

Region II Streams Office
5931 Fox River Drive
Plano, Illinois 60545

Biological Surveys of Big Rock Creek and Tributaries August, 2002 and July, 2003



March, 2004
Robert C. Rung and Stephen M. Pescitelli

Cover photo: Big Rock Creek at R.H. Klatt Park in Plano, Illinois.

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Executive Summary

During August 2002, fish population sampling was conducted at 14 stations within the Big Rock Creek watershed. Sampling was conducted on five mainstem stations and nine stations on four major tributaries, in three counties; Dekalb (n=2), Kane (n=8), and Kendall (n=4) Counties. A total of 15,395 fish representing 40 species were collected using electric seine and backpack electrofishing. Based on fish sampling results, all five main stem stations of Big Rock Creek, and three tributary stations, qualify for the highest Biological Stream Characterization (BSC) rating of "A" (Unique Aquatic Resource). The West Branch of Big Rock Creek had IBI scores of 49 ("B") and 52 ("A") at two sampling stations, which were very representative of conditions throughout the entire branch. Two stations on the East Branch of Big Rock Creek scored 48 and 49, both in the "B" range, described by BSC as a "Highly Valued Aquatic Resource". Welch Creek stations exhibited the highest variability in IBI scores ranging 37 ("C"), to 56 ("A").

Smallmouth bass was the most abundant sportfish, and were collected at all stations. Channel catfish were found only at the two stations downstream of a dam in Plano. One other dam is located on the mainstem of Big Rock Creek, approximately 1 mile upstream of the dam in Plano (Figure 1). A specimen of the State Endangered greater redhorse sucker (*Moxostoma valenciennesi*), one of Illinois' rarest fishes, was also collected downstream of the dams. Mottled sculpin (*Cottus bairdi*), a species associated with cool water streams with limited distribution in Illinois, was collected in the lower reaches of Big Rock and Little Rock Creeks.

Mussel sampling was conducted in July 2003, at the 14 fish sampling stations, resulting in the collection of 612 mussels, representing 12 species. Two State Threatened mussel species were collected during the survey: spike mussel (*Elliptio dilatata*) was collected at two stations, and the slippershell mussel (*Alasmidonta viridis*) was found at one station. The intolerant ellipse mussel (*Venustachoncha ellipsiformes*) was collected at six stations.

Region II, Illinois Eco Watch Office conducted a macroinvertebrate survey of Big Rock Creek and tributaries during July 2003. Sampling was conducted at 12 of the 14 fish stations. Eleven of the 12 stations rated good water quality, with a Macroinvertebrate Biotic Index (MBI) score less than 6. One station on the West Branch (WBR-2) scored 6.15. Based on MBI scores, water quality did not appear to be a limiting factor for Big Rock Creek biotic communities.

Introduction

A comprehensive watershed survey was conducted in Big Rock Creek during 2002 and 2003 in support of planning efforts by the Big Rock Creek Watershed Committee. Fish, mussel, and macroinvertebrate communities were sampled at 14 stations to establish baseline conditions for biological communities, aquatic habitat, and water quality in the Big Rock Creek Watershed.

Big Rock Creek, one of the largest tributaries to the Fox River, had been sampled on a limited scale by the Illinois Department of Natural Resources (IDNR) and the Illinois Environmental Protection Agency (IEPA) prior to this survey. Results of those earlier surveys indicated that Big Rock Creek supported a diverse fish community with good water quality and habitat (Sallee and Bergmann 1986). Recent flood events, combined with ongoing urban development within the watershed, have increased 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 Big Rock Creek Watershed Committee. The Partnership includes many watershed residents, and is

supported by the IDNR, Natural Resources Conservation Service (NRCS), Kane County Forest Preserve District, and Kendall County Forest Preserve District. Coordination is handled by a local not-for-profit group, The Conservation Foundation, who have designated a Watershed Coordinator.

Watershed Characteristics

Big Rock Creek watershed encompasses 124,160 acres/194 square miles (NRCS, 2002, Figure 1) extending into 12 Townships in three counties (DeKalb, Kane, and Kendall). Eight communities reside in the watershed: Elburn, Kaneville, Troxel, Hinckley, Big Rock, Little Rock, Sandwich, and Plano (Figure 1). Waste Water Treatment Plants (WWTP) in four communities discharge effluent into Big Rock Creek or tributary streams including: Little Rock Creek (Hinckley), Harvey Creek, a tributary to Little Rock Creek (Sandwich), Big Rock Creek (Plano), and Welch Creek (Elburn). Big Rock Creek also receives effluent from the Village of Big Rock.

The five headwater tributaries of Big Rock Creek originate in DeKalb and Kane Counties. Little Rock Creek originates south of the City of DeKalb and east of State Route 23 in DeKalb County. The West Branch of Big Rock Creek and Battle Creek both originate southeast of DeKalb and join to form the West Branch of Big Rock Creek (Figure 1). Young's Creek originates in Kane County, then meanders across the DeKalb/Kane County line before joining the East Branch of Big Rock Creek. The East Branch originates north of Interstate 88, then flows south through Lone Grove Forest Preserve enroute to its confluence with Young's Creek. Welch Creek originates on the west side of the Village of Elburn in Kane County and flows south past Kaneville, along Dauberman Road to its confluence with Big Rock Creek in Big Rock Forest Preserve near Jericho Road (Figure 1).

Low water temperature (62°F in August) in Big Rock Creek near Klatt Park, and in Little Rock Creek south of Griswold Springs Road indicates that ground water discharge (seeps and tiles) may be a major component of baseflow in the lower portions of the watershed. Baseflow in the upper reaches of the watershed was highly variable. However, actual flow data is not available due to the absence of stream flow gauging stations in the watershed.

Six public areas were identified within the Big Rock Creek Watershed (Figure 1). Three properties are owned by the Forest Preserve District of Kane County including: Lone Grove Preserve (East Branch Big Rock Creek at Perry Road); Big Rock Forest Preserve (Big Rock Creek/Welch Creek confluence on Jericho Road) and Deer Valley Golf Course (Big Rock Creek on Jericho Road). Three municipal parks include: Streamside Park on Little Rock Creek in the Village of Hinckley, Richard H. Klatt Park on Big Rock Creek in the Village of Plano and a new Park in Sandwich on Harvey Creek.

The watershed landscape is principally agricultural and low density residential. Nearly all the headwater reaches are in agricultural areas, and are channelized or ditched. The lower portions of many of the tributaries exhibited various levels of recovery from previous channelization. Two areas on the mainstem, at Big Rock Forest Preserve and at Plano Waste Water treatment plant have also been channelized. Five stream corridor pastures areas were observed in the watershed, where it appeared that the streambanks and streambed have been substantially impacted by livestock. Big Rock Creek and its tributaries have channel gradients ranging from 5.2 ft/mile to 16.7 ft/mile, representing moderate to high slopes compared to most Illinois' streams.

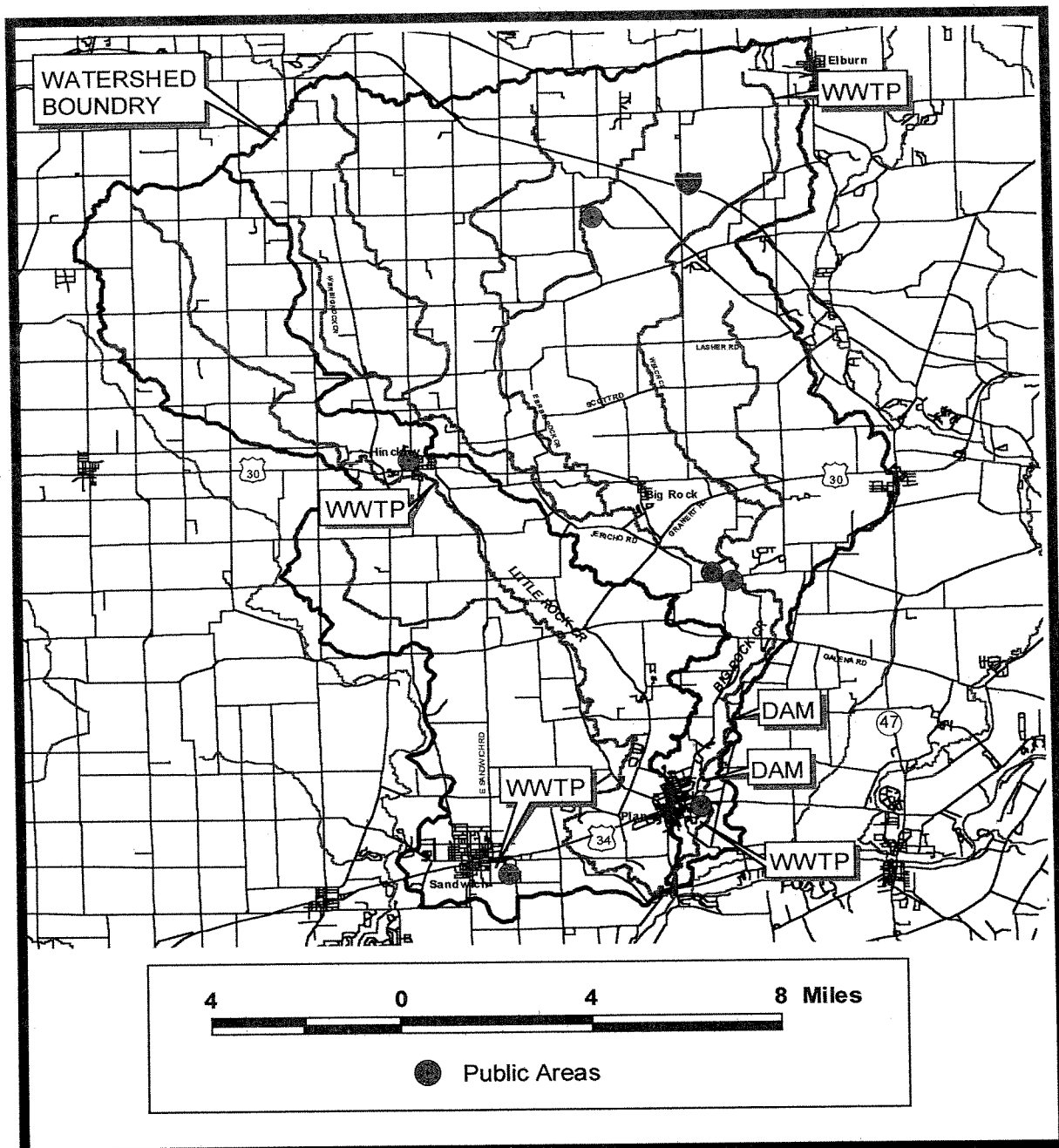


Figure 1. Big Rock Creek Watershed showing dams, wastewater treatment plants (WWTP), and public areas.

Two dams were identified on the mainstem of Big Rock Creek (Figure 1). The downstream structure is approximately one mile north of U.S. Route 34. The second dam is located approximately two miles north of U.S. Route 34. The lower dam provides water to a historic mill race, which together with a stone power house are part of Plano's Klatt Park. The upper dam provides water to two off-stream ponds. These two dams are the only structures known to block fish movement in the Big Rock Creek system.

Methods

Fish population sampling was conducted at fourteen stations between August 12 and August 22, 2002. Five stations were located on the mainstem of Big Rock Creek, with nine stations on major tributaries (Figure 2). Stations were selected following extensive field reconnaissance, and represent the full range of habitat types available for Big Rock Creek and its principal tributaries. The primary sampling method (13 of 14 stations) was electric seine, a 9-meter (30 ft.) electrified cable powered by a single-phase, 1600 watt AC generator (Bayley et al. 1989). The upstream and downstream limits of each electric seine station were blocked by nets to prevent fish escapement and/or entry into the station during sampling. A back-pack mounted 110 volt generator powered electro-fishing unit was utilized to sample the narrow, shallow station on the East Branch Big Rock Creek (EBR-2). Sampling times and station lengths (see Appendix B) varied based on complexity of the habitat and channel characteristics. Electro-fishing stations on Big Rock Creek mainstem (n=5) were an average of 772 feet in length, with an average sampling time of 48 minutes. Tributary stations (n=9) averaged 564 feet in length with an average electro-fishing time of 40 minutes. 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 each species at each station. Smaller individuals were preserved and identified in the laboratory.

An Index of Biotic Integrity (IBI; Smogor, 2000) value was calculated using fish data for each station in the 2002 survey (Table 4, also refer to Appendix A). The IBI is a widely-used stream quality measurement based upon the fish community, taking into account the number 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. Total IBI scores range from 0-60, with higher scores indicating better quality. The IBI is also 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.

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
IBI----->	51 - 60	41 - 50	31 - 40	21 - 30	≤ 20

Mussel sampling was conducted on July 21 and 22, 2003, at each the 2002 fish sampling

stations (Figure 2). Prior to sampling, a protocol/methods class was conducted by IDNR biologist, Robert Szafoni. Sampling was conducted by IDNR biologists, Shedd Aquarium staff, Natural Resource Conservation Service (NRCS) personnel, Kane County Government personnel, and numerous volunteers. There were 29 participants for the July 21 class and sampling, and 24 participants for the July, 22 sampling. Volunteers were divided into three groups, each having responsibility for assigned stations. Sampling was conducted by hand grabbing, and/or by visual observation in shallow water (Szafoni, 2002). Each station was sampled for four man-hours (four hours divided by the number of samplers). Mussels were collected and placed into mesh sampling bags. After sampling was completed, mussels were identified to species, counted, aged and placed back in the stream. Voucher specimens (typically shells of dead mussels) were retained for each species at each location.

A Mussel Classification Index (MCI; Szafoni, 2002) was calculated for each station. The MCI compares the mussel community at each location with results from State-wide collections to determine relative quality. Although the index has not been correlated to actual stream disturbance/quality level, higher scores are generally indicative of higher quality stream conditions, with a positive correlation between MCI and IBI scores (Szafoni, 2004). The MCI is calculated as the sum of four factors: species richness, intolerant species, abundance, and reproductive success. Each factor has a minimum value of 1, and a maximum value of 5. The MCI value rates the statewide significance of the station's mussel assemblage, and assigns resource value descriptors to each range of values (Table 2, Szafoni, 2002).

Table 2. Mussel Classification Index (MCI) Values

MCI	Mussel Resource Value	Approximate Description of Mussel Resource Value
4	Restricted	No live mussels present; only weathered dead, sub-fossil, or no shell material found.
5 - 7	Limited	Low species richness and/or abundance. May be recoverable or recovering with improved conditions.
8 - 11	Moderate	Species richness and/or abundance typical for stream of given location and order. May be a resource of local significance or recovering from degradation.
12 - 15	Highly Valued	High species richness and/or abundance; rare species present; evidence of recent recruitment likely.
16 +	Unique	Very high species richness and/or abundance; listed species present; evidence of recruitment common.

Macroinvertebrate sampling was organized and coordinated by the IDNR's Region II River Watch Office of Illinois Eco-Watch. Sampling was performed by volunteer residents and landowners in the Big Rock Watershed, and others. Sampling was conducted at 12 of the 14 fish and mussel sites from June 9, 2003 through June 30, 2003. River Watch personnel utilized survey results to calculate a Macroinvertebrate Biotic Index (MBI, Hite and Bertrand, 1989) for each location. The MBI is an index for evaluating water quality based on the tolerance of invertebrate taxa to pollution. MBI values range from 0-12, with lower scores indicating better water quality: ≤ 6.0 good water quality,

6.1 - 7.5 fair water quality, 7.6 - 8.9 poor water quality, and ≥ 9.0 very poor water quality.

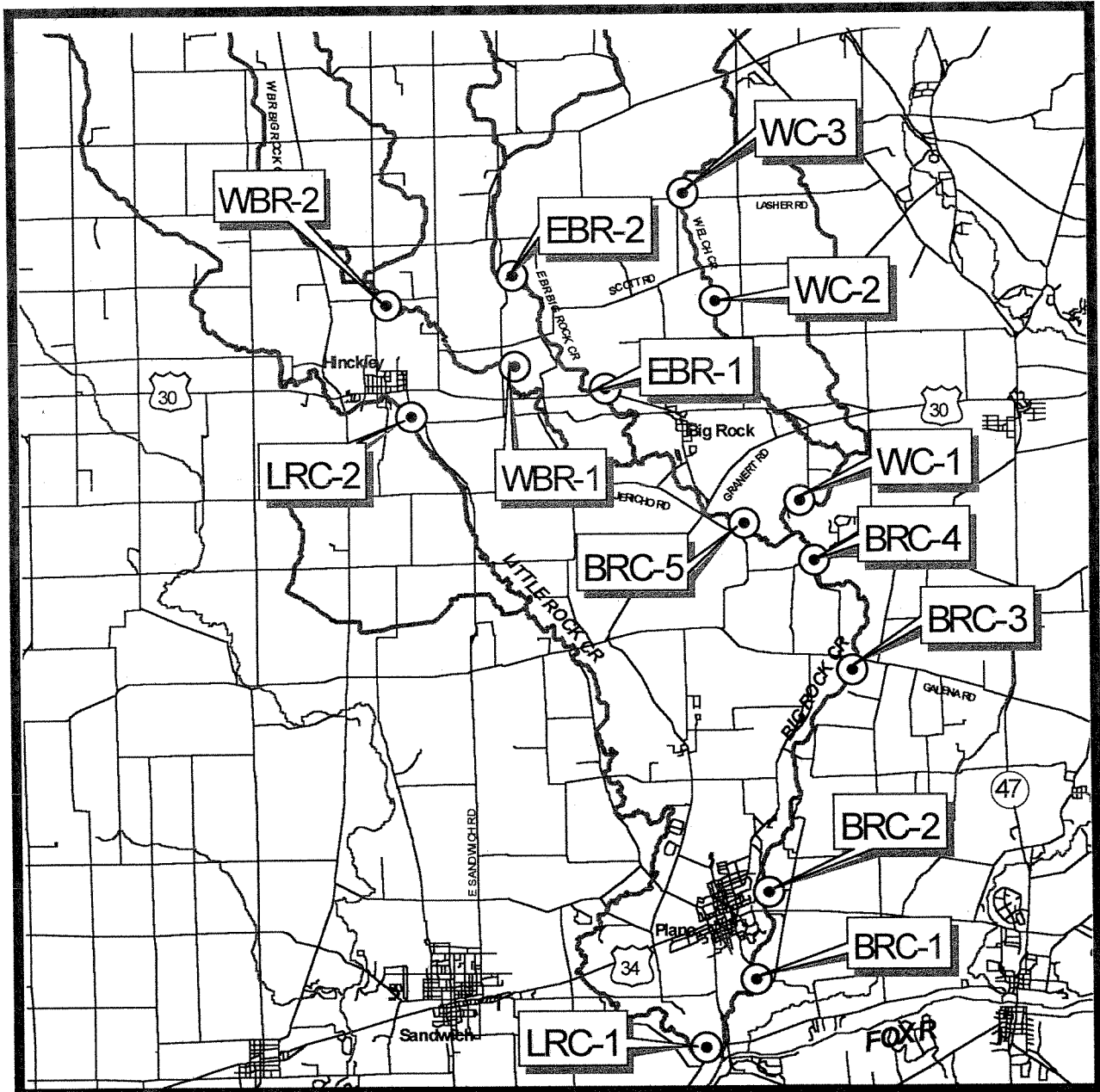


Figure 2. Big Rock Creek Watershed sampling stations for the 2002, 2003 surveys. BRC = Big Rock Creek, WC = Welch Creek, EBR = East Branch, WBR = West Branch, LRC = Little Rock Creek.

Results and Discussion

Fish population sampling resulted in the collection 15,395 individuals representing 40 species (Table 3). Fish intolerant of siltation and other types of degradation (Smogor, 2000) represented 16.5% (n=2,550) of the total abundance, and 22.5% (n=9) of all species collected. One State Endangered greater redhorse sucker (*Moxostoma valenciennesi*) was collected at BRC-2, in Plano. The adult specimen was 25.2 inches in length (641 mm) and 6.2 pounds (2824 g) in weight, and was returned to the stream in good condition. The single individual was found downstream of the dam in Plano (Figure 1), suggesting this species may be excluded from using the upper reaches of Big Rock Creek.

Another species of interest found during the survey was mottled sculpin (*Cottus bairdi*), an intolerant, cool water species, with a very limited distribution in Illinois outside of the Fox River Basin (Smith, 1979). Mottled sculpin were found only in the lowest reaches of both Big Rock and Little Rock Creeks where they were relatively abundant (Table 3). The presence of this species suggests significant input of high quality, low temperature ground water.

Stream quality based on the Index of Biotic Integrity (IBI) was very high throughout most of the watershed. All five mainstem stations on Big Rock Creek had IBI values greater than 52, with three stations scoring 57 or above (Table 4), on a scale of 0-60. The fish communities of Big Rock Creek mainstem indicate good habitat and water quality, with all locations rating in the "A" range, the highest category possible, designated as a "Unique Aquatic Resource" (BSC, Bertrand et al, 1996).

Big Rock Creek tributary stations also rated very well, with IBIs at three of the nine tributary stations qualifying for a rating of 'A'. However, scores were generally lower with a wider range (37 to 56) compared to mainstem stations (Table 4). The West Branch of Big Rock Creek had IBI scores of 49 ("B") and 52 ("A") at two sampling stations (Table 4), which were very representative of conditions throughout the entire branch. Two stations on the East Branch of Big Rock Creek scored 48 and 49, both in the "B" range, described by BSC as a "Highly Valued Aquatic Resource". The two East Branch stations were also typical of conditions throughout the entire branch. In contrast, Welch Creek had a more diverse channel morphometry (from wide/shallow, to incised and narrow/deep, to riffle/pool) but less diverse substrate composition composed predominantly of sand. Three stations were selected to represent the range of conditions present. As expected, Welch Creek exhibited the highest variability in IBI scores, ranging 37, to 56 (Table 4), the lowest and highest IBI values for all tributary stations. The individual IBI metric scoring for all survey stations is available in Appendix A.

Little Rock Creek is functionally a separate stream system, joining Big Rock Creek within approximately 500 feet of the confluence with the Fox River. Two stations were sampled on Little Rock Creek during the 2002 survey. The lower station (LRC-1), approximately 3/4 mile north of the Fox River (Figure 2), scored an IBI of 53 with a BSC rating of 'A' (Table 4). The upper station (LRC-2), in the Village of Hinckley (Figure 2) was in the "B" range, with an IBI of 45 (Table 4). The middle reach of Little Rock Creek was not included in the 2002 fish survey due to an extensive fish kill which occurred in 1998, stretching from Galena Road downstream to Plano (Figure 1). Observations made during 1998 and 1999 in this segment indicate relatively diverse habitat, with minimal modification of the stream channel. The presence of good habitat, high quality fish communities upstream and downstream of the kill zone (based on 2002 survey), and lack of

Table 3. Fish sampling results by station for 2002 Big Rock Creek Watershed survey.

COMMON NAME	SCIENTIFIC NAME	Little Rock Creek		West Branch Big Rock Creek		East Branch Big Rock Creek		Welch Creek			Big Rock Creek (main stem)					total
		LRC-1	LRC-2	WBR-1	WBR-2	EBR-1	EBR-2	WC-1	WC-2	WC-3	BRC-1	BRC-2	BRC-3	BRC-4	BRC-5	
Gizzard shad	Dorosoma cepedianum	0	0	0	0	0	0	2	0	27	0	0	0	0	1	30
Carp	Cyprinus carpio	3	4	0	10	0	0	0	6	15	4	8	0	0	2	53
Southern redbelly dace	Prooxinus erythrogaster	0	4	0	0	0	1	0	26	243	0	0	0	0	0	274
Creek chub	Semotilus atromaculatus	12	87	32	28	54	78	11	28	24	0	0	5	5	24	388
Hornhead chub	Nocomis biguttatus	67	220	103	84	47	45	71	73	110	3	8	19	58	55	863
Central stoneroller	Camposoma anomalum	244	198	18	127	241	166	72	55	126	114	400	33	136	779	2709
Largescale stoneroller	Camposoma oligolepis	69	1	0	0	3	0	14	1	0	57	262	101	173	357	1038
Suckermouth minnow	Phenacobius mirabilis	4	1	0	0	0	0	0	2	0	1	0	0	1	1	10
Blacknose dace	Rhinichthys atratulus	0	20	1	0	0	3	0	94	312	6	19	0	3	0	483
Striped shiner	Luxilus chrysocephalus	3	149	34	23	9	12	3	35	95	0	1	2	2	2	371
Common shiner	Luxilus cornutus	7	683	16	77	48	65	9	102	321	0	1	5	23	12	1369
Redfin shiner	Lythrurus umbratilis	0	23	4	16	4	0	0	0	0	0	0	0	8	0	55
Spotfin shiner	Cyprinella spiloptera	48	14	0	10	8	0	15	0	0	18	32	16	41	72	274
Fathead minnow	Pimephales promelas	2	0	0	0	0	0	0	0	0	0	1	0	0	1	4
Bluntnose minnow	Pimephales notatus	213	828	56	77	267	69	33	63	492	24	44	30	30	508	2905
Rosyface shiner	Notropis rubellus	30	5	6	7	10	0	7	4	0	4	30	36	21	6	165
Bigmouth shiner	Notropis dorsalis	39	250	4	3	0	20	2	4	40	13	3	0	8	3	389
Sand shiner	Notropis ludibundus	340	242	24	37	42	14	115	11	17	41	37	43	251	158	1372
Quillback	Carpiodes cyprinus	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
White sucker	Catostomus commersoni	12	136	15	21	50	14	8	29	26	5	49	3	9	0	377
Northern hog sucker	Hypentelium nigricans	20	4	3	1	12	0	5	0	0	13	25	23	53	64	223
Greater hogsucker ***	Moxostoma valenciennesi	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Shorthead redhorse	Moxostoma macrolepidotum	5	0	0	0	0	0	0	0	0	1	1	1	4	0	12
Black redhorse	Moxostoma duquesnei	0	0	0	0	0	0	0	0	0	0	9	7	18	24	58
Golden redhorse	Moxostoma erythrurum	1	3	2	6	4	0	7	2	3	0	4	13	57	8	110
Channel catfish	Ictalurus punctatus	1	0	0	0	0	0	0	0	0	8	2	0	0	0	11
Yellow bullhead	Ameiurus natalis	1	48	6	2	5	0	5	6	5	0	0	3	1	34	116
Stoneroll	Noturus flavus	1	3	5	0	6	0	15	1	0	4	7	1	3	36	81
Slender madtom	Noturus exilis	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Mottled sculpin	Cottus bairdi	19	0	0	0	0	0	0	0	0	17	140	0	0	0	176
Black crappie	Pomoxis nigromaculatus	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4
Rock bass	Ambloplites rupestris	0	0	16	27	8	5	0	0	0	0	0	10	1	4	71
Largemouth bass	Micropterus salmoides	2	0	0	0	0	0	1	0	0	0	0	2	2	16	23
Smallmouth bass	Micropterus dolomieu	45	2	39	10	36	17	20	2	1	11	18	12	20	150	383
Green sunfish	Lepomis cyanellus	2	7	0	1	1	1	7	1	1	0	0	0	7	9	38
Bluegill	Lepomis macrochirus	2	1	2	3	52	12	1	5	0	3	2	8	8	8	189
Johnny darter	Etheostoma nigrum	9	55	23	26	8	14	6	2	17	6	3	1	3	3	184
Banded darter	Etheostoma zonale	29	0	2	0	11	0	16	0	0	19	43	27	28	132	307
Orangethroat darter	Etheostoma spectabile	0	15	7	5	18	49	12	0	0	0	0	1	0	8	115
Fanail darter	Etheostoma flabellare	0	14	37	1	7	13	2	0	0	1	1	0	0	4	80
total no. species		1230	3017	457	603	961	598	463	552	1876	373	1151	409	1143	2572	15395
total no. species		28	27	24	24	24	18	26	22	18	22	27	26	30	31	40

***State Endangered

Table 4. Summary of sampling results and biological index rating for Big Rock Creek Watershed surveys, August, 2002 and July, 2003

STATION LOCATION			FISH				MUSSELS				MACRO INVERTEBRATES			
County	Stream Name	Station #	# fish	# spp	IBI ¹	BSC ²	# mussels	# spp	MC ³	MKV ⁴	#Insects	# taxa	MBI ⁵	Water Quality ⁶
Kendall	Big Rock Creek	BRC-1	373	22	52	A	2	2	5	L	123	8	5.67	GOOD
Kendall	Big Rock Creek	BRC-2	1,151	27	57	A	0	0	4	R	74	10	5.46	GOOD
Kendall	Big Rock Creek	BRC-3	409	26	58	A	2	1	6	L	86	8	5.56	GOOD
Kane	Big Rock Creek	BRC-4	1,143	30	59	A	32	8	14	HV	-	-	-	-
Kane	Big Rock Creek	BRC-4.5	-	-	-	-	83	6	13	HV	-	-	-	-
Kane	Big Rock Creek	BRC-5	2,573	31	54	A	18	4	8	M	215	18	5.94	GOOD
Kane	W. Br. Big Rock	WBR-1	457	24	52	A	155	6	13	HV	21	11	4.9	GOOD
Dekalb	W. Br. Big Rock	WBR-2	603	24	49	B	109	8	15	HV	129	12	6.15	FAIR
Kane	E. Br. Big Rock	EBR-1	951	24	49	B	1	1	5	L	-	-	-	-
Kane	E. Br. Big Rock	EBR-2	598	17	48	B	0	0	4	R	126	12	5.43	GOOD
Kane	Welch Creek	WC-1	463	26	56	A	37	9	14	HV	132	13	5.19	GOOD
Kane	Welch Creek	WC-2	552	22	44	B	29	2	8	M	202	15	5.73	GOOD
Kane	Welch Creek	WC-3	1,876	18	37	C	137	3	12	HV	100	8	5.88	GOOD
Kendall	Little Rock Cr	LRC-1	1,230	28	53	A	7	3	9	M	39	11	5.08	GOOD
Dekalb	Little Rock Cr	LRC-2	3,017	27	45	B	0	0	4	R	145	12	5.43	GOOD

1. Index of Biotic Integrity (IBI) (Smogor, 2000)
2. Biological Stream Characterization (BSC)(Bertrand, 1996)
3. Mussel Classification Index (MCI) value (Szafoni, 2002)
4. Mussel Resource Value rating (U= unique; HV=highly valued; M= moderate value; L=limited value; R=restricted value) (Szafoni, 2002)
5. Macro Invertebrate Index (MBI) (Hite and Bertrand, 1989)
6. Water Quality Rating: MBI values ≤ 6 = good water quality; 6.0-7.5 = fair water quality; 7.6-8.9 = poor water quality; ≥ 9 = very poor water quality

migration barriers, suggest good potential for long-term recovery in the middle segment of Little Rock Creek.

Table 5. Big Rock Creek Sportfish Collection - August, 2002.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Total Number Collected</u>
Smallmouth Bass	<i>Micropterus dolomieu</i>	383
Bluegill Sunfish	<i>Lepomis macrochirus</i>	189
Rock Bass	<i>Ambloplites rupestris</i>	71
Largemouth Bass	<i>Micropterus salmoides</i>	23
Channel Catfish	<i>Ictalurus punctatus</i>	11
Black Crappie	<i>Pomoxis nigromaculatus</i>	4
	TOTAL	681

Sportfish comprised 4.4% of all fish collected and were represented by six species (Table 5). Smallmouth bass (*Micropterus dolomieu*) was the most abundant sport species (n=383), representing 56.2% of all sportfish and 2.5% of all fish collected, and appearing at all sampling stations (Table 3). Sample size ranged from one smallmouth bass at station WC-3 to 150 at station BRC-5 (Table 3). The largest smallmouth bass were collected at Stations BRC-4 and BRC-5, 15.9 inches in length (404mm) and 2.1 pounds (952g), and 15.9 inches in length (403mm) and 2.28 pounds (1034g), respectively. Smallmouth bass spawning success was indicated by the abundance of fingerling bass (n=293) less than four inches in length (Figure 3). Fingerling smallmouth bass were collected at each of the 14 sample stations, and represented 76.5% of all smallmouth bass collected. The two dams near Plano may preclude migration of Fox River smallmouth bass into Big Rock Creek, therefore, reproduction is primarily from resident adults. Lack of cross-breeding with Fox River smallmouth bass may potentially reduce the long-term genetic diversity of smallmouth bass populations in Big Rock Creek.

Bluegill (*Lepomis macrochirus*, n=189) and largemouth bass (*Micropterus salmoides*, n=23) were present throughout most locations in the watershed (Table 3). These species are adapted to lower gradient streams, ponds, and lakes. The small maximum size of the bluegill (5.6 inches) and largemouth bass (9.5 inches), and the predominance of juveniles suggests that these species are not highly successful in the higher gradient conditions present in Big Rock Creek. Displacement from ponds in the watershed may be the primary source of recruitment for these species, rather than reproduction from a resident creek population.

Rock bass (*Ambloplites rupestris*) comprised 10.4% (n=71) of all sportfish in the survey (Table 5) and were widespread in the Big Rock Creek watershed, with the exception of Welch Creek (Table 3). Nearly 79% of all rock bass (n=56) were found in Big Rock tributaries. However, the largest individuals, ranging up to 7.3 inches, were collected at mainstem stations, especially BRC-3 (n=10; ave length = 6.4 inches). Rock bass distribution has diminished in many of the more urbanized stream systems in the Chicago Region. For example, this species is uncommon or absent in the upper DuPage River, Blackberry Creek, and the Fox River mainstem and tributaries upstream of Yorkville (FAS, 2003).

Channel Catfish (*Ictalurus punctatus*) were represented in the 2002 Big Rock Creek survey by eleven individuals ranging in size from 11 to 26 inches (282-660 mm) with an average length of

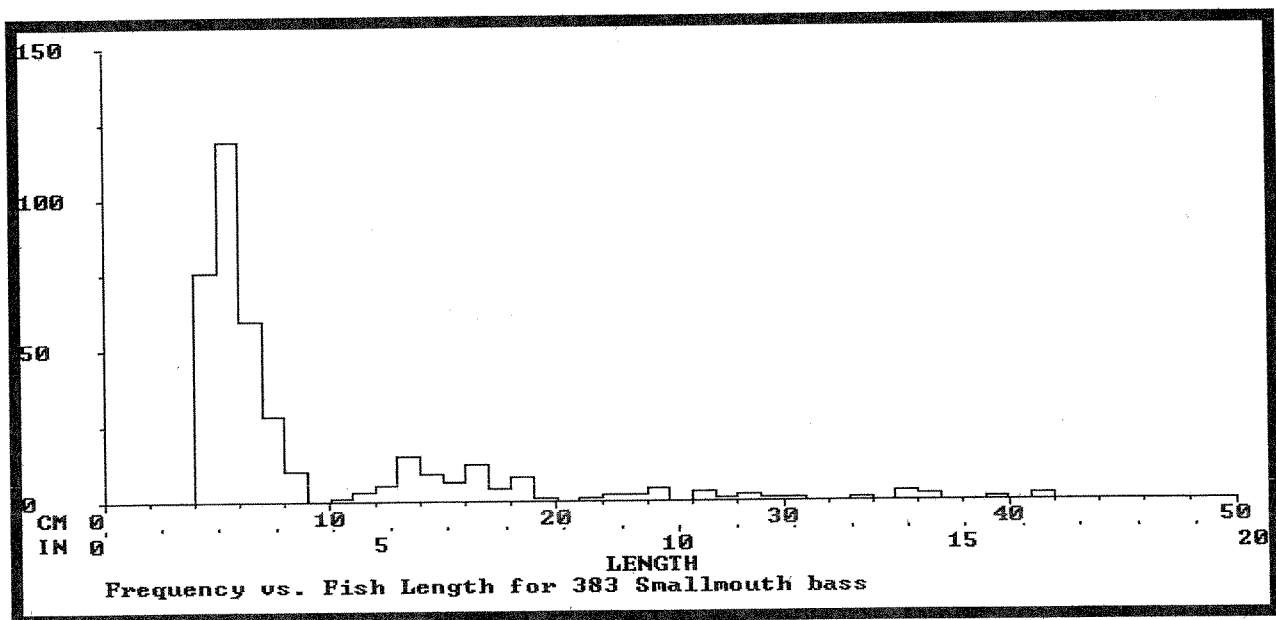


Figure 3. Size distribution for smallmouth bass for the 2002 Big Rock Creek Survey, all stations combined.

16.1 inches (408.6mm). Body condition was generally good, with weights within the range expected, and averaging 1.72 pounds (779.8g). All channel catfish were collected from two stations downstream of the two dams (Table 3), and appear to be excluded from accessing approximately 68 miles of stream habitat above the dams.

Macroinvertebrate surveys of Big Rock Creek and tributaries were conducted at 12 of the 14 stations from June 9, 2003 through June 30, 2003. Eleven of the 12 stations rated good water quality, with a Macroinvertebrate Biotic Index (MBI) score less than 6 (Table 4). The one exception (WBR-2) was within 0.15 point (in a 12 point system) of attaining a good water quality rating. Based on MBI scores, water quality did not appear to be a limiting factor for Big Rock Creeks biotic communities.

Mussel sampling at 15 stations resulted in the collection of 612 individuals representing 12 species (Table 6). The ellipse mussel (*Venustaconcha ellopsiformes*) which is considered rare, and intolerant in Illinois (Szafoni, 2002), was collected at six stations in the Big Rock Creek watershed (Table 6). Two State Threatened species were also collected in 2003, spike mussel (*Elliptio dilatata*) and slippershell mussel (*Alasmidonta viridis*). A total of 4 spike mussels were collected at two stations (WC-1, BRC-4), and one slippershell mussel was collected at WBR-2 (Table 6). Big Rock Creek mainstem station BRC-4 yielded three live spike mussels in 2003, and five live specimens in 1998, using comparable effort (Schanzle, 2003). Within the Fox River Basin, spike mussel has only been collected in three tributary streams: Big Rock Creek, Little Indian Creek (n=1), and Ferson Creek (n=2), and is declining in abundance statewide (Schanzle, 2003). A mussel survey of the Fox River during 1957-58 yielded 11 spike mussel from four stations, but only one spike mussel has been collected in the Fox River since 1997 (Schanzle, 2003). These three tributary populations of spike mussels may represent a primary stock source for the Fox River watershed.

Overall, mussel distribution was somewhat sporadic throughout the Big Rock Creek Watershed (Table 6), with some stations having very few species and low abundance. The Mussel Resource Value index (Szafoni 2002) ranged from Highly Valued to Restricted, with no stations rating as Unique (Table 4). Expansion and improvement of mussel populations depends primarily on transportation by fish. Larval mussels, known as glochidia, attach to the gills and fins of fish for distribution. Restoration of mussel populations can therefore be affected by fish migration barriers such as the dams currently present on the mainstem of Big Rock Creek. These dams will also affect the mussel community's ability to recover from catastrophic events such as drought, floods, and fish kills.

References

- Bayley, R.R., R.W. Larimore and D.C. Dowling. 1989. Electric seine as a fish sampling gear in streams. *Transactions of the American Fisheries Society* 118:447-453
- Bertrand, W.A., R.L. Hite and D.M. Day. 1996. Biological Stream Characterization (BSC): Biological Assessment of Illinois Stream Quality through 1993. Illinois Environmental Protection Agency. IEPA/BOW/96-058. Springfield Illinois.
- Hite, R.L. and Bertrand, W.A. 1989. Biological Stream Characterization (BSC): A Biological Assessment of Illinois Stream Quality. Illinois Environmental Protection Agency. IEPA/WPC/89-275. Springfield Illinois.
- Sallee, D.R. and Bergmann, H.W. 1986. 1982 Fox River Basin Fisheries Assessment. Illinois Department of Conservation. 200-10-86
- Schanzle et al. 2003. The Freshwater Mussels (Bivalvia: Unionidae) of the Fox River Basin, Illinois and Wisconsin. Illinois Department of Natural Resources and John G. Shedd Aquarium..
- Smogor, R. 2002. Draft Manual for Calculating Index of Biotic Integrity Scores for Streams in Illinois. Illinois Environmental Protection Agency, Bureau of Water, Springfield Illinois.
- Smith, P. W. 1979. The Fishes of Illinois. Univ of Illinois Press. ISBN 0-252-07084-4
- Szafoni, R. 2002. Protocol for Surveying Freshwater Mussels in Wadable Streams and Wadable Portions of Large Rivers. Illinois Department of Natural Resources. Charleston Illinois
- Szafoni, R. 2004. A mussel quality index for Illinois Streams. Abstract. 42nd Annual Meeting of the Illinois Fisheries Society. March 2004, Champaign, Illinois.

Table 6. Big Rock Creek Watershed mussel population survey, July 2003

COMMON NAME	SCIENTIFIC NAME	Little Rock Creek		West Branch Big Rock Creek		East Branch Big Rock Creek		Welch Creek			Big Rock Creek (main stem)						total
		LRC-1	LRC-2	WBR-1	WBR-2	EBR-1	EBR-2	WC-1	WC-2	WC-3	BRC-1	BRC-2	BRC-3	BRC-4	BRC-4.5	BRC-5	
Elkoe	Alasmidonta marginata	0	0	0	0	0	0	7	0	0	0	0	0	8	6	3	24
Slippershell**	Alasmidonta viridis	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Cylindrical papershell	Anodonta imbecilis	1	0	10	55	1	0	1	3	0	0	0	0	1	1	0	73
Spike**	Elliptio dilatata	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	4
Plain pocketbook	Lampsilis cardium	5	0	36	3	0	0	4	0	0	0	0	2	13	27	13	103
Fatmucket	Lampsilis silvatica	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
White heelsplitter	Lasmigona complanata	0	0	15	13	0	0	14	0	1	1	0	0	2	43	0	89
Creek heelsplitter	Lasmigona compressa	0	0	6	27	0	0	1	26	135	0	0	0	1	3	1	200
Giant floater	Pyganodon grandis	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Creeping	Strophitus undulatus	0	0	1	5	0	0	6	0	0	0	0	0	1	0	0	13
Lilliput	Toxolasma parvus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2
Ellipse	Venusstacoma ellipsiformes	0	0	87	4	0	0	2	0	1	0	0	0	3	3	0	100
total no. species		7	0	155	109	1	0	37	29	137	2	0	2	32	83	18	612
total no. species		3	0	6	8	1	0	9	2	3	2	0	1	8	6	4	12

** State Threatened Species

NOTE: Station BRC-4.5 is an area located between stations BRC-4 and BRC-5 that was sampled as part of a training session for people involved in the survey.

TABLE 7. Big Rock Creek Biological Sampling Station Locations

Station #	Stream Name	Station Location	T. R. Sec	Latitude (N)	Longitude (W)	County
BRC-1	Big Rock Creek	South side of Plano, approx 1000' downstream of Hale Road	T.37N R.6E SE 27	41° 38' 49.99"	88° 31' 38.18"	Kendall
BRC-2	Big Rock Creek	R.H. Klat Park, Village of Plano. Upstream of the Main Street bridge.	T.37N R.6E SW 23	41° 39' 59.0"	88° 31' 26.0"	Kendall
BRC-3	Big Rock Creek	LaSalle Manor property, approx 500' downstream of Galena Road	T.37N R.6E SE 1	41° 38' 38.36"	88° 29' 45.33"	Kendall
BRC-4	Big Rock Creek	Big Rock Forest Preserve, approx 1000' upstream of Jericho Road bridge.	T.38N R.6E SE 26	41° 44' 15.9"	88° 30' 36.79"	Kane
BRC-5	Big Rock Creek	Deer Valley Golf Course upstream through Marvel Davis property. West of Big Rock FP, north of Jericho Road.	T.38N R.6E SW 26/SE 27	41° 44' 21.61"	88° 31' 35.4"	Kane
WBR-1	W. Br. Big Rock	2 mile east of Hinckley, 1/4 mile north of Rt. 30 on County Line Road, east side of road. FN 9634	T.38N R.6E W 18	41° 46' 16"	88° 36' 03"	Kane
WBR-2	W. Br. Big Rock	2 mile north of Village of Hinckley, east of Hinckley Rd, south side of Phillips Road.	T.38N R.5E NW 11	41° 47' 11"	88° 38' 22"	Dekalb
EBR-1	E. Br. Big Rock	East side of Crossroad Youth Center property, west of Village of Big Rock, north side of Route 30.	T.38N R.6E SE 17	41° 46' 08"	88° 34' 19"	Kane
EBR-2	E. Br. Big Rock	East of Hinckley, 1.5 mile north of Route 30 on County Line Rd, East side of County Line Rd. FN 10828	T.38N R.6E NW 7	41° 47' 33"	88° 35' 53"	Kane
WC-1	Welch Creek	at main campus of Camp Dean, at south end of Camp Dean Road, north of Big Rock Forest Preserve	T.38N R.6E E 26	41° 44' 38"	88° 30' 57"	Kane
WC-2	Welch Creek	Approx 4 mile north of Village of Big Rock, 1 mile west of Dauberman Rd, S side of Scott Rd 47W461 Scott Rd.	T.38N R.6E N 10	41° 47' 24"	88° 32' 19"	Kane
WC-3	Welch Creek	Approx 6 mile north of Village of Big Rock, north side of intersection of Florence Rd and Lasher Rd.	T.39N R.6E SW 34	41° 48' 27"	88° 32' 47"	Kane
LRC-1	Little Rock Cr	Approx 2 mile SSW of Plano, east side of Burr Oak Road	T.37N R.6E SE 33	41° 38' 3.79"	88° 32' 49"	Kendall
LRC-2	Little Rock Cr	South side of Hinckley, downstrm of WWTP. West side of East Sandwich Road.	T.38N R.5E SW 14	41° 45' 55"	88° 37' 52"	Dekalb

* Illinois Stream Information System (ISIS) generated lat/long

Appendix A. BIG ROCK CREEK and TRIBUTARIES FISH POPULATION SURVEY - AUGUST, 2002

Individual Station Metric Scores for determination of Index of Biotic Integrity (IBI) Score and Biological Stream Characterization (BSC) Rating

Station Code>> Sample Date>>	BRC-1 8/2002 # or % Score	BRC-2 8/2002 # or % Score	BRC-3 8/2002 # or % Score	BRC-4 8/2002 # or % Score	BRC-5 8/2002 # or % Score	LRC-1 8/2002 # or % Score	LRC-2 8/2002 # or % Score
Number of native fish species	21	26	26	29	31	27	26
Number of native sucker species	3	6	5	5	5	4	3
Number of native sunfish species	2	2	6	6	6	4	3
Number of native intolerant species	6	8	6	6	6	6	5
Number of native minnow species	10	12	10	14	13	13	15
Number native benthic invertivore spp	6	6	5	6	6	6	5
% specialist benthic invertivores	15	20	18	14	7	7	3
% generalist feeders	33	17	30	49	36	56	83
% coarse substrate spawners	56	68	64	51	57	40	44
% tolerant species	9	9	12	19	23	20	37
IBI Score*	52	57	58	59	55	53	45
BSC Rating**	A	A	A	A	A	A	B

Station Code>> Sample Date>>	WBR-1 8/2002 # or % Score	WBR-2 8/2002 # or % Score	EBR-1 8/2002 # or % Score	EBR-2 8/2002 # or % Score	WC-1 8/2002 # or % Score	WC-2 8/2002 # or % Score	WC-3 8/2002 # or % Score
Number of native fish species	24	23	24	17	26	21	17
Number of native sucker species	3	3	3	1	3	2	2
Number of native sunfish species	3	4	4	4	4	3	2
Number of native intolerant species	6	4	5	3	5	4	3
Number of native minnow species	11	12	11	9	12	13	10
Number native benthic invertivore spp	7	4	6	3	6	2	2
% specialist benthic invertivores	17	5	6	13	10	1	1
% generalist feeders	42	6	6	48	46	74	86
% coarse substrate spawners	54	51	57	61	48	72	65
% tolerant species	24	23	40	27	14	24	30
IBI Score*	52	49	49	48	56	44	37
BSC Rating**	A	B	B	B	A	B	C

* Index of Biotic Integrity (IBI, Smogor, 2002)

** Biological Stream Classification (BSC, Bertrand, 1996)

APPENDIX B: Station Accounts

The following is a description of sampling results for the survey for each individual station, grouped by mainstem and major tributaries. A total of nine stations on four tributaries, and five stations on the mainstem of Big Rock Creek are discussed.

Mainstem of Big Rock Creek

The mainstem of Big Rock Creek originates at the confluence of the East and West Branches of Big Rock Creek, approximately 3/4 mile west of Price Road near the Village of Big Rock in Kane County. As Big Rock Creek flows south, it is joined by Welch Creek just north of Jericho Road, and by Little Rock Creek approximately 500 feet north of the confluence with the Fox River in Kendall County. Five fish sampling stations and six mussel sampling stations were distributed along the mainstem (Figure B1).

Table B1. Big Rock Creek Mainstem Station Characteristics

Parameter	BRC-1	BRC-2	BRC-3	BRC-4	BRC-5
Date Sampled (fish)	8/20/2002	8/20/2002	8/21/2002	8/22/2002	8/19/2002
Water Temperature C°/F°	19.5 / 67	17.1 / 63	23.3 / 74	23.1 / 74	23.0 / 74
Air Temperature C°/F°	23.0 / 73	21.0 / 70	33.0 / 91	21.0 / 70	22.0 / 72
Conductivity (umhos/cm)	658	599	671	645	560
Turbidity (NTU)	4.0	3.9	-	23	3.9
Flow Velocity - ft/sec	0.3	0.6	-	-	-
Average Depth (feet)	2.0	2.5	-	-	-
Station Length (feet)	723	700	800	878	760
Sampling Effort (minutes)	41	55	47	48	50
Stream Gradient (feet/mile) (ave % slope/hundred ft)	15.1 0.287	16.4 0.310	6.2 0.118	5.2 0.099	7.7 0.145
Stream Width (feet)	30	40	30	30	25
Sampling Efficiency (poor=0/best=27)	9	9	9	3	27
Gear Type, ES= electric seine. PE=back-pack	ES	ES	ES	ES	ES
Data ID Number	12049	12050	12051	12052	12053
IEPA Station Code Number	DTC-02	DTC-05	DTC-04	DTC-07	NONE

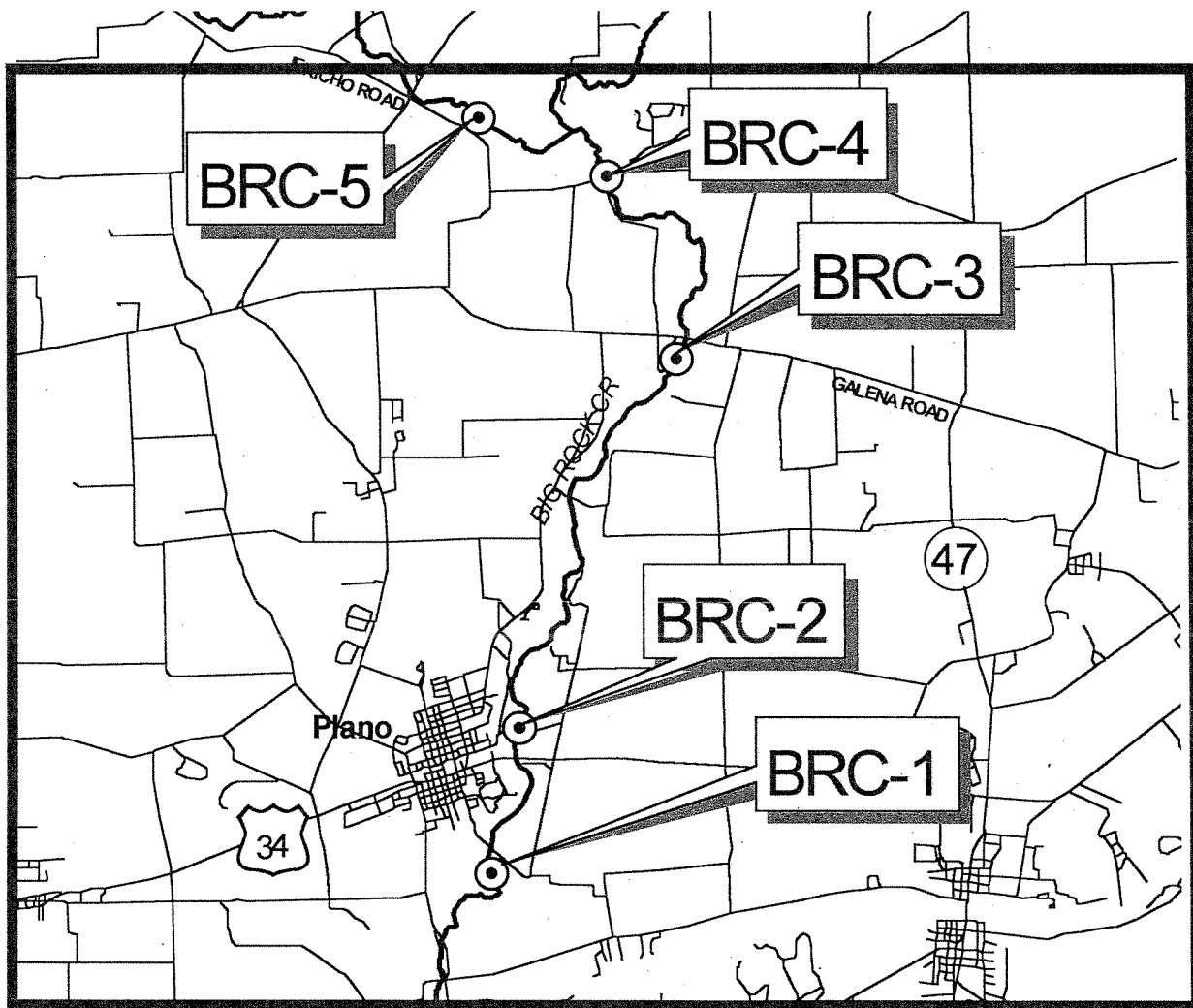


Figure B1. Main Stem of Big Rock Creek 2002 and 2003 sampling stations.

Big Rock Creek Mainstem Station BRC-1

Station BRC-1 is located on the southeast side of the Village of Plano, approximately 1 ½ miles upstream from the confluence with the Fox River. The sampling station was approximately 2000' downstream of the Hale Road bridge (Figure B1).

The sample reach had four riffles separating four pools, and three runs. The stream at this location has a high gradient (15.1 feet/mile) with a substrate comprised of moderately fine, loose and unstable gravel (50% coverage), small cobble (20%) and sand (30%). The stream appears to be incising and widening. Instream habitat consisted primarily of brush and debris/submerged logs, a few boulders ($\leq 1\%$), and four deep pools (25% total coverage). Filamentous algae grew excessively, covering most hard substrate surfaces, colonizing all cobble and larger gravel substrates.

The riparian corridor on the west side is a steep bluff in the southern portion of the station. The bluff terminates sharply to the north, adjacent to a forested floodplain with a diverse, native plant under-story. There is an abandoned channel in the west side floodplain where the stream was relocated several decades ago. The east side is entirely forested floodplain, also with a diverse, native plant under-story. There are two visible naturally abandoned stream channels within the east floodplain. Approximately 50% of the station was covered by shade at the time of sampling.

Table B2. Big Rock Creek Station BRC-1 Fish Collection, August 20, 2002

Common Name	Scientific Name	Tolerance *	Qty
Common Carp	Cyprinus carpio	Tolerant	4
Hornyhead chub	Nocomis biguttatus	Intolerant	3
Central stoneroller	Campostoma anomalum	-	114
Largescale stoneroller	Campostoma oligolepis	-	57
Suckermouth minnow	Phenacobius mirabilis	-	1
Blacknose dace	Rhinichthys atratulus	-	6
Spotfin shiner	Cyprinella spiloptera	-	18
Bluntnose minnow	Pimephales notatus	Tolerant	24
Rosyface shiner	Notropis rubellus	Intolerant	4
Bigmouth shiner	Notropis dorsalis	-	13
Sand shiner	Notropis ludibundus	-	41
White sucker	Catostomus commersoni	Tolerant	5
Northern hogsucker	Hypentelium nigricans	Intolerant	13
Shorthead redhorse	Moxostoma macrolepidotum	-	1
Channel catfish	Ictalurus punctatus	-	8
Stonecat	Noturus flavus	-	4
Mottled sculpin	Cottus bairdi	Intolerant	17
Smallmouth bass	Micropterus dolomieu	Intolerant	11
Bluegill	Lepomis macrochirus	-	3
Johnny darter	Etheostoma nigrum	-	6
Banded darter	Etheostoma zonale	Intolerant	19
Fantail darter	Etheostoma flabellare	-	1
Total Number			373
Total Species			22

Table B3. Big Rock Creek Station BRC-1 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
White heelsplitter	Lasmigona compressa	-	1
Giant floater	Pyganodon grandis	-	1
Total Number			2
Total Species			2

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or not designated (-) as tolerant or intolerant.

Fish sampling at station BRC-1 resulted in the collection of 373 fishes representing 21 native species and the non-native specie, common carp. An IBI of 52 (Smogor, 2000) was calculated for this station, which is a BSC value of "A" (Appendix A). Six of the species collected are considered intolerant of habitat and water quality degradation (Smogor, 2000). BRC-1 produced the largest collection of channel catfish (n=8) in the survey. The channel catfish ranged in size from 11 inches (282 mm) to 19.7 inches (500 mm) in length. Mottled sculpin (n=17), and one adult smallmouth bass (13.7 inches) were among the fish species collected at this station (Table B2). A common carp 26 inches in length and 8.1 pounds in weight was the largest of four individuals collected at this station.

Mussel sampling resulted in the collection of two mussels representing two species (Table B3). A Mussel Classification Index (MCI) value of 5 was calculated for BRC-1, which is designated as a Limited Mussel Resource (Table 4).

BRC-1 exhibited the lowest abundance of fish (n=373) of any station in the survey and a very sparse mussel population. The low productivity at this location may reflect disturbances that resulted from the extreme flood events of July 1996 and February 1997. During these floods mussels apparently were swept away in the lower reaches of many Fox River tributaries (Schanzle, per com). During the July, 1996 flood, the stream channel just south of BRC-1 relocated, eliminating a large meander. The loss of the meander shortened and steepened this reach of stream. Higher water velocity combined with abundant fine substrate, provides very unstable habitat for both fish and forage organisms resulting in lower productivity. The excessive algae growth observed at BRC-1 was not encountered at other mainstem stations, and may be due to nutrient input from the Waste Water Treatment Plant located upstream of Hale Road.

Big Rock Creek Mainstem Station BRC-2

Station BRC-2 was located in the Village of Plano north of the Richard H. Klatt Park. The lower end of the station was situated on a riffle approximately 40 feet north of the Main Street bridge (Figure B1). The sample reach had three riffles representing 25% of the length of the station, three pools (50% of length of station), and three shallow runs (25%). Deep pool habitat was abundant, with one pool approximately five feet in depth. Sampling effectiveness was reduced in the deepest pool. The substrate material was dominated by large boulders (15% coverage) and large cobble (50% coverage). Gravel (30%) and sand (5%) covered the remaining area. Instream habitat was composed primarily of cobble and boulder substrate and deep pools, as woody debris was not abundant. Cobble and boulders were not embedded, providing excellent habitat for small fish and macroinvertebrates to use the recesses for cover. Water temperature was lower at this station than other mainstem stations, indicating a high percentage of ground water input.

The stream flows through a deep valley at this location, bordered to the east and west by a forested riparian corridor, providing shade to approximately 50% of the water surface area. The east bank was a narrow corridor at the base of a steep bluff, while the west bank was a broad floodplain. The quality of the vegetation communities is unknown.

Fish sampling at BRC-2 produced 1,151 fishes representing 26 native species and one non-native specie, common carp (Table B4). An IBI of 57 was calculated for BRC-2, which rates as a

BSC value of "A" (Appendix A). Eight species that are considered intolerant of degradation (Smogor, 2000) were collected. Notable in the fish sample was the State Endangered greater redhorse sucker (n=1) and numerous mottled sculpin (n=140). The greater redhorse exhibited the large size (25.2 inches in length, and 6.2 pounds in weight) and vibrant colors (bright red fins and gold colored sides) typical for this species. BRC-2 was one of only three stations where mottled sculpin were collected during the survey, and were substantially more abundant at this station (n=140) than at the other two locations, BRC-1 (n=17) and Little Rock Creek station LRC-1 (n=19). Smallmouth bass were abundant at this station (n=18) however; 12 of the smallmouth bass collected were 2002 Young-of-the-Year fingerling fish. The six adult fish had an average length of 11.5 inches (293 mm), while the largest smallmouth bass was 14 inches in length (359 mm). Two channel catfish were collected, 26 inches in length (660 mm) and 18 inches in length (457 mm). The 26 inch individual weighed 6.9 pounds (3138 g). Common carp were moderately abundant at BRC-2 (n=8), the largest measured 23 inches in length and 6.6 pounds in weight.

No mussels were collected at this location, possibly due to extreme flows through this reach during the July 1996 and February 1997 floods. An MCI value of 4 was calculated for BRC-2, which rates as a Restricted Mussel Resource that is unlikely to recover except through immigration of mussel fauna. Since fish are hosts for larval mussels, and Fox River fish have access to this location, it is likely that the mussel fauna will recover over time.

Table B4. Big Rock Creek Station BRC-2 Fish Collection, August 20, 2002

Common Name	Scientific Name	Tolerance*	Qty
Common Carp	Cyprinus carpio	Tolerant	8
Hornyhead chub	Nocomis biguttatus	Intolerant	8
Central stoneroller	Campostoma anomalum	-	400
Largescale stoneroller	Campostoma oligolepis	-	262
Blacknose dace	Rhinichthys atratulus	-	19
Striped shiner	Luxilus chrysocephalus	-	1
Common shiner	Luxilius cornutus	-	1
Spotfin shiner	Cyprinella spiloptera	-	32
Fathead minnow	Pimephales promelas	Tolerant	1
Bluntnose minnow	Pimephales notatus	Tolerant	44
Rosyface shiner	Notropis rubellus	Intolerant	30
Bigmouth shiner	Notropis dorsalis	-	3
Sand shiner	Notropis ludibundus	-	37
White sucker	Catostomus commersoni	Tolerant	49
Northern hogsucker	Hypentelium nigricans	Intolerant	25
Greater redhorse **	Moxostoma valenciennesi	Intolerant	1
Shorthead redhorse	Moxostoma macrolepidotum	-	1
Black redhorse	Moxostoma duquesnei	Intolerant	9
Golden redhorse	Moxostoma erythrurum	-	4
Channel catfish	Ictalurus punctatus	-	2
Stonecat	Noturus flavus	-	7
Mottled sculpin	Cottus bairdi	Intolerant	140
Smallmouth bass	Micropterus dolomieu	Intolerant	18
Bluegill	Lepomis macrochirus	-	2
Johnny darter	Etheostoma nigrum	-	3
Banded darter	Etheostoma zonale	Intolerant	43
Fantail darter	Etheostoma flabellare	-	1
		Total Number	1151
		Total Species	27

*Tolerance status indicates whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or not designated (-) as tolerant or intolerant.

** State Endangered Species

Big Rock Creek Mainstem Station BRC-3

Station BRC-3 is located approximately 500 feet downstream of Galena Road. The lower block net was located in the mid-point of a channelized and leveed section of the station (Figure B1). The sample reach was wide (average width 30 feet) and shallow (average depth one foot), with three riffles. Two very long runs representing approximately 70% of the station connected with two shallow pools (maximum depth, 24 inches). A small colony of the aquatic plant Water Star-grass (*Heteranthera dubia*) was observed. The substrate was comprised of exposed bedrock (30%), cobble (30%), sand (15%), coarse gravel (14%), silt/mud (10%), and boulders (1%). The cobble and intermixed boulders were minimally embedded on the exposed bedrock, and provided the primary source of habitat throughout much of the station. There was minimal woody debris. Approximately 100 feet of rip rap bank was present along the channelized section.

The east bank riparian area is a densely forested, steep bluff. The west bank riparian zone consisted of a levee separating the stream from a pond that occupies the original channel location. The levee along the upper two-thirds of the station supports woody vegetation with the lower section planted in native warm-season grasses.

Fish sampling at BRC-3 resulted in the collection of 409 fishes representing 26 native species (Table B5). An IBI of 58 was calculated for this station (Appendix A), with a BSC value of "A". Six of the species collected are considered to be intolerant of degradation (Smogor 2000). Although other sample stations produced larger collections of rock bass, BRC-3 had much larger individuals. Eight of the ten rock bass collected were six inches in length or larger, while only four of the 43 rock bass collected at other stations were greater than six inches in length. The maximum and average rock bass lengths for BRC-3 were 7.3 inches (185mm) and 6.4 inches (162mm), respectively. The rip rap along the levee provided habitat that favored rock bass.

Mussel sampling at BRC-3 resulted in the collection of 2 live mussels, representing one species, the plain pocketbook mussel (*Lampsilis cardium*, Table B6). A MCI value of 6 was calculated for BRC-3, rating as a Limited Mussel Resource. The low mussel diversity and abundance may be due to the 1996/97 floods and/or a paucity suitable substrate and depth.

Table B5. Big Rock Creek Station BRC-3 Fish Collection, August 21, 2002

Common Name	Scientific Name	Tolerance *	Qty
Creek chub	<i>Semotilus atromaculatus</i>	Tolerant	5
Hornyhead chub	<i>Nocomis biguttatus</i>	Intolerant	19
Central stoneroller	<i>Campostoma anomalum</i>	-	33
Largescale stoneroller	<i>Campostoma oligolepis</i>	-	101
Striped shiner	<i>Luxilus chrysocephalus</i>	-	2
Common shiner	<i>Luxilus cornutus</i>	-	5
Spotfin shiner	<i>Cyprinella spiloptera</i>	-	16
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant	30
Rosyface shiner	<i>Notropis rubellus</i>	Intolerant	35
Sand shiner	<i>Notropis ludibundus</i>	-	43
White sucker	<i>Catostomus commersoni</i>	Tolerant	3
Northern hogsucker	<i>Hypentelium nigricans</i>	Intolerant	23
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	-	1
Black redhorse	<i>Moxostoma duquesnei</i>	Intolerant	7
Golden redhorse	<i>Moxostoma erythrurum</i>	-	13
Yellow bullhead	<i>Ameiurus natalis</i>	Tolerant	3
Stonecat	<i>Noturus flavus</i>	-	1
Black crappie	<i>Pomoxis nigromaculatus</i>	-	1
Rock bass	<i>Ambloplites rupestris</i>	-	10
Largemouth bass	<i>Micropterus salmoides</i>	-	2
Smallmouth bass	<i>Micropterus dolomieu</i>	Intolerant	12
Green sunfish	<i>Lepomis cyanellus</i>	Tolerant	7
Bluegill	<i>Lepomis macrochirus</i>	-	8
Johnny darter	<i>Etheostoma nigrum</i>	-	1
Banded darter	<i>Etheostoma zonale</i>	Intolerant	27
Orangethroat darter	<i>Etheostoma spectabile</i>	-	1
		Total Number	409
		Total Species	26

Table B6. Big Rock Creek Station BRC-3 Mussel Collection, July 21, 2003

Common Name	Scientific Name	Tolerance *	Qty
Plain pocketbook	<i>Lampsilis cardium</i>	-	2
		Total Number	2
		Total Species	1

*Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Big Rock Creek Mainstem Station BRC-4

The Big Rock Creek mainstem Station BRC-4 is located approximately 1000 feet north of Jericho Road in the Forest Preserve District of Kane County Big Rock Forest Preserve (Figure B1). The lower end of the station was located approximately 900 feet downstream (south) of the confluence of Welch Creek. Sampling was conducted in the rain and during rising water following an overnight rain. Despite decreased water clarity, sampling efficiency appeared to be largely unaffected with a high abundance and diversity of fish collected.

The sampling reach had an average width of 30 feet; with two long, deep, pools (40% coverage), two riffles (15%), and one very long run (45%). The substrate was primarily sand (40%) and gravel (35%), with silt/mud (10%) and claypan (10%) also present. Cobble (5%) and boulders (2%) were less available for habitat, but woody debris, submerged roots, under-cut banks, and submerged logs were abundant. Three fallen trees were present, with approximately 20% of the station composed of under-cut banks behind exposed tree roots. Both the east and west riparian corridors were forested flood-plain. The area to the west of the stream contains an abandoned channel that may serve as a fish refuge during floods.

Sampling produced 1,143 fishes representing 29 native species and the non-native common carp (Table B7). An IBI of 59 (out of a possible 60) was calculated for this station, with a BSC value of "A" (Appendix A). Six of the species collected are considered intolerant of habitat degradation. Northern hog sucker (*Hypentelium nigricans*), an intolerant species, were abundant (n=53), and smallmouth bass were well represented (n=20). The largest smallmouth bass collected was nearly 16 inches in length (404 mm), but the average length was only 8.7 inches (221 mm) (YOY fingerling fish are not included in the average length).

Mussel sampling at BRC-4 yielded 32 mussels representing eight species (Table B8). A MCI of 14 was calculated for BRC-4, rating this reach of stream as a Highly Valued Mussel Resource of State-wide significance, due to the species richness. Three individuals of the State Threatened spike mussel (*Elliptio dilatata*) and three individuals of the intolerant ellipse mussel (*Venustaconcha ellipsiformes*) were collected.

Table B7. Big Rock Creek Station BRC-4 Fish Collection, August 22, 2002

COMMON NAME	SCIENTIFIC NAME	Tolerance *	QTY
Common Carp	Cyprinus carpio	Tolerant	2
Creek chub	Semotilus atromaculatus	Tolerant	5
Hornyhead chub	Nocomis biguttatus	Intolerant	58
Central stoneroller	Campostoma anomalum	-	136
Largescale stoneroller	Campostoma oligolepis	-	173
Suckermouth minnow	Phenacobius mirabilis	-	1
Blacknose dace	Rhinichthys atratulus	-	3
Striped shiner	Luxilus chrysocephalus	-	2
Common shiner	Luxilius cornutus	-	23
Redfin shiner	Lythrurus umbratilis	-	8
Spotfin shiner	Cyprinella spiloptera	-	41
Bluntnose minnow	Pimephales notatus	Tolerant	201
Rosyface shiner	Notropis rubellus	Intolerant	21
Bigmouth shiner	Notropis dorsalis	-	8
Sand shiner	Notropis ludibundus	-	251
White sucker	Catostomus commersoni	Tolerant	9
Northern hogsucker	Hypentelium nigricans	Intolerant	53
Shorthead redhorse	Moxostoma macrolepidotum	-	4
Black redhorse	Moxostoma duquesnei	Intolerant	18
Golden redhorse	Moxostoma erythrurum	-	57
Yellow bullhead	Ameiurus natalis	Tolerant	1
Stonecat	Noturus flavus	-	3
Black crappie	Pomoxis nigromaculatus	-	2
Rock bass	Ambloplites rupestris	-	1
Largemouth bass	Micropterus salmoides	-	2
Smallmouth bass	Micropterus dolomieu	Intolerant	20
Green sunfish	Lepomis cyanellus	Tolerant	1
Bluegill	Lepomis macrochirus	-	8
Johnny darter	Etheostoma nigrum	-	3
Banded darter	Etheostoma zonale	Intolerant	28
TOTAL NUMBER			1143
TOTAL SPECIES			30

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Table B8. Big Rock Creek Station BRC-4 Mussel Collection, July 21, 2003

Common Name	Scientific Name	Tolerance *	Qty
Elktoe	<i>Alasmodonta marginata</i>	-	8
Cylindrical papershell	<i>Anodontoides ferussacianus</i>	-	1
** Spike **	<i>Elliptio dilatata</i>	Intolerant	3
Plain pocketbook	<i>Lampsilis cardium</i>	-	13
White heelsplitter	<i>Lasmigona complanata</i>	-	2
Creek heelsplitter	<i>Lasmigona compressa</i>	-	1
Creeper	<i>Strophitus undulatus</i>	-	1
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	3
Total Number			32
Total Species			8

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

** State Threatened Species

Big Rock Creek Mainstem Station BRC-5

Station BRC-5 was located east of Granart Road on the north side of Jericho Road (Figure B1). The length of the station was divided between Kane County Forest Preserve District's Deer Valley Golf Course on the south (400 feet in length), and private property on the north (360 feet in length).

This reach of stream averaged approximately 25 feet in width, with an average depth of one foot. A large pool (10% of station length) occurred at the lower end of this station near the downstream block net. A long run extended through the golf course property, which appeared to have been straightened with a low rock dam present at the downstream end. Run habitat represented 75% of the channel morphology at this station. North (up stream) of the golf course, on the private property portion of the station, stream gradient was higher and the channel had not been straightened. This portion of the station had five riffles separated by four runs, and no pool habitat.

Substrate composition was strongly influenced by the low rock dam. Sand (40%) and gravel (30%) dominated the substrate in the impounded area. Cobble (20%) and boulders (2%) were present throughout the length of the station, and were not embedded in the faster flowing area upstream of the run. They provided cover and habitat for fish and other aquatic organisms. Small colonies of the native submersed aquatic plant, Water Star Grass (*Heteranthera dubia*) and the non-native Curley Leaf Pondweed (*Potamogeton crispus*), were observed at this station, but contributed only minimally to habitat.

The riparian corridor in the upper portion of this station was pasture, with livestock having unobstructed access to the stream, resulting in bank and streambed damage. The lower portion of the station runs through the Deer Valley Golf Course, where the riparian area was primarily turf grass with a narrow, unmowed stream border.

Fish population sampling resulted in the collection of 2,572 fishes representing 30 native species, and one non-native species, common carp (Table B9). An IBI of 54, was calculated for this station, with a BSC value of "A" (Appendix A). Six of the species collected are considered intolerant of habitat degradation. The riffle portion of this station provided good darter habitat, yielding four species; the highest species total found for mainstem stations. Banded darters (*Etheostoma zonale*) were particularly abundant (n=132) at BRC-5, exceeding the number found at any of the other stations. Smallmouth bass were also more abundant (n=150) at BRC-5 than any other survey stations. Although the largest smallmouth bass was nearly 16 inches (403 mm) in length, most smallmouth bass collected at this station were less than seven inches in length. Overall, BRC-5 was one of the most productive stations in the watershed, holding the highest total number for the following species: stonecat (*Noturus flavus*), black redhorse sucker (*Moxostoma duquesnei*), central stoneroller (*Campostoma anomalum*), largescale stoneroller (*Campostoma oligolepis*), Spotfin shiner (*Cyprinella spiloptera*), northern hog sucker, largemouth bass, and bluegill (Table 3).

Mussel sampling at BRC-5 resulted in the collection of 18 mussels representing four species (Table B10). A MCI of 8 was calculated for qualifying this reach of stream as a Moderate Value Mussel Resource of local significance. Much of the station was located in the pastured area where the mussel population appeared to have been impacted by livestock use.

Table B9. Big Rock Creek Station BRC-5 Fish Collection, August 19, 2002

Common Name	Scientific Name	Tolerance	Qty
Gizzard shad	Dorosoma cepedianum	-	1
Carp	Cyprinus carpio	Tolerant	1
Creek chub	Semotilus atromaculatus	Tolerant	24
Hornyhead chub	Nocomis biguttatus	Intolerant	55
Central stoneroller	Campostoma anomalum	-	779
Largescale stoneroller	Campostoma oligolepis	-	357
Suckermouth minnow	Phenacobius mirabilis	-	1
Striped shiner	Luxilus chrysocephalus	-	2
Common shiner	Luxilius cornutus	-	12
Spotfin shiner	Cyprinella spiloptera	-	72
Fathead minnow	Pimephales promelas	-	1
Bluntnose minnow	Pimephales notatus	Tolerant	508
Rosyface shiner	Notropis rubellus	Intolerant	6
Bigmouth shiner	Notropis dorsalis	-	3
Sand shiner	Notropis ludibundus	-	158
Quillback	Carpiodes cyprinus	-	2
Northern hogsucker	Hypentelium nigricans	Intolerant	64
Black redhorse	Moxostoma duquesnei	Intolerant	24
Golden redhorse	Moxostoma erythrurum	-	8
Yellow bullhead	Ameiurus natalis	-	34
Stonecat	Noturus flavus	-	35
Black crappie	Pomoxis nigromaculatus	-	1
Rock bass	Ambloplites rupestris	-	4
Largemouth bass	Micropterus salmoides	-	16
Smallmouth bass	Micropterus dolomieu	Intolerant	150
Green sunfish	Lepomis cyanellus	-	9
Bluegill x Green sunfish hybrid	Lepomis macrochirus x L. cyanellus	-	1
Bluegill	Lepomis macrochirus	-	90
Johnny darter	Etheostoma nigrum	-	11
Banded darter	Etheostoma zonale	Intolerant	132
Orangethroat darter	Etheostoma spectabile	-	8
Fantail darter	Etheostoma flabellare	-	4
TOTAL NUMBER			2573
TOTAL SPECIES			31

Table B10. Big Rock Creek Station BRC-5 Mussel Collection, July 21, 2003

Common Name	Scientific Name	Tolerance	Qty
Elktoe	<i>Alasmodonta marginata</i>	-	3
Plain pocketbook	<i>Lampsilis cardium</i>	-	13
Creek heelsplitter	<i>Lasmigona compressa</i>	-	1
Lilliput	<i>Toxolasma parvus</i>	-	1
Total Number			18
Total Species			4

Big Rock Creek Mainstem Station BRC-4.5 (mussel only)

Station BRC-4.5 was located on Kane County Forest Preserve District property (Deer Valley Golf Course) approximately 500' downstream of station BRC-5. BRC-4.5 was established to facilitate a hands-on training class prior to the mussel survey. The class was conducted on the morning of July 21, 2003. Samplers participated in a practice sampling effort and critique, and observed how to age mussels.

Numerous mussels were collected by participants, and are included for interest and contrast. Mussel abundance was much higher at BRC-4.5 (Table B11) than either BRC-4 (Table B8) or BRC-5 (Table B10), which may be due to the difference in sampling effort (10 man-hours at BRC-4.5 versus 4 man-hours at all other stations). However, six species, including the intolerant ellipse mussel, were collected at BRC-4.5, while only four species were collected at BRC-5. Mussel sampling at BRC-4.5 resulted in the collection of 83 mussels representing six species. A MCI of 13 was calculated that qualifies this reach of stream as a Highly Valued Mussel Resource of State wide significance.

Table B11. Big Rock Creek Station BRC-4.5 Mussel Collection, July 21, 2003

Common Name	Scientific Name	Tolerance *	Qty
Elktoe	<i>Alasmodonta marginata</i>	-	6
Cylindrical papershell	<i>Anodontoides ferussacianus</i>	-	1
Plain pocketbook	<i>Lampsilis cardium</i>	-	27
White heelsplitter	<i>Lasmigona complanata</i>	-	43
Creek heelsplitter	<i>Lasmigona compressa</i>	-	3
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	3
Total Number			83
Total Species			6

*Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

West Branch of Big Rock Creek

The West Branch of Big Rock Creek is the most western portion of the watershed contributing directly to the mainstem. The most northerly portion of the West Branch is called Battle Creek, which originates at the watershed divide separating the Kishwaukee River and Fox River basins in Dekalb County, near Gurler Road (Figure B2). Two stations were located on the West Branch of Big Rock Creek. The West Branch joins the East Branch in Kane County, approximately 3/4 mile west of Price Road, near the Village of Big Rock.

Table B12. West Branch of Big Rock Creek Station Characteristics

Parameter	WBR-1	WBR-2
Date Sampled (fish)	8/14/2002	8/14/2002
Water Temperature C ⁰ /F ⁰	NA	NA
Air Temperature C ⁰ /F ⁰	25.5 / 78	NA
Conductivity (umhos/cm)	448	509
Turbidity (NTU)	NA	NA
Flow Velocity - ft/sec	0.9	1.0
Average Depth (feet)	1.5	1.8
Station Length (feet)	600	570
Sampling Effort (minutes)	41	34
Stream Gradient (feet/mile) (ave % slope/hundred ft)	7.1 0.135	6.1 0.116
Stream Width (feet)	20	20
Sampling Efficiency (poor=0/best=27)	9	3
Gear Type, (ES= electric seine. PE=back-pack)	ES	ES
Data ID Number	12044	12045
IEPA Station Code Number	NONE	NONE

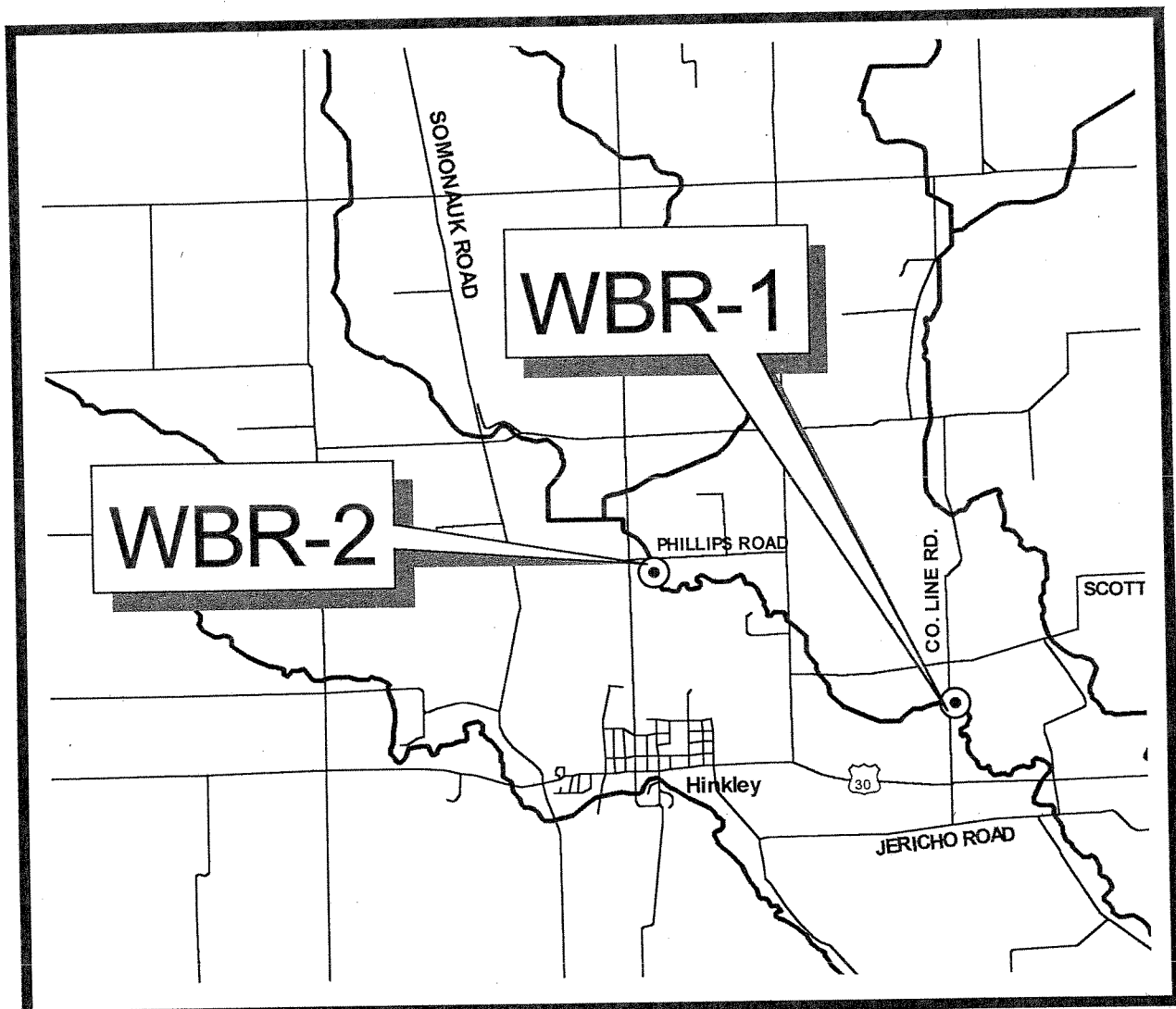


Figure B2. West Branch of Big Rock Creek 2002 and 2003 Sampling Stations

West Branch of Big Rock Creek Station WBR-1

Station WBR-1 was located north of U.S. Route 30, east of West County Line Road (Figure B2). The sample reach exhibited a natural meandering configuration with good riffle and pool development. Riffles ($n=3$) and runs ($n=2$) each made up approximately 15% of the reach. Four pools, with principally clean cobble/gravel substrates, represented 70% of the area. Pool depth did not exceed two feet at the time of the survey. The downstream half of the reach was higher gradient than the upper portion. The substrate was primarily gravel (50%) and cobble (35%) with small amounts of sand (10%) and silt/mud (5%). The stream channel is moderately incised, but appears to be stable. Instream habitat was primarily cobble (not embedded) with low quantities of woody debris and root wads.

The stream was 75% shaded by a forested riparian zone planted with black walnut trees. In addition to providing shade, riparian trees contribute twigs and leaves to the stream, which increases the productivity by providing forage for macroinvertebrates and other organisms at the base of the food pyramid.

Fish population sampling at WBR-1 resulted in the collection of 457 fishes representing 24 species (Table B13). An IBI of 52, was calculated for this station, with a BSC value of "A" (Appendix A). Six species intolerant of degraded conditions were collected, representing nearly 34% of the sample (n=155). WBR-1 was one of only three tributary stations with a BSC value of "A". The most numerous species; the hornyhead chub (*Nocomis biguttatus*, n=103) is an intolerant species (Smogor, 2000).

The primary sportfish species at the station was smallmouth bass (n=39), and rock bass (n=16). The largest smallmouth bass collected was 10.6 inches (269 mm) in length. Nearly 82% of the smallmouth were 2002 year class fingerling fish. The rock bass population exhibited a similar composition. The largest rock bass was seven inches in length, with 12 juveniles and fingerling fish (1.3 to 3.0 inches in length) collected. The prevalence of 2002 year class of both smallmouth bass and rock bass indicates that this reach of stream may serve as a spawning and nursery area.

The mussel survey resulted in the collection of 155 mussels representing six species (Table B14) with a Mussel Classification Index (MCI) of 13, qualifying this reach of stream as a Highly Valued Mussel Resource of state-wide significance. The most numerous species in the sample was the ellipse mussel (*Venustaconcha ellipsiformes*, n=87), an intolerant and rare mussel in most of Illinois. The number of ellipse mussel collected at WBR-1 represented 87% of all the ellipse mussel collected for the Big Rock Creek Mussel Survey (total n=100). The station with the next greatest abundance of ellipse mussel (WBR-2) only yielded four individuals. Although three of the fifteen stations sampled for mussels on Big Rock Creek and its tributaries had more species collected (up to 9 species); WBR-1 had the highest total abundance of mussels (Table 7). The mussel sample at WBR-1 represented 25% of the total of all mussels collected in Big Rock Creek during the 2003 survey. Two juvenile mussels (less than 3 years old) were collected at WBR-1, indicating that recruitment is occurring.

Very dry conditions existed throughout the summer of 2003. On September 23, 2003, an inspection of the West Branch revealed that the straightened reach approximately 700 - 1000 feet in length, downstream of WBR-1, and parallel to U.S. Route 30, had gone dry. The nearby shaded meander pools at WBR-1 contained considerable water. It appeared that this reach of stream may be serving as a refuge for aquatic life in this portion of the West Branch of Big Rock Creek.

Table B13. Station WBR-1 Fish Collection, August 14, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE*	QTY
Creek chub	<i>Semotilus atromaculatus</i>	-	32
Hornyhead chub	<i>Nocomis biguttatus</i>	Intolerant	103
Central stoneroller	<i>Campostoma anomalum</i>	-	18
Blacknose dace	<i>Rhinichthys atratulus</i>	-	1
Striped shiner	<i>Luxilus chrysocephalus</i>	-	34
Common shiner	<i>Luxilus cornutus</i>	-	16
Redfin shiner	<i>Lythrurus umbratilis</i>	-	4
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant	56
Rosyface shiner	<i>Notropis rubellus</i>	Intolerant	6
Bigmouth shiner	<i>Notropis dorsalis</i>	-	4
Sand shiner	<i>Notropis ludibundus</i>	-	24
White sucker	<i>Catostomus commersoni</i>	Tolerant	15
Northern hogsucker	<i>Hypentelium nigricans</i>	Intolerant	3
Golden redhorse	<i>Moxostoma erythrurum</i>	-	2
Yellow bullhead	<i>Ameiurus natalis</i>	Tolerant	6
Stonecat	<i>Noturus flavus</i>	-	5
Slender madtom	<i>Noturus exilis</i>	Intolerant	2
Rock bass	<i>Ambloplites rupestris</i>	-	16
Smallmouth bass	<i>Micropterus dolomieu</i>	Intolerant	39
Bluegill	<i>Lepomis macrochirus</i>	-	2
Johnny darter	<i>Etheostoma nigrum</i>	-	23
Banded darter	<i>Etheostoma zonale</i>	Intolerant	2
Orangethroat darter	<i>Etheostoma spectabile</i>	-	7
Fantail darter	<i>Etheostoma flabellare</i>	-	37
Total Number			457
Total Species			24

Table B14. Station WBR-1 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Cylindrical papershell	<i>Anodontoidea ferussacianus</i>	-	10
Plain pocketbook	<i>Lampsilis cardium</i>	-	36
White heelsplitter	<i>Lasmigona complanata</i>	-	15
Creek heelsplitter	<i>Lasmigona compressa</i>	-	6
Creeper	<i>Strophitus undulatus</i>	-	1
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	87
Total Species		6	Total Number
			155

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

West Branch of Big Rock Creek Station WBR-2

Station WBR-2 was located north of Hinckley, east of Hinckley Road, and downstream of the Phillips Road bridge (Figure B2). West Branch tributaries, including Battle Creek, converge to form the West Branch of Big Rock Creek approximately 800 feet upstream of Phillips Road. The upstream end of the sample reach was approximately 500 feet downstream of the Phillips Road bridge, in a straightened reach of stream.

The straightened configuration of the this reach favored the development of runs rather than pools. Runs comprised approximately 60% of the stream morphology at this location. There was one riffle (representing 10% or less of the area) that was comprised of gravel and cobble. Two pools (maximum depth, 3.0 feet) made up approximately 30% the reach. The substrate was primarily silt/mud/sand, which together represented 50% of the area. Fine and medium gravel was present in approximately 40% of the reach, whereas cobble was primarily confined to the riffle, and comprised approximately 10% of the substrate. Instream habitat was minimal (approximately 15% coverage) and was comprised of some woody debris and submerged terrestrial vegetation, especially where vegetated clumps of the bank had sloughed into the stream. At the time of the fish population survey, the stream banks supported numerous trees (box elder, maple, etc) growing on banks built-up with dredge spoil from past channelizing activities. The stream corridor was separated from row crop areas by a grass waterway.

Fish population sampling at WBR-2 resulted in the collection of 603 fishes representing 24 species (Table B15). An IBI of 49 was calculated for WBR-2 which qualifies for a BSC rating of 'B' (Appendix A). The collection contained four species that are intolerant of degradation, representing nearly 17% of the collection. Six species were collected that are classified as tolerant, representing 23% of the collection.

Two sportfish species were collected: smallmouth bass (*Micropterus dolomieu*, n= 10) and rock bass (*Ambloplites rupestris*, n=27). All the smallmouth bass collected were fingerling fish from the 2002 year class (≤ 3 " in length). The largest rock bass collected was 7 inches in length (178 mm). Seventeen juvenile or fingerling, rock bass (≤ 3.5 " in length) were collected. The abundance of 2002 year class fish indicates that this reach of stream serves as a spawning and nursery area for smallmouth bass and rock bass.

Mussel sampling resulted in the collection of 109 mussels representing 8 species (Table B16). WBR-2 received a MCI of 15, and qualified as a Highly Valued Mussel Resource (Table 4). Two species typically found in headwaters, lilliput (*Toxolasma parvus*) and the State Threatened slippershell (*Alasmodonta viridis*) were collected. Overall, WBR-2 had the third highest mussel abundance and the second highest species total for the 2003 Big Rock Creek Mussel Survey.

At the time of the survey, channel excavation and stream bank tree removal had recently been conducted over an approximate 500-foot reach from the Phillips Road bridge downstream. Mussel sampling was conducted in an undisturbed portion of the streambed, just downstream of the excavated segment.

Table 15. Station WBR-2 Fish Collection, August 14, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Carp	<i>Cyprinus carpio</i>	Tolerant	10
Creek chub	<i>Semotilus atromaculatus</i>	Tolerant	28
Hornyhead chub	<i>Nocomis biguttatus</i>	Intolerant	84
Central stoneroller	<i>Campostoma anomalum</i>	-	127
Blacknose dace	<i>Rhinichthys atratulus</i>	-	1
Striped shiner	<i>Luxilus chrysocephalus</i>	-	23
Common shiner	<i>Luxilius cornutus</i>	-	77
Redfin shiner	<i>Lythrurus umbratilis</i>	-	16
Spotfin shiner	<i>Cyprinella spiloptera</i>	-	10
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant	77
Rosyface shiner	<i>Notropis rubellus</i>	Intolerant	7
Bigmouth shiner	<i>Notropis dorsalis</i>	-	3
Sand shiner	<i>Notropis ludibundus</i>	-	37
White sucker	<i>Catostomus commersoni</i>	Tolerant	21
Northern hogsucker	<i>Hypentelium nigricans</i>	Intolerant	1
Golden redhorse	<i>Moxostoma erythrurum</i>	-	6
Yellow bullhead	<i>Ameiurus natalis</i>	Tolerant	2
Rock bass	<i>Ambloplites rupestris</i>	-	27
Smallmouth bass	<i>Micropterus dolomieu</i>	Intolerant	10
Green sunfish	<i>Lepomis cyanellus</i>	Tolerant	1
Bluegill	<i>Lepomis macrochirus</i>	-	3
Johnny darter	<i>Etheostoma nigrum</i>	-	26
Orangethroat darter	<i>Etheostoma spectabile</i>	-	5
Fantail darter	<i>Etheostoma flabellare</i>	-	1
Total Number			603
Total Species			24

Table B16. Station WBR-2 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Slippershell	<i>Alasmodonta viridis</i>	Intolerant	1
Cylindrical papershell	<i>Anodontoides ferussacianus</i>	-	55
Plain pocketbook	<i>Lampsilis cardium</i>	-	3
White heelsplitter	<i>Lasmigona complanata</i>	-	13
Creek heelsplitter	<i>Lasmigona compressa</i>	-	27
Creeper	<i>Strophitus undulatus</i>	-	5
Lilliput	<i>Toxolasma parvus</i>	-	1
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	4
Total Number			109
Total Species			8

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

**State Threatened species

East Branch of Big Rock Creek

The East Branch of Big Rock originates as two small tributaries that arise north of Inter-State 88. One tributary, designated Young's Creek, originates north of Keslinger Road. Both tributaries begin in Kane County, however; Young's Creek meanders across the Dekalb/Kane County line three times. The East Branch begins at the confluence of these tributaries, flowing approximately 1 3/4 miles in Dekalb County before entering into Kane County 2 miles north of U.S. Route 30 on West County Line Road. The East Branch and the West Branch join to form the mainstem of Big Rock Creek approximately 3/4 of a mile west of Price Road near the Village of Big Rock in Kane County. Two stations were sited on the East Branch of Big Rock Creek.

Table B17. East Branch of Big Rock Creek Station Characteristics

Parameter	EBR-1	EBR-2
Date Sampled (fish)	8/13/2002	8/13/2002
Water Temperature C ⁰ /F ⁰	23 / 74	24 / 76
Air Temperature C ⁰ /F ⁰	26.6 / 80	27 / 81
Conductivity (umhos/cm)	830	560
Turbidity (NTU)	na	na
Flow Velocity - ft/sec	na	1.2
Average Depth (feet)	2.0	0.5
Station Length (feet)	540	500
Sampling Effort (minutes)	38	45
Stream Gradient (feet/mile) (ave % slope/hundred ft)	7.1 0.135	9.5 0.180
Stream Width (feet)	20	15
Sampling Efficiency (poor=0/best=27)	27	3
Gear Type, (ES= electric seine. PE=back-pack)	ES	PE
Data ID Number	12046	12047
IEPA Station Code Number	NONE	NONE

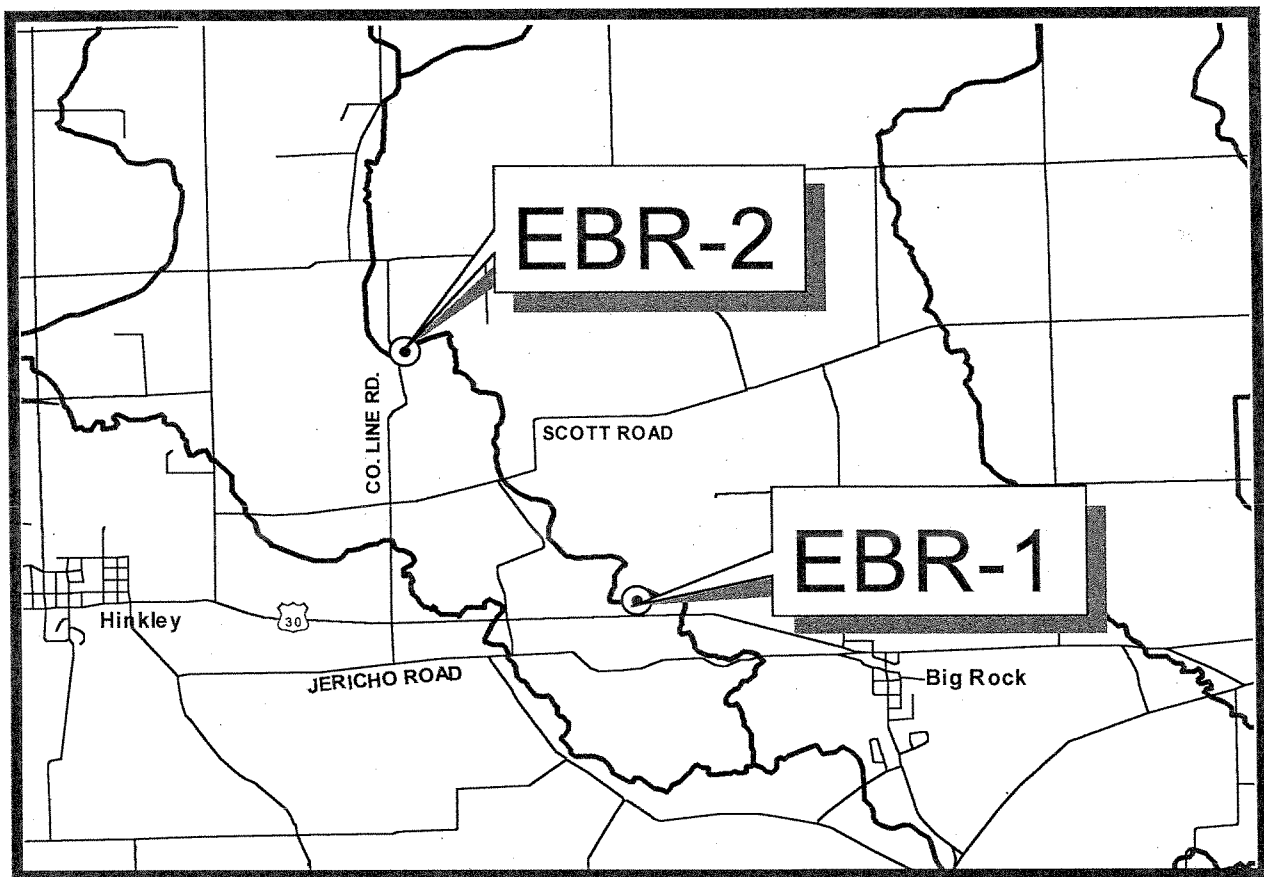


Figure B3. East Branch of Big Rock Creek 2002 and 2003 Sampling Stations

East Branch Big Rock Creek Station EBR-1

Station EBR-1 was located west of the Village of Big Rock, on the north side of U.S. Route 30 (Figure B3). The downstream end of the station was located approximately 50 feet north of the U.S. Route 30 bridge.

The stream at this location exhibits a naturally meandering, but somewhat incised channel with deep pools and riffles. Meander pools and riffles are typical stream morphology for most of the East Branch between U.S. Route 30 and West County Line Road. At EBR-1, pools ($n=4$) comprised approximately 80% of the stream length, separated by five short riffles (10%), and three short runs (10%). Substrate was composed of 40% sand, 30% gravel, 20% cobble (principally in riffle areas), and 10% silt/ mud. Habitat features included aquatic vegetation, submerged terrestrial vegetation, woody debris, and tree roots. The riparian corridor on the west side of the stream was primarily an athletic field and picnic area in turf grass. The east corridor was forested. Trees on both sides of the stream shaded approximately 40% of the stream channel.

Fish population sampling resulted in the collection of 951 fishes representing 24 species (Table B18). An IBI of 49 was calculated for this station, with a BSC rating of "B" (Appendix A). The most abundant species were in the minnow family including, bluntnose minnow ($n=267$) and central

stoneroller (n=241). Both species are omnivorous, eating algae, plant material, and small aquatic insect larvae. Intolerant species (n=5) represented just 12% of the total fish abundance.

Sportfish were represented by smallmouth bass (n=36) and rock bass (n=8). Smallmouth bass ranged in size from 1.4 to 13.7 inches (35-343 mm) in length. Rock bass ranged in length from 2.3 to 7.3 inches (58-185 mm) in length. The smallmouth bass collection was dominated by 2002 year class fingerling and juvenile fish (31 of 36). The relative abundance of young sportfish indicates that this reach of stream may serve as a nursery/rearing area. The deep pools in this reach of stream may also serve as a refuge for both the adult and juvenile fish in this part of the watershed.

Only one mussel, a recently killed cylindrical papershell (*Anodontoidea ferussacianus*), was collected (Table B19). EBR-1 rated as a Limited Mussel Resource with an MCI of 5. Old, weathered, relict shells of four additional species including the State Threatened spike mussel were found. On October 24, 2003, most of this reach of stream was dry. Minimal water remained in the meander bend pools and in a scour hole under a railroad trestle parallel to U.S. Route 30. An unreliable water source is one possible explanation for the absence of live specimens of the four relict mussels found at this location.

Table B18. Station EBR-1 Fish Collection, August 13, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Creek chub	<i>Semotilus atromaculatus</i>	Tolerant	54
Hornyhead chub	<i>Nocomis biguttatus</i>	Intolerant	47
Central stoneroller	<i>Campostoma anomalum</i>	-	241
Largescale stoneroller	<i>Campostoma oligolepis</i>	-	3
Striped shiner	<i>Luxilus chrysocephalus</i>	-	9
Common shiner	<i>Luxilius cornutus</i>	-	48
Redfin shiner	<i>Lythrurus umbratilis</i>	-	4
Spotfin shiner	<i>Cyprinella spiloptera</i>	-	8
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant	267
Rosyface shiner	<i>Notropis rubellus</i>	Intolerant	10
Sand shiner	<i>Notropis ludibundus</i>	-	42
White sucker	<i>Catostomus commersoni</i>	Tolerant	50
Northern hogsucker	<i>Hypentelium nigricans</i>	Intolerant	12
Golden redhorse	<i>Moxostoma erythrurum</i>	-	4
Yellow bullhead	<i>Ameiurus natalis</i>	Tolerant	5
Stonecat	<i>Noturus flavus</i>	-	6
Rock bass	<i>Ambloplites rupestris</i>	-	8
Smallmouth bass	<i>Micropterus dolomieu</i>	Intolerant	36
Green sunfish	<i>Lepomis cyanellus</i>	Tolerant	1
Bluegill	<i>Lepomis macrochirus</i>	-	52
Johnny darter	<i>Etheostoma nigrum</i>	-	8
Banded darter	<i>Etheostoma zonale</i>	Intolerant	11
Orangethroat darter	<i>Etheostoma spectabile</i>	-	18
Fantail darter	<i>Etheostoma flabellare</i>	-	7
Total Number			951
Total Species			24

Table B19. Station EBR-1 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Cylindrical papershell	<i>Anodontoidea ferussacianus</i>	-	1
Total Number			1
Total Species			1

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

East Branch of Big Rock Creek Station EBR-2

Station EBR-2 is located approximately 500 feet east (downstream) of the West County Line Road bridge, approximately 1.8 miles north of U.S. Route 30 (Figure B3). West County Line Road is located east of the Village of Hinckley, and west of the Village of Big Rock. The station is approximately 2.0 miles downstream of the confluence of Young's Creek and other headwater tributaries, where the name East Branch of Big Rock Creek originates. The stream flows east at this location, and is bordered on the south by a bluff and on the north by a flood-plain hay field and small forested area.

The straightened channel at this location is a typical channel morphology for most of the East Branch upstream of EBR-2, including Young's Creek and other East Branch tributaries. Moving downstream, the channel is beginning to recover from channelization, exhibiting modest meander formation. With the re-establishment of meanders, the stream is also reforming riffles. However, the total area of the three riffles within EBR-2 only covered approximately 5% of the station. Most of the station was shallow (6"-12"), making it difficult to distinguish shallow pools from runs, which together comprised approximately 95% of the station. Submerged aquatic vegetation (*Myriophyllum* spp.) and filamentous algae covered 50% of the station. The substrate was primarily silty-sand and small gravel (80%), with scattered larger cobble and boulders (10%) present at the upper end of the station and in the pools. Silt and mud was prevalent (10% coverage) in locations where the banks are sloughing into the stream. Aquatic habitat at this station was almost entirely vegetation, both aquatic and submerged terrestrial plants and algae. A riparian corridor of tall reed canary grass (*Phalaris arundinacea*) borders the stream on both sides.

EBR-2 was the only station sampled using a back-pack electrofishing unit. Sampling produced 598 fishes representing 18 species (Table B20) yielding an IBI of 48, and an BSC rating of "B" (Appendix A). Two species most often associated with cool brooks and headwater areas, red belly dace (*Phoxinus erythrogaster*, n=1) and blacknose dace (*Rhinichthys atratulus*, n=3) (Smith, 1979) were collected at this station. Fingerling and juvenile fish dominated the collection. The largest fish collected were juveniles, including a 5.4 inch (137 mm) creek chub (*Semotilus atromaculatus*), a 5.3 inch (135 mm) white sucker (*Catostomus commersoni*), and a 5 inch (127 mm) smallmouth bass. The most abundant species was the central stoneroller (n=166), an omnivorous minnow capable of consuming algae.

Weathered, relict shells of a cylindrical papershell and a plain pocketbook (*Lampsilis cardium*) were the only evidence of mussels present at EBR-2. No live or recently dead mussels were found. A MCI of 4 qualifies EBR-2 as a Restricted Mussel Resource that is unlikely to recover except through immigration from better sites, after conditions improve.

Table B20. Station EBR-2 Fish Collection, August 13, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Southern redbelly dace	Phoxinus erythrogaster	Intolerant	1
Creek chub	Semotilus atromaculatus	Tolerant	78
Hornyhead chub	Nocomis biguttatus	Intolerant	45
Central stoneroller	Campostoma anomalum	-	166
Blacknose dace	Rhinichthys atratulus	-	3
Striped shiner	Luxilus chrysocephalus	-	12
Common shiner	Luxilius cornutus	-	65
Bluntnose minnow	Pimephales notatus	Tolerant	69
Bigmouth shiner	Notropis dorsalis	-	20
Sand shiner	Notropis ludibundus	-	14
White sucker	Catostomus commersoni	Tolerant	14
Rock bass	Ambloplites rupestris	-	5
Smallmouth bass	Micropterus dolomieu	Intolerant	17
Green sunfish	Lepomis cyanellus	Tolerant	1
Bluegill	Lepomis macrochirus	-	12
Johnny darter	Etheostoma nigrum	-	14
Orangethroat darter	Etheostoma spectabile	-	49
Fantail darter	Etheostoma flabellare	-	13
Total Number			598
Total Species			18

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Welch Creek

Welch Creek is the eastern-most component of the Big Rock Creek watershed, originating west of the Village of Elburn as two small tributaries north of Keslinger Road. The Elburn Waste Water Treatment Plant discharge may be the principal source of water in the eastern headwater tributary. Welch Creek, the second longest Big Rock Creek tributary, flows approximately 17 miles from it's headwaters to its confluence with Big Rock Creek approximately 2000 feet upstream of Jericho Road. Welch Creek had a more diverse channel morphometry than the other tributaries. While a considerable length of the stream had been straightened, and was wide and shallow, other reaches are recovering, or had an established, natural, meandering channel. In most areas sand substrate predominated, but some had a cobble/gravel substrate. Three stations were sampled on Welch Creek to represent the range of stream characteristics.

Table B21. Welch Creek Station Characteristics

Parameter	WC-1	WC-2	WC-3
Date Sampled (fish)	8/21/2002	8/16/2002	8/16/2002
Water Temperature C ⁰ /F ⁰	21.2/70	22/71.6	21.4/70.5
Air Temperature C ⁰ /F ⁰	25/77	28.2/83	25/77
Conductivity (umhos/cm)	682	561	591
Turbidity (NTU)	na	13	13
Flow Velocity - ft/sec	na	1.5	1.0
Average Depth (feet)	1.0	1.5	1.0
Station Length (feet)	591	500	500
Sampling Effort (minutes)	48	34	35
Stream Gradient (feet/mile) (ave % slope/hundred ft)	7.1 (0.35)	14.3 (0.271)	10.0 (0.189)
Stream Width (feet)	20	15	20
Sampling Efficiency (poor=0/best=27)	9	3	9
Gear Type, (ES= electric seine. PE=back-pack)	ES	ES	ES
Data ID Number	12054	12055	12056
IEPA Station Code Number	NONE	NONE	NONE

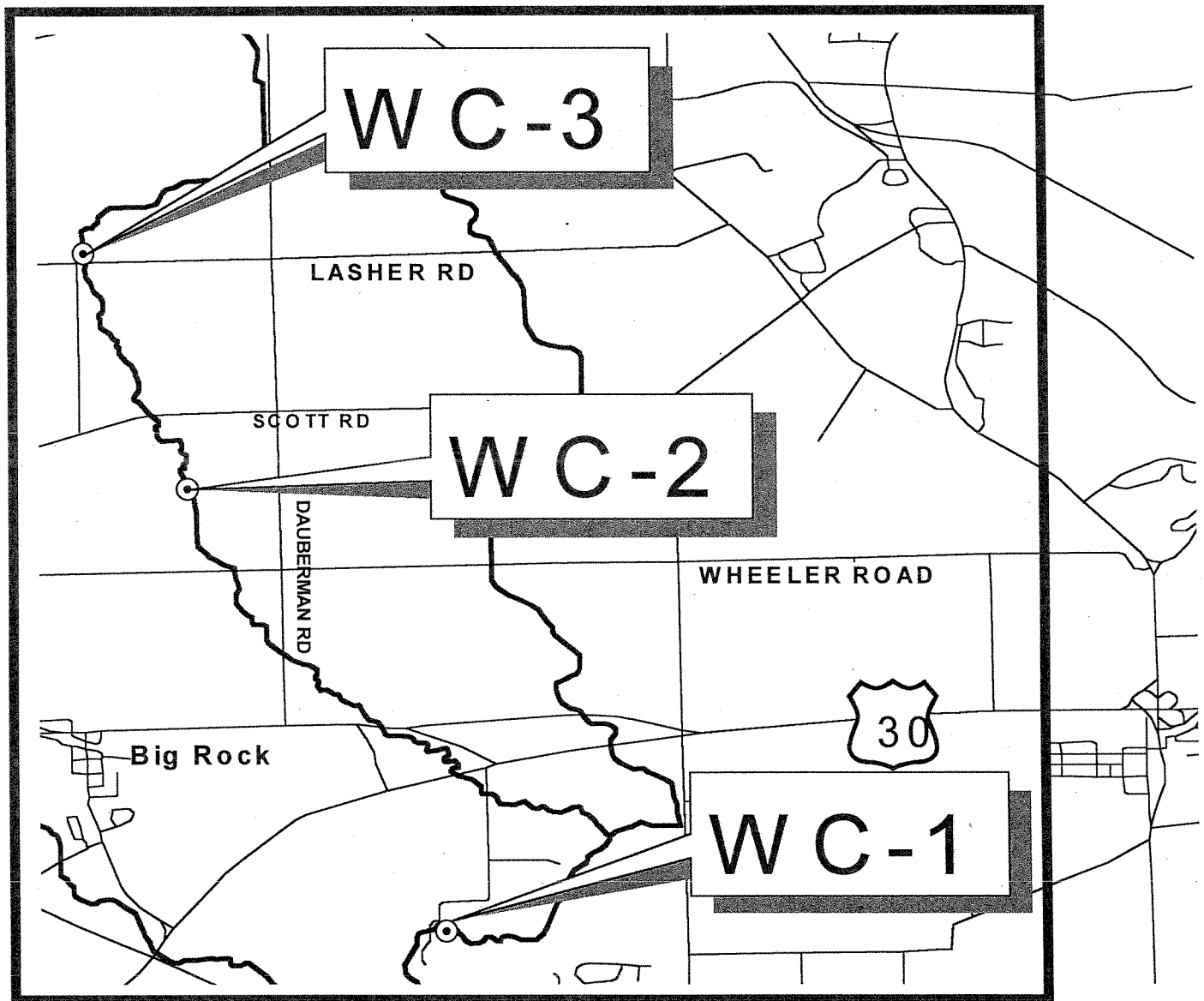


Figure B4. Welch Creek 2002 and 2003 Sampling Stations

Station WC-1

Station WC-1 was located on Welch Creek approximately one mile north of the confluence of Welch Creek and Big Rock Creek on Camp Dean property (Girl Scouts of U.S.A, Figure B4). Camp Dean is located at the end of Camp Dean Road, approximately two miles south of Granart Road, and approximately eight miles west of Illinois Route 47. The lower block net was located approximately 50 feet upstream of a foot bridge.

Portions of the channel are incised and appear to have been straightened. Meander bends, with the associated pools and riffles, are re-establishing in the upper two thirds of the station. At the time of the survey, a channel was forming that, at higher flows, creates an island. The lower 1/3 of

the station is still a straight-line channel.

Channel substrate varied substantially between pools, runs, and riffles. The four pools in the sample reach exhibited depths from 18 inches to 36 inches and had a substrate comprised of sand, gravel, and some mud. In the area sampled, silt/mud substrate was only found primarily in one pool. Mud/silt covered nearly a third of the pool (approximately 15% of the sample reach). The substrate in the other pools was primarily sand and gravel. Gravel was found in the tail areas of pools, mixed with cobble in the riffle/run areas. The majority of the area within the riffles and runs was cobble. For the entire reach, percent substrate coverage was: 40% cobble, 25% sand, 20% gravel, and 15% silt. Much of the cobble was not imbedded, providing the principle habitat for invertebrates and many smaller fishes. There was one dead-fall tree, two additional areas of woody debris, and two areas of exposed, submerged tree roots.

Fish population sampling resulted in the collection of 463 fishes representing 26 species (Table B22). An IBI of 56 was calculated for WC-1, which qualifies this reach of stream for a rating of "A" (Appendix A). The high species diversity at this station reflects the variety of habitats available. Nearly all the fish collected were small in size. Fifteen of the twenty smallmouth bass collected were from the 2002 year class. The largest fish collected, a smallmouth bass, was 10.3 inches (262 mm) in length. Several larger common carp were observed in the stream, but not collected in the sample.

Mussel sampling efforts resulted in the collection of 37 individuals from 9 species (Table B23). An MCI rating of 14 qualifies WC-1 as a Highly Valued Mussel Resource of state-wide significance. WC-1 had the highest mussel species diversity of any Big Rock Creek watershed sampling station. One individual of the State Endangered spike mussel was collected. Spike mussel were collected at only one other site in the watershed. Two individuals of the rare, intolerant ellipse mussel were also collected at WC-1. Ellipse mussel was collected at six of the fifteen Big Rock Creek watershed survey stations.

Table B22 Welch Creek Station WC-1 Fish Collection, August 21, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Gizzard shad	Dorosoma cepedianum	-	2
Creek chub	Semotilus atromaculatus	Tolerant	11
Hornyhead chub	Nocomis biguttatus	Intolerant	71
Central stoneroller	Campostoma anomalum	-	72
Largescale stoneroller	Campostoma oligolepis	-	14
Blacknose dace	Rhinichthys atratulus	-	4
Striped shiner	Luxilus chrysocephalus	-	3
Common shiner	Luxilius cornutus	-	9
Spotfin shiner	Cyprinella spiloptera	-	15
Bluntnose minnow	Pimephales notatus	Tolerant	33
Rosyface shiner	Notropis rubellus	Intolerant	7
Bigmouth shiner	Notropis dorsalis	-	2
Sand shiner	Notropis ludibundus	-	115
White sucker	Catostomus commersoni	Tolerant	8
Northern hogsucker	Hypentelium nigricans	Intolerant	5
Golden redhorse	Moxostoma erythrurum	-	7
Yellow bullhead	Ameiurus natalis	Tolerant	5
Stonecat	Noturus flavus	-	15
Largemouth bass	Micropterus salmoides	-	1
Smallmouth bass	Micropterus dolomieu	Intolerant	20
Green sunfish	Lepomis cyanellus	Tolerant	7
Bluegill	Lepomis macrochirus	-	1
Johnny darter	Etheostoma nigrum	-	6
Banded darter	Etheostoma zonale	Intolerant	16
Orangethroat darter	Etheostoma spectabile	-	12
Fantail darter	Etheostoma flabellare	-	2
Total Number			463
Total Species			26

Table B23. Welch Creek Station WC-1 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Elktoe	<i>Alsmidonta marginata</i>	-	7
Cylindrical papershell	<i>Anodontoides ferussacianus</i>	-	1
Spike	<i>Elliptio dilatata</i>	Intolerant	1
Plain pocketbook	<i>Lampsilis cardium</i>	-	4
White heelsplitter	<i>Lasmigona complanata</i>	-	14
Creek heelsplitter	<i>Lasmigona compressa</i>	-	1
Giant floater	<i>Pyganodan grandis</i>	-	1
Creeper	<i>Strophitus undulatus</i>	-	6
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	2
Total Number			37
Total Species			9

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or not designated (-) as tolerant or intolerant.

** State Threatened Species

Station WC-2

Station WC-2 is located approximately 1000 feet south of Scott Road, nearly one mile west of Dauberman Road, and four miles north of the Village of Big Rock (Figure B4). Although WC-2 is located just two miles south of the next upstream station (WC-3), it had a unique, sinuous, channel configuration.

The stream is separated from agricultural fields by a grass and intermittently forested corridor, varying in width from 300 feet to 600 feet. A 65 to 130-foot wide corridor of naturalized, or native vegetation made up the immediate stream border. Forested areas provided shade over approximately 20% of the stream channel.

The stream gradient at this location is relatively high at 14.3 feet per mile, and the channel is deeply incised. The stream's meander pattern is pronounced, and highly sinuous. Ongoing channel evolution is evident. The island bars are comprised of recently deposited, sandy material, resulting from rapid erosion from channel migration. Five pools occurred in the sample reach with an average depth of two feet, and a maximum depth of three feet. Riffles (n=6) appeared to be unstable, and were composed primarily of sand and small gravel. Channel substrate at this station was predominately sand and small gravel which covered 95% of area. The remaining 5% was silt and mud from outside bend bank failures. Terrestrial vegetation overhanging the bank was the principal habitat type. Undercut banks and woody debris provided additional habitat.

Fish population sampling resulted in the collection of 552 fishes representing 21 native species and one non-native species (common carp) (Table 24). An IBI of 44 was calculated for WC-2,

qualifying this reach of stream for a BSC rating of "B" (Appendix A). The southern red belly dace, a species associated with cool brooks, spring seeps and headwaters (Smith, 1979), was collected (n=26) at this station. All fish collected were small, the largest was a golden redhorse sucker (*Moxostoma erythrurum*) 8.7 inches (221 mm) in length. More than 91% of the fish collected were Cyprinid (minnow) species. The characteristics and composition of the fish population at this station reflects its position high in Welch Creek's watershed.

A total of 29 live mussels representing two species were collected at WC-2 (Table B25), qualifying as a Moderate Mussel Resource of local significance, with an MCI value of 8. The mussels ranged in age from less than 3 years old to greater than 11 years old, indicating successful reproduction and the ability of mussels to persist at this location.

Table B24. Welch Creek Station WC-2 Fish Collection, August 16, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Common Carp	Cyprinus carpio	Tolerant	6
Southern redbelly dace	Phoxinus erythrogaster	Intolerant	26
Creek chub	Semotilus atromaculatus	Tolerant	28
Hornyhead chub	Nocomis biguttatus	Intolerant	73
Central stoneroller	Campostoma anomalum	-	55
Largescale stoneroller	Campostoma oligolepis	-	1
Suckermouth minnow	Phenacobius mirabilis	-	2
Blacknose dace	Rhinichthys atratulus	-	94
Striped shiner	Luxilus chrysocephalus	-	35
Common shiner	Luxilius cornutus	-	102
Bluntnose minnow	Pimephales notatus	Tolerant	63
Rosyface shiner	Notropis rubellus	Intolerant	4
Bigmouth shiner	Notropis dorsalis	-	4
Sand shiner	Notropis ludibundus	-	11
White sucker	Catostomus commersoni	Tolerant	29
Golden redhorse	Moxostoma erythrum	-	2
Yellow bullhead	Ameiurus natalis	Tolerant	6
Stonecat	Noturus flavus	-	1
Smallmouth bass	Micropterus dolomieu	Intolerant	2
Green sunfish	Lepomis cyanellus	Tolerant	1
Bluegill	Lepomis macrochirus	-	5
Johnny darter	Etheostoma nigrum	-	2
Total Number			552
Total Species			22

Table B25. Welch Creek Station WC-2 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Creek heelsplitter	<i>Lasmigona compressa</i>	-	26
Cylindrical papershell	<i>Anodontoidea ferussacianus</i>	-	3
Total Number			29
Total Species			2

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Welch Creek Station WC-3

Welch Creek station WC-3 was located on the north side of Lasher Road, one mile west of Dauberman Road, and approximately 2 miles north of WC-2 (Figure B4). This station was channelized, typical of nearly all of Welch Creek upstream of this location. The stream channel was incised and straight, but has not recently been ditched or maintained. At the time of the survey, the channel exhibited signs of recovery (ie. sand bar and pool formation and bank slumping).

The stream banks showed moderate erosion and slumping on outside bends, and the formation of sand bars, or "braiding", at several locations. Four riffles were present in the sample area, representing approximately 25% of the station. Pool formation is still in its infancy, as only one deep pool was present in the sampled reach (5% of station). Most of the sampled reach was composed of run morphology. Substrate was primarily sand (60%) and small gravel (40%), which is typical for the segment of stream between Lasher Road and Keslinger Road. The principal aquatic habitat features were undercut banks and terrestrial vegetation over hanging the banks. The stream has a moderately high gradient of 10 feet/mile, which may account for the lack of finer, more mobile silt and mud substrate at this station.

The stream corridor is approximately 75 feet wide, vegetated primarily with reed canary grass. Stream banks are steep on both sides, but much higher on the east side. The majority of the flood plain is on the west side, with pasture above the higher bank on the east side.

Fish population sampling resulted in the collection of 1,876 fishes representing 17 native species and one non-native species (common carp) (Table B26). An IBI of 37 was calculated for WC-3 qualifying this reach of stream for a 'C' rating (Appendix A). Although fish abundance was high for a tributary station (average tributary abundance = 841), species diversity was low (average tributary species diversity = 23). WC-3 also had very few invertivores (insect eating fish), which comprised only 1% of the total abundance. In contrast, the East Branch of Big Rock Creek station, EBR-2, also only had 17 species present; however, it had 13% invertivore species. Small stream size and high position in the watershed contributed to low species diversity at both WC-1 and EBR-2. However, the paucity of instream habitat at WC-3 is probably responsible for the low percentage of invertivores and may also contribute to low species diversity. Two cool water streams species, the southern redbelly dace and blacknose dace (Smith, 1979), were abundant at this station (n= 243 and n=312, respectively).

Mussel sampling resulted in the collection of 137 individuals representing 3 species (Table B27). One individual of the rare and intolerant ellipse mussel was collected. A MCI value of 12 was calculated, qualifying WC-3 as a Highly Valued Mussel Resource of statewide significance, due to mussel abundance.

Table B26. Welch Creek Station WC-3 Fish Collection, August 16, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Gizzard shad	Dorosoma cepedianum	-	27
Carp	Cyprinus carpio	Tolerant	15
Southern redbelly dace	Phoxinus erythrogaster	Intolerant	243
Creek chub	Semotilus atromaculatus	Tolerant	24
Hornyhead chub	Nocomis biguttatus	Intolerant	110
Central stoneroller	Campostoma anomalum	-	126
Blacknose dace	Rhinichthys atratulus	-	312
Striped shiner	Luxilus chrysocephalus	-	96
Common shiner	Luxilus cornutus	-	321
Bluntnose minnow	Pimephales notatus	Tolerant	492
Bigmouth shiner	Notropis dorsalis	-	40
Sand shiner	Notropis ludibundus	-	17
White sucker	Catostomus commersoni	Tolerant	26
Golden redbreast	Moxostoma erythrum	-	3
Yellow perch	Ameiurus natalis	Tolerant	5
Smallmouth bass	Micropterus dolomieu	Intolerant	1
Green sunfish	Lepomis cyanellus	Tolerant	1
Johnny darters	Etheostoma nigrum	-	17
Total Number			1876
Total Species			18

Table B27. Mussel Collection for Welch Creek Station WC-3, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
White heelsplitter	<i>Lasmigona complanata</i>	-	1
Creek heelsplitter	<i>Lasmigona compressa</i>	-	135
Ellipse	<i>Venustaconcha ellipsiformes</i>	Intolerant	1
Total Number			137
Total Species			3

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Little Rock Creek

Little Rock Creek begins in Dekalb County, north of Perry Road, south of the City of Dekalb, and as far west as Illinois Route 23. It arises on the east side of the watershed divide that separates the South Branch of the Kishwaukee River and Fox River watersheds. Flowing 30 miles through Kane and Kendall Counties, it joins with Big Rock Creek approximately 500 feet from the confluence with the Fox River. A nearly autonomous system, Little Rock Creek is almost twice the length of the Welch Creek, the next longest Big Rock Creek tributary.

Table B28. Little Rock Creek Station Characteristics

Parameter	LRC-1	LRC-2
Date Sampled (fish)	8/22/2002	8/12/2002
Water Temperature C ⁰ /F ⁰	21 / 70	na
Air Temperature C ⁰ /F ⁰	26 / 79	na
Conductivity (umhos/cm)	825	na
Turbidity (NTU)	4	na
Flow Velocity - ft/sec	na	na
Average Depth (feet)	1.0	0.5
Station Length (feet)	576	700
Sampling Effort (minutes)	38	46
Stream Gradient (feet/mile) (ave % slope/hundred ft)	16.7 0.316	5.9 0.111
Stream Width (feet)	21	22
Sampling Efficiency (poor=0/best=27)	3	9
Gear Type, (ES= electric seine. PE=back-pack)	ES	ES
Data ID Number	12057	12048
IEPA Station Code Number	DTCA-01	NONE

Two stations were sampled on Little Rock Creek during the 2002/2003. The middle reach of Little Rock Creek was not included in the 2002 fish survey due to an extensive fish kill which occurred in 1998, stretching from Galena Road downstream to Plano (Figure 1).

The entire Big Rock Creek watershed experienced drought conditions during late summer and early fall, 2003. A stream flow inspection of Little Rock Creek was conducted on September 23 and October 24, 2003. At the Creek Road bridge near Plano, on both occasions, the stream channel was dry, with a very shallow pool under the bridge. Although no flow was observed in Little Rock Creek during this period, it appeared that several refuges existed. On October 24, 2003, substantial pools were observed at Bastian Road (south of the Village of Hinckley), at Shabbona Grove Road, and north of the U.S. Route 34 bridge near Plano.

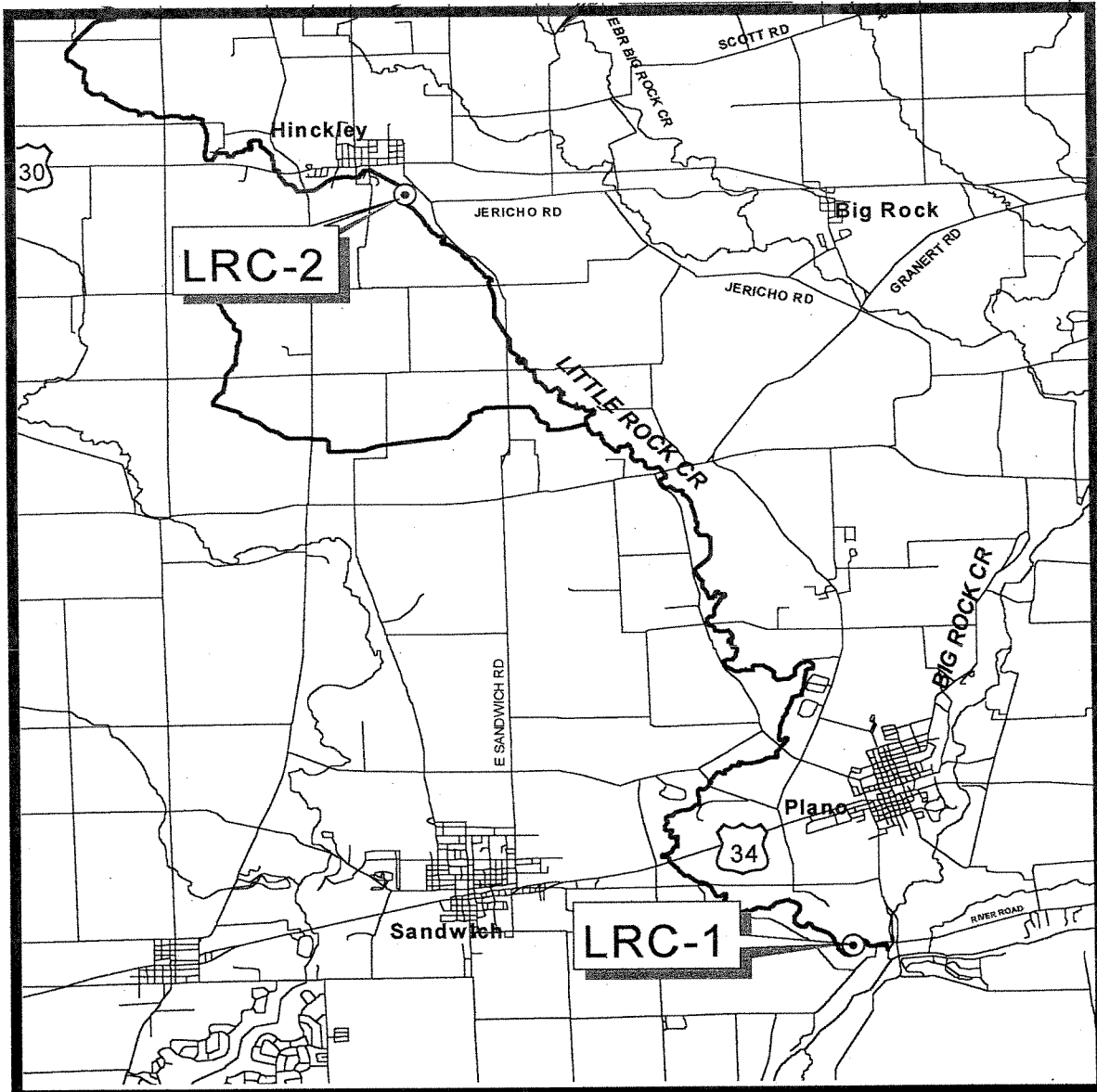


Figure B5. Little Rock Creek 1999, 2002, and 2003 Sampling Stations

Little Rock Creek Station LRC-1

Little Rock Creek station LRC-1 was located approximately 3/4 mile west of the confluence with Big Rock Creek (Figure B5). The station is located southwest of the City of Plano, south (downstream) of U.S. Route 34, and east of Burr Oak Road.

The stream channel gradient at LRC-1 was higher than any other station in the survey (16.7 ft/mile). The channel has exposed bedrock, steep riffles, and deep pools - characteristics typical of the lower reaches of Little Rock Creek (south of U.S. Route 34). A dominant feature of this station was a long, boulder and cobble strewn run (approximately 30% of the length of this station). The run was approximately one foot deep with considerable bed rock exposed on the west shoreline and stream bottom. Overall, the stations substrate was composed of bedrock, boulders, and cobble, with sand and gravel point bars. Three pools were present in this station with depths from approximately 24 to 36 inches. Substrate over nearly 15% of the reach was exposed bedrock. Sand and gravel covered 40% of the station, with the remaining 25% was cobble. Approximately 15% of the channel was shaded at the time of sampling.

Brush, roots, debris, and aquatic plants (*Potamogeton* spp) were present, but limited, contributing very little usable habitat. Boulders and cobbles were not imbedded, with substantial interstitial areas for fish and macroinvertebrate habitat. A dam collapsed by the floods of 1996 and 1997 is located approximately 500 feet upstream of the sampling location. The failure of this dam has provided an opportunity for many species of fish, including smallmouth bass, to recolonize the upper reaches of Little Rock Creek.

The riparian area is a narrow plain at the bottom of a deep valley. Agriculture is limited to the eastern highlands adjacent to the valley. The stream corridor at this location is heavily vegetated with native (and non-native) plants and trees.

Fish population sampling resulted in the collection of 1,230 fishes representing 27 native species and one non-native species (common carp, Table B29). An IBI score of 53 was calculated for LRC-1 qualifying this reach of stream for an "A" rating (Appendix A). LCR-1 was one of only three stations in the Big Rock Creek Watershed survey where mottled sculpin (n=19) and channel catfish (one individual, 18.7 inches in length) were collected. Smallmouth bass (n=45) were collected in the second highest abundance for the 2002 survey. Smallmouth bass were represented by fingerling and juvenile fish 1.7 to 8.0 inches in length (42 - 200 mm), and two adults between 14 and 15 inches (357 - 380 mm).

Mussel sampling resulted in the collection of 7 mussels representing 3 species (Table B30). A MCI value of 9 was calculated for LRC-1, which qualifies as a Moderate Mussel Resource. Recent high flow events may account for reduced mussel communities in lower Little Rock Creek, similar to the condition described for the downstream areas of Big Rock Creek.

Table B29. Little Rock Creek Station LRC-1 Fish Collection, August 22, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Carp	Cyprinus carpio	Tolerant	3
Creek chub	Semotilus atromaculatus	Tolerant	12
Hornyhead chub	Nocomis biguttatus	Intolerant	67
Central stoneroller	Campostoma anomalum	-	244
Largescale stoneroller	Campostoma oligolepis	-	69
Suckermouth minnow	Phenacobius mirabilis	-	4
Striped shiner	Luxilus chrysocephalus	-	3
Common shiner	Luxilius cornutus	-	7
Spotfin shiner	Cyprinella spiloptera	-	48
Fathead minnow	Pimephales promelas	Tolerant	2
Bluntnose minnow	Pimephales notatus	Tolerant	213
Rosyface shiner	Notropis rubellