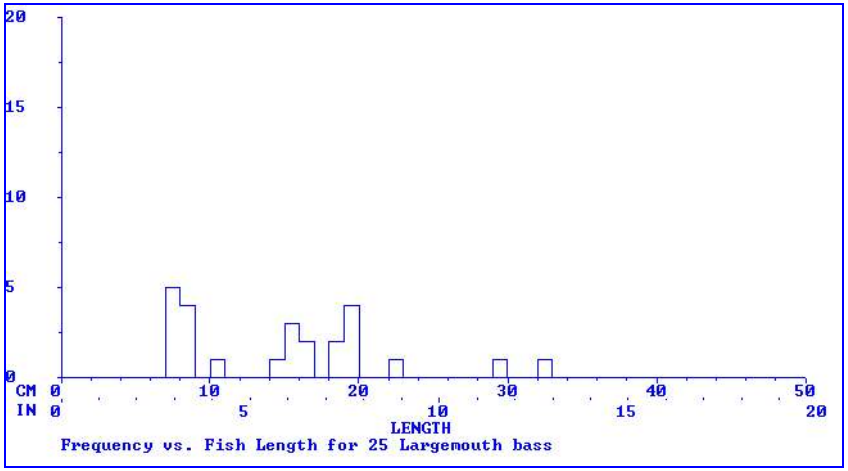
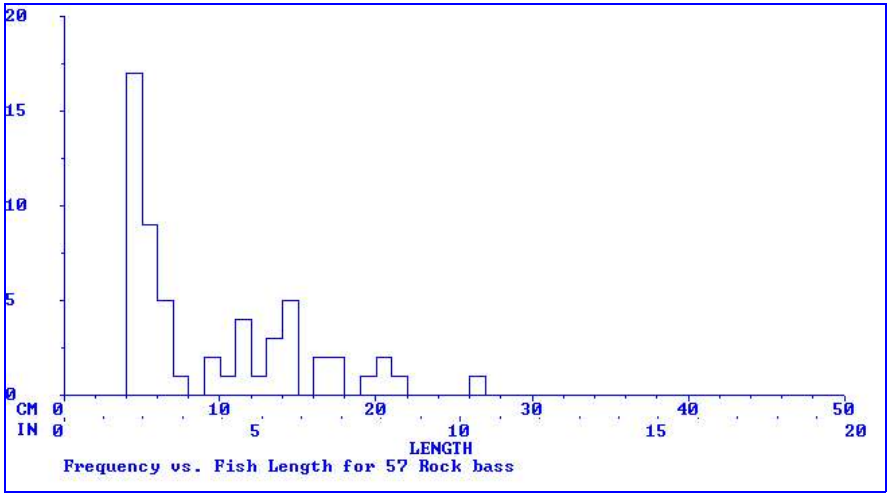


Figure 2. Stream flow data from nearby Hickory Creek, presented as an indicator for flow level in Jackson Creek, which does not have a USGS flow gauge.







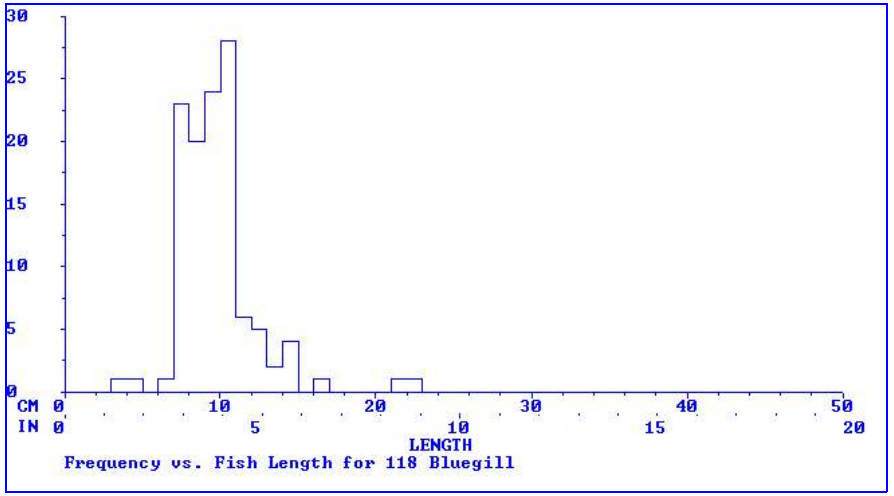


Figure 3. Length frequency distributions for selected sport species, 2003IDNR Jackson Creek Fish Survey; all stations combined

Appendix
STATION ACCOUNTS

The following is a description and sampling results by station. Stations are grouped by location on the mainstem or tributary. Descriptions of four stations on two tributaries and five stations on the mainstem of Jackson Creek are presented.

Jackson Creek Mainstem
Station JC-1

Station Location: Station was located approximately 1000 feet east of Baseline Road on Midewin National Tall Grass Prairie property. The upper end of the station was at remnant bridge abutments downstream (west) of an abandoned officer housing area known as the 'brown circle'.

Riparian Corridor Characteristics: A high bluff abuts the stream along the south side, while a moderately sloped bank abuts the north side. The north side corridor is sparsely forested, while the south bluff supports grasses and shrubs.

Channel Characteristics: Gradient was moderate. Reach sampled exhibited minimal meandering, but appeared to not be altered. Substrate was composed of 60% exposed bedrock and 40% cobble and boulders . There were 5 riffles, 6 pools and 5 runs. The deepest pool recorded was 30 inches in depth.

Stream Habitat Features: Cobble and boulder size stones were not imbedded in the substrate. The interstitial areas around and under the rocks provided substantial habitat for fish and invertebrates. Undercut bank and rock ledge habitat was scare, while woody brush and debris was not available for additional habitat.

Fish Sampling Results: Sampling resulted in the collection of 609 fishes representing 23 species. An IBI of 45 was calculated for this station, qualifying for a BSC rating of 'B'. Tolerant species (n=6) represented 26% of species collected. Intolerant species (n=4) represented 17%. Smallmouth bass (n=43) were more abundant at this station than any other in the survey. They ranged in length from 2.7 inches (68mm) to 13.5 inches (344mm).

Additional Notes: This is the only station where a rainbow darter (*Etheostoma caeruleum*) was collected - an uncommon species that is listed as a species of special concern by the Chicago Wilderness Partnership.

Common name	Scientific name	Qty
Creek chub**	*Semotilus atromaculatus*	1
Hornyhead chub*	*Nocomis biguttatus*	70
Central stoneroller	*Campostoma anomalum*	137
Striped shiner	*Luxilus chrysocephalus*	88
Redfin shiner	*Lythrurus umbratilus*	2
Spotfin shiner	*Cyprinella spiloptera*	28
Fathead minnow**	*Pimephales promelas*	1
Bluntnose minnow**	*Pimephales notatus*	123
Sand shiner	*Notropis ludibundus*	42
Spottail shiner	*Notropis hudsonius*	1
White sucker**	*Catostomus commersoni*	2
Yellow bullhead**	*Ameiurus natalis*	2
Slender madtom*	*Noturus exilis*	15
Blackstripe topminnow	*Fundulus notatus*	10
Rock bass	*Ambloplites rupestris*	5
Largemouth bass	*Micropterus salmoides*	1
Smallmouth bass*	*Micropterus dolomieu*	43
Green sunfish**	*Lepomis cyanellus*	5
Longear sunfish	*Lepomis megalotis*	24
Orangespotted sunfish	*Lepomis humilis*	2
Blackside darter	*Percina maculata*	4
Johnny darter	*Etheostoma nigrum*	2
Rainbow darter*	*Etheostoma caeruleum*	1
*Intolerant	**Total fish**	**609**
**Tolerant	**Total species**	**23**

Parameter	JC-1
Date Sampled	09/15/03
Water Temperature C^0/F^0	20/68
Conductivity (umhos/cm)	842
Flow Velocity - ft/sec	0.5-1.5
Average Depth (feet)	0.75
Station Length (feet)	542
Sampling Effort (minutes)	33
Stream Width (feet)	32
Sampling Efficiency (poor=0/best=27)	9
Gear Type, BE=boat ES= electric seine. PE=back-pack	PE
Data ID Number	11458
IEPA Station Code Number	na

Jackson Creek Mainstem Station JC-2

Station Location: Station was located on the U. S. Army's Joliet Training Area (JTA) Unit 5N, south of Arsenal Road and north of Diagonal Road, northwest of the Village of Elwood. Sampling was conducted at a location where the range access road crosses Jackson Creek at a low-water crossing (ford). Approximately 10% of the 650 foot length station was located downstream (north) of the ford.

Riparian Corridor Characteristics: Both sides of the stream were border by a sparsely forested riparian zone that varied in width from approximately 50 feet to greater than 100 feet.

Channel Characteristics: The station exhibited moderate gradient throughout. Substrate was primarily sand, gravel, and cobble (80%). Boulders were abundant, providing approximately 20% coverage. There are six pools (40% of the station), five riffles (40%), and four runs (20%) in the sampled reach. Maximum pool depth recorded was four feet.

Stream Habitat Features: Habitat was good at this station, as the aquatic-emergent plant water willow (*Justicia americana*) was abundant, as were boulders and moderately deep pools. The boulders were not imbedded in the substrate providing interstitial areas for fish and invertebrate habitat. Undercut banks, submerged logs, brush and debris were present in low quantities that were insufficient to serve as a significant source of habitat.

Fish Sampling Results: Sampling resulted in the collection of 353 fishes representing 23 species. An IBI of 46 was calculated for this station, qualifying for a BSC rating of 'B'. Tolerant species (n=5) represented 21% and intolerant species (n=4) represented 17% of species collected. Smallmouth bass were less abundant at this station than JC-1 (16 versus 43, respectively), but the maximum size was larger (15.3 inches (389mm) in length at JC-2, versus 13.5 inches (344mm) at JC-1.

Additional Notes: This was the only station where the black redhorse sucker (*Moxostoma duquesnei*, n=1) were collected. The black redhorse is intolerant of habitat and water degradation (Smogor, 2000) and is less tolerant of pollution, siltation and turbidity than most other sucker species (Smith, 1979).

Common Name	Scientific name	Qty
Creek chub**	*Semotilus atromaculatus*	1
Hornyhead chub*	*Nocomis biguttatus*	58
Central stoneroller	*Campostoma anomalum*	43
Striped shiner	*Luxilus chrysocephalus*	69
Redfin shiner	*Lythrurus umbratilus*	15
Spotfin shiner	*Cyprinella spiloptera*	15
Bluntnose minnow**	*Pimephales notatus*	21
Sand shiner	*Notropis ludibundus*	9
White sucker**	*Catostomus commersoni*	13
Black redhorse*	*Moxostoma duquesnei*	1
Yellow bullhead**	*Ameiurus natalis*	3
Tadpole madtom	*Noturus gyrinus*	1
Slender madtom*	*Noturus exilis*	12
Blackstripe topminnow	*Fundulus notatus*	9
Rock bass	*Ambloplites rupestris*	8
Largemouth bass	*Micropterus salmoides*	2
Smallmouth bass*	*Micropterus dolomieu*	16
Green sunfish**	*Lepomis cyanellus*	1
Bluegill	*Lepomis macrochirus*	6
Longear sunfish	*Lepomis megalotis*	30
Orangespotted sunfish	*Lepomis humilis*	4
Blackside darter	*Percina maculata*	12
Johnny darter	*Etheostoma nigrum*	4
*Intolerant	**Total fish**	**353**
**Tolerant	**Total species**	**23**

Parameter	JC-2
Date Sampled	09/15/03
Water Temperature C^0/F^0	20.9/69.6
Conductivity (umhos/cm)	861
Flow Velocity - ft/sec	0-1.5
Average Depth (feet)	1.2
Station Length (feet)	650
Sampling Effort (minutes)	28
Stream Width (feet)	45
Sampling Efficiency (poor=0/best=27)	3
Gear Type, BE=boat ES= electric seine. PE=back-pack	ES
Data ID Number	11459
IEPA Station Code Number	na

Jackson Creek Mainstem Station JC-3

Station Location: Sampling was conducted upstream of the Brandon Road bridge, located approximately one mile north of the Village of Elwood.

Riparian Corridor Characteristics: The north corridor was residential lawns with the bank rimmed with trees. The south corridor was forested with a dense undergrowth. Tree canopy provided shade over approximately 80% of the sample reach.

Channel Characteristics: The channel was approximately 45 feet in width, low gradient, with an average depth of 1.5 feet and a maximum depth of 4.0 feet. Channel is moderately incised, with considerable bank erosion, especially along the lawn edges. Substrate was primarily sand (60% coverage), with gravel and cobble comprising the remaining 40%.

Stream Habitat Features: Minimal habitat was available. Boulders, undercut banks, root wads and other woody debris were present in very limited quantities (approximately 15% coverage). A small colony of the aquatic, emergent plant water willow (*Justicia americana*) was present near the bridge. Extensive shading prevented expansion of the water willow.

Fish Sampling Results: Sampling resulted in the collection of 495 fishes representing 23 species. Although this station has the same number of species as JC-1 and JC-2 (n=23), the IBI is lower (IBI = 40, BSC = 'C'). The reduction of IBI value reflects the abundance of species that are tolerant of degradation; white sucker (n=27) and bluntnose minnow (n=103). Tolerant species represent over 21% (n=5) of the species and over 27% (n=137) of fish collected at this station. Intolerant species represent just 13% (n=3) of the species and 9% (n=46) of the fish collected. Smallmouth bass (n=18) were represented by fish up to 13 inches (329mm) in length. Young-of-the-year fish represented just 11% (n=2) of the smallmouth bass collected at JC-3. The abundance of tolerant species, and low presence of young-of-the-year smallmouth result from the paucity of habitat, and possibly low water quality, at this station.

Additional Notes: Golden redhorse sucker (*Moxostoma erythrurum*) were abundant only at this station, resulting in 24 of the 25 golden redhorse collected during the Jackson Creek survey. Golden redhorse are the most common, and least intolerant species of redhorse sucker (Smith, 1979).

Common name	Scientific name	Qty
Gizzard shad	*Dorosoma cepedianum*	4
Carp**	*Cyprinus carpio*	2
Hornyhead chub*	*Nocomis biguttatus*	26
Central stoneroller	*Campostoma anomalum*	18
Striped shiner	*Luxilus chrysocephalus*	31
Redfin shiner	*Lythrurus umbratilus*	50
Spotfin shiner	*Cyprinella spiloptera*	30
Bluntnose minnow**	*Pimephales notatus*	103
Sand shiner	*Notropis ludibundus*	28
Quillback	*Carpiodes cyprinus*	2
White sucker**	*Catostomus commersoni*	27
Golden redhorse	*Moxostoma erythrurum*	24
Yellow bullhead**	*Ameiurus natalis*	1
Slender madtom*	*Noturus exilis*	2
Blackstripe topminnow	*Fundulus notatus*	2
Rock bass	*Ambloplites rupestris*	6
Largemouth bass**	*Micropterus salmoides*	2
Smallmouth bass*	*Micropterus dolomieu*	18
Green sunfish**	*Lepomis cyanellus*	4
Bluegill	*Lepomis macrochirus*	20
Longear sunfish	*Lepomis megalotis*	38
Orangespotted sunfish	*Lepomis humilis*	55
Johnny darter	*Etheostoma nigrum*	2
*Intolerant	**Total fish**	**495**
**Tolerant	**Total species**	**23**

Parameter	JC-3
Date Sampled	09/16/03
Water Temperature C^0/F^0	na
Conductivity (umhos/cm)	na
Flow Velocity - ft/sec	na
Average Depth (feet)	1.5
Station Length (feet)	na
Sampling Effort (minutes)	45
Stream Width (feet)	45
Sampling Efficiency (poor=0/best=27)	9
Gear Type, BE=boat ES= electric seine. PE=back-pack	BE
Data ID Number	11460
IEPA Station Code Number	na

Jackson Creek Mainstem Station JC-4 (GC-03)

Station Location: The station is located downstream (west) of the Rowell Road bridge, north of Manhattan (Arsenal) Road and south of Breen Road.

Riparian Corridor Characteristics: The riparian zone on both sides is agricultural fields. A narrow grass corridor borders the stream. The stream receives no shade.

Channel Characteristics: The stream is approximately 25 feet wide with an average depth of 2.8 feet. Pools in the sample reach attained depths of up to 3.5 feet. The channel is incised and large clumps of bank material had slumped into the stream at several locations. The channel has a moderately low gradient with a substrate comprised of silt and sand (45% coverage) in two pools and gravel (50%), cobble (5%) in two riffle areas.

Stream Habitat Features: Aquatic habitat consisted of colonies of the aquatic plant milfoil (Myriophyllum sp) and the emergent plant, water willow (*Justicia americana*). The plants, combined with the few boulders present and an under-cut bank, provided approximately 30% coverage of the sampled reach.

Fish Sampling Results: Sampling resulted in the collection of 952 fishes representing 22 species. Over 22% (n=5) of the species collected were tolerant species while intolerant species were represented by just two species (9% of species collected). However, the actual number of tolerant and intolerant fish was nearly evenly split with 20% (n=194) tolerant and 15% (n=143) intolerant. Smallmouth bass were represented by 18 individuals that ranged from 2.1 inches (53mm) to 12.3 inches (313 mm) in length.

Additional Notes: Rock bass (n=34) were much more abundant at this station than any other station, and represented nearly 60% of all rock bass collected during the Jackson Creek survey. Rock bass were primarily represented by small specimens (29 of 34 fish were < 4 inches in length). The largest rock bass collected at JC-4 was 7.75 inches (197mm) in length. An IBI of 41 (Smogor, 2000) was calculated for JC-4, qualifying for a BSC rating (Bertrand et al, 1996) of 'B'.

Common name	Scientific name	Qty
Creek chub**	*Semotilus atromaculatus*	2
Hornyhead chub*	*Nocomis biguttatus*	125
Central stoneroller	*Campostoma anomalum*	108
Striped shiner	*Luxilus chrysocephalus*	203
Redfin shiner	*Lythrurus umbratilus*	21
Spotfin shiner	*Cyprinella spiloptera*	3
Bluntnose minnow**	*Pimephales notatus*	104
Sand shiner	*Notropis ludibundus*	1
White sucker**	*Catostomus commersoni*	67
Yellow bullhead**	*Ameiurus natalis*	20
Tadpole madtom	*Noturus gyrinus*	1
Blackstripe topminnow	*Fundulus notatus*	130
Rock bass	*Ambloplites rupestris*	34
Largemouth bass	*Micropterus salmoides*	3
Smallmouth bass*	*Micropterus dolomieu*	18
Green sunfish**	*Lepomis cyanellus*	1
Bluegill	*Lepomis macrochirus*	12
Longear sunfish	*Lepomis megalotis*	82
Orangespotted sunfish	*Lepomis humilis*	1
Blackside darter	*Percina maculata*	6
Johnny darter	*Etheostoma nigrum*	8
Fantail darter	*Etheostoma flabellare*	2
*Intolerant	Total fish	952
**Tolerant	Total species	22

Parameter	JC-4
Date Sampled	09/16/03
Water Temperature C^0/F^0	19.1/66.4
Conductivity (umhos/cm)	671
Flow Velocity - ft/sec	0.3-0.8
Average Depth (feet)	2.8
Station Length (feet)	500
Sampling Effort (minutes)	77
Stream Width (feet)	25
Sampling Efficiency (poor=0/best=27)	9
Gear Type, BE=boat ES= electric seine. PE=back-pack	ES
Data ID Number	11461
IEPA Station Code Number	GC-03

Jackson Creek Mainstem Station JC-5

Station Location: Station was located approximately two miles northeast of the Village of Manhattan, on the east side of Cherry Hill Road, west of U.S. Route 52, south of Baker Road and north of Manhattan/Arsenal Road.

Riparian Corridor Characteristics: A grass waterway on each side of the stream separates the streambank from agricultural fields at this location.

Channel Characteristics: This low gradient reach of stream has been channelized or straightened. The channel is deeply incised inside steeply sloped banks. Bank failure was evident at several locations. Average width was 21 feet with an average depth of 2.8 feet. Three pools were separated by three run areas. Substrate was primarily sand, silt, and mud (75% coverage) with some exposed claypan (5%).

Stream Habitat Features: Habitat was minimal, comprised of some submerged roots and a substantial amount of submerged and over-hanging terrestrial vegetation; principally reed canary grass (*Phalaris arundinacea*).

Fish Sampling Results: Sampling resulted in the collection of 245 fishes representing 11 species. The sample at JC-5 produced the second lowest fish collection of the Jackson Creek survey with less than one half the species collected at other mainstem stations, and far fewer fish collected. No smallmouth bass or rock bass were collected. An IBI of 31 was calculated for JC-5, qualifying for a BSC rating of 'C'.

Common name	Scientific name	Qty
Hornyhead chub*	*Nocomis biguttatus*	2
Striped shiner	*Luxilus chrysocephalus*	48
Redfin shiner	*Lythrurus umbratilus*	2
Spotfin shiner	*Cyprinella spiloptera*	5
White sucker**	*Catostomus commersoni*	27
Golden redhorse	*Moxostoma erythrurum*	1
Blackstripe topminnow	*Fundulus notatus*	46
Largemouth bass	*Micropterus salmoides*	1
Bluegill	*Lepomis macrochirus*	3
Bluegill x Green sunfish hybrid	*L. macrochirus x L. cyanellus*	2
Longear sunfish	*Lepomis megalotis*	95
Orangespotted sunfish	*Lepomis humilis*	13
*Intolerant	**Total fish**	**245**
**Tolerant	**Total species**	**11**

Parameter	JC-5
Date Sampled	09/17/03
Water Temperature C^0/F^0	19.1/66.4
Conductivity (umhos/cm)	1,097
Flow Velocity - ft/sec	na
Average Depth (feet)	2.8
Station Length (feet)	370
Sampling Effort (minutes)	18
Stream Width (feet)	21
Sampling Efficiency (poor=0/best=27)	27
Gear Type, BE=boat ES= electric seine. PE=back-pack	ES
Data ID Number	11462
IEPA Station Code Number	na

Manhattan Branch Station MB-1 (GCA-01)

Station Location: Station is located approximately 150 feet west of the Arsenal Road and State Route 53 intersection on the south side of Arsenal Road. Sampling started approximately 100 feet south of the Arsenal Road bridge. Station is 0.25 mile (1,320 feet) south (upstream) of the confluence with Jackson Creek.

Riparian Corridor Characteristics: The east side is a pasture that is forested with oak trees. On the west side a canary reed grass (*Phalaris arundinacea*) and rice cut grass (*Leersia oryzoides*) stream border separates the stream from residential lawns. The numerous oak trees provided shade that affected less than 5% of the sample reach.

Channel Characteristics: The channel was approximately 10 feet wide with a moderate gradient. The principal substrate was exposed bedrock, which comprised approximately 80% of the substrate. Four riffles were composed of cobble and gravel (20%) and three run areas separated four shallow pools.

Stream Habitat Features: Instream cover was primarily supplied by filamentous algae that covered nearly every hard surface in this reach, and several boulders. Over-hanging terrestrial grasses provided additional cover/habitat.

Fish Sampling Results: Sampling resulted in the collection of 236 fishes representing 12 species. The fish collection at MB-1 was the lowest number of fish for any station in the survey, but not the lowest diversity (JC-5 had only 11 species). Central stoneroller (*Campostoma anomalum*) were the most abundant fish at this station, and were more abundant than at any other station in the survey. The central stoneroller is a herbivore, therefore, their abundance likely reflects the extensive algae growth at MB-1. Four rock bass between 4.3 inches (109mm) and 5.0 inches (126mm) were collected. No smallmouth bass were collected. An IBI of 37 (Smogor, 2000) was calculated for MB-1, qualifying for a BSC rating of 'C'(Bertrand et al, 1996).

Common name	Scientific name	Qty
Creek chub**	*Semotilus atromaculatus*	8
Hornyhead chub*	*Nocomis biguttatus*	36
Central stoneroller	*Campostoma anomalum*	170
Striped shiner	*Luxilus chrysocephalus*	2
Spotfin shiner	*Cyprinella spiloptera*	2
Bigmouth shiner	*Notropis dorsalis*	1
White sucker**	*Catostomus commersoni*	1
Yellow bullhead**	*Ameiurus natalis*	2
Rock bass	*Ambloplites rupestris*	4
Longear sunfish	*Lepomis megalotis*	8
Orangespotted sunfish	*Lepomis humilis*	1
Fantail darter	*Etheostoma flabellare*	1
*Intolerant	**Total fish**	**236**
**Tolerant	**Total species**	**12**

Parameter	MB-1
Date Sampled	9/17/03
Water Temperature C^0/F^0	19.8/67.6
Conductivity (umhos/cm)	1411
Flow Velocity - ft/sec	1.0
Average Depth (feet)	<1.0
Station Length (feet)	200
Sampling Effort (minutes)	16
Stream Width (feet)	10
Sampling Efficiency (poor=0/best=27)	27
Gear Type, BE=boat ES= electric seine. PE=back-pack	PE
Data ID Number	11463
IEPA Station Code Number	GCA-01

Manhattan Branch Station MB-2

Station Location: Station is approximately 1 ½ mile west of the Village of Manhattan on the east side of the intersection of Brown Road and Cherry Hill Road, on the north side of Brown Road, approximately one mile south of Manhattan/Arsenal Road. Sampling was conducted for 200 feet starting at the Cherry Hill Road bridge and sampling east (upstream).

Riparian Corridor Characteristics: The south side corridor was lawn and the north corridor was an agricultural field with a narrow edge of natural vegetation along the stream.

Channel Characteristics: A low gradient, incised, straightened channel approximately 10 feet wide with an average depth of 1.5 feet. Substrate was gravel and cobble for nearly 60% of the station, including the one run and three riffles. Approximately 40% of the station is mud or sand, especially the two pool areas. Shading along both shorelines was provided by over-hanging terrestrial grasses.

Stream Habitat Features: Terrestrial grasses hanging over the bank or in the stream, larger cobble, and a few boulders provided the only available cover/habitat at this station.

Fish Sampling Results: Sampling resulted in the collection of 316 fishes representing 14 species. Fish species that are tolerant of habitat and/or water quality degradation represented over 35% (n=5) of all species collected, and nearly 40% (n=126) of all fish collected. An IBI of 38 was calculated for MB-2, qualifying for a BSC rating of 'C'.

Additional Notes: Southern redbelly dace (Phoxinus erythrogaster), an intolerant, cool water species, with a limited distribution in Illinois was collected at this station.

Common name	Scientific name	Qty
Southern redbelly dace*	*Phoxinus erythrogaster*	24
Creek chub**	*Semotilus atromaculatus*	20
Hornyhead chub*	*Nocomis biguttatus*	29
Central stoneroller	*Campostoma anomalum*	22
Striped shiner	*Luxilus chrysocephalus*	46
Redfin shiner	*Lythrurus umbratilus*	1
Fathead minnow**	*Pimephales promelas*	2
Bluntnose minnow**	*Pimephales notatus*	64
White sucker**	*Catostomus commersoni*	33
Yellow bullhead**	*Ameiurus natalis*	7
Blackstripe topminnow	*Fundulus notatus*	5
Longear sunfish	*Lepomis megalotis*	23
Johnny darter	*Etheostoma nigrum*	39
Orangethroat darter	*Etheostoma spectabile*	1
*Intolerant	**Total fish**	**316**
**Tolerant	**Total species**	**14**

Parameter	MB-2
Date Sampled	9/17/03
Water Temperature C^0/F^0	19.5/67.1
Conductivity (umhos/cm)	1590
Flow Velocity - ft/sec	0.25
Average Depth (feet)	1.5
Station Length (feet)	200
Sampling Effort (minutes)	14
Stream Width (feet)	10
Sampling Efficiency (poor=0/best=27)	3
Gear Type, BE=boat ES= electric seine. PE=back-pack	PE
Data ID Number	11464
IEPA Station Code Number	na

Jackson Branch Station JB-1

Station Location: The station was located 1.9 mile northeast (upstream) of the confluence of Jackson Branch with Jackson Creek. The station was on the south side of Bernhard Road, west of Cherry Hill Road and east of Ridge Road.

Riparian Corridor Characteristics: Stream corridor on both sides is a grass and shrub floodplain. A residential lawn borders the stream for approximately 100 feet near Bernhard Road, otherwise corridor is naturalized vegetation. Several trees and shrubs grow along the stream and provide approximately 25% of the channel with shade.

Channel Characteristics: The stream is approximately 15 feet wide with an average depth of 0.75 feet. It has a moderate gradient and is recovering from historic channelization. Several islands and mud or sand bars have formed. Substrate composition varied widely at locations within the sample reach. Generally, substrate was composed of 50% mud and silt, and another 25% of sand. The sample reach had three riffles which contained various amounts of gravel and cobble that over-all covered approximately 15% of the reach. There were four shallow pools (max depth 2.0 feet), but the majority of the reach (approximately 55%) was 'run' type structure. Claypan was exposed along the banks in over 10% of this reach.

Stream Habitat Features: Extensive colonies of submerged aquatic vegetation (Potamogeton sp) was the principal habitat feature. Brush, boulders, and logs were available for habitat, but only in minimal quantities.

Fish Sampling Results: Sampling resulted in the collection of 781 fishes representing 15 species. Fish species that are tolerant of degraded habitat or water quality represented 40% (n=6) of all species collected at this station, reflecting the dominance of mud and sand as substrate. An IBI of 34 was calculated for JB-1, qualifying for a BSC rating of 'C'.

Common name	Scientific name	Qty
Creek chub**	*Semotilus atromaculatus*	17
Hornyhead chub*	*Nocomis biguttatus*	81
Central stoneroller	*Campostoma anomalum*	121
Striped shiner	*Luxilus chrysocephalus*	336
Redfin shiner	*Lythrurus umbratilus*	10
Fathead minnow**	*Pimephales promelas*	1
Bluntnose minnow**	*Pimephales notatus*	161
Bigmouth shiner	*Notropis dorsalis*	17
Sand shiner	*Notropis ludibundus*	8
White sucker**	*Catostomus commersoni*	10
Yellow bullhead**	*Ameiurus natalis*	1
Blackstripe topminnow	*Fundulus notatus*	10
Largemouth bass	*Micropterus salmoides*	2
Green sunfish**	*Lepomis cyanellus*	4
Bluegill	*Lepomis macrochirus*	2
* Intolerant	**Total fish**	**781**
**Tolerant	**Total species**	**15**

Parameter	JB-1
Date Sampled	9/17/03
Water Temperature C^0/F^0	19.2 / 66.5
Conductivity (umhos/cm)	701
Flow Velocity - ft/sec	na
Average Depth (feet)	0.75
Station Length (feet)	325
Sampling Effort (minutes)	22
Stream Width (feet)	15
Sampling Efficiency (poor=0/best=27)	27
Gear Type, BE=boat ES= electric seine. PE=back-pack	PE
Data ID Number	11465

Jackson Branch Station JB-2

Station Location: Station was located south of Laraway Road in Jackson Heights sub-division, in the New Lenox Park District's Country View Park community park.

Riparian Corridor Characteristics: The south corridor was lawn with a stream edge of naturalized, grass, weeds and shrub vegetation. The north corridor was a narrow border of naturalized woody vegetation with a dense under-story. The streamside trees and shrubs provided approximately 10% of the channel with shade. A storm-water detention dry basin of approximately one surface acre area is situated in the portion of the park on the south side of the stream. The upper limit of the station was a riffle approximately 30 feet downstream of an outfall from the New Lenox Waste Water Treatment plant. Approximately 20 feet downstream of the riffle, a shallow, narrow, cool water, water cress choked, tributary joins Jackson Branch. The small size of the tributary did not warrant using a blocking net.

Channel Characteristics: The channel had an average width of approximately 15 feet and an average depth of one foot. Two pools were present, with a maximum depth of 2.5 feet. Substrate was composed of 50% mud and silt and 40% sand. A small amount of gravel (10% coverage) was present in two riffles that were located at the upper and lower end of the station.

Stream Habitat Features: Exposed submerged roots of streamside willows (Salix sp) were abundant, as was aquatic vegetation. Together these features provided habitat over 40% of the station length. Submerged aquatic vegetation, pondweed (Potamogeton sp), was abundant, and emergent aquatic vegetation was common. Emergent plants were represented by water cress (Nasturtium sp), arrowhead (Sagittaria sp), and smartweed (Polygonum sp).

Fish Sampling Results: The collection included 688 fishes representing 19 species. Fish species that are tolerant of degraded habitat or water quality represented over 31% (n=6) of all species collected at this station, reflecting the abundance of mud and sand as substrate. An IBI of 32 was calculated for JB-2, qualifying for a BSC rating of 'C'.

Additional Notes: The upper end of station was approximately 30 feet downstream of the New Lenox Waste Water Treatment Plant outfall.

Common name	Scientific name	Qty
Carp**	*Cyprinus carpio*	4
Creek chub**	*Semotilus atromaculatus*	25
Hornyhead chub*	*Nocomis biguttatus*	32
Central stoneroller	*Campostoma anomalum*	53
Striped shiner	*Luxilus chrysocephalus*	121
Bluntnose minnow**	*Pimephales notatus*	30
Bigmouth shiner	*Notropis dorsalis*	1
Sand shiner	*Notropis ludibundus*	2
White sucker**	*Catostomus commersoni*	40
Yellow bullhead**	*Ameiurus natalis*	201
Black bullhead	*Ameiurus melas*	1
Blackstripe topminnow	*Fundulus notatus*	15
Largemouth bass	*Micropterus salmoides*	14
Smallmouth bass*	*Micropterus dolomieu*	1
Green sunfish**	*Lepomis cyanellus*	49
Bluegill x Green sunfish hybrid	*Lepomis macrochirus x L. cyanellus*	1
Bluegill	*Lepomis macrochirus*	76
Longear sunfish	*Lepomis megalotis*	1
Orangespotted sunfish	*Lepomis humilis*	16
Johnny darter	*Etheostoma nigrum*	5
*Intolerant	**Total fish**	**688**
**Tolerant	**Total species**	**19**

Parameter	JB-2
Date Sampled	9/17/03
Water Temperature C^0/F^0	21.9 / 71.4
Conductivity (umhos/cm)	804
Flow Velocity - ft/sec	na
Average Depth (feet)	1.0
Station Length (feet)	300
Sampling Effort (minutes)	24
Stream Width (feet)	15
Sampling Efficiency (poor=0/best=27)	na
Gear Type, BE=boat ES= electric seine. PE=back-pack	PE
Data ID Number	11466
IEPA Station Code Number	na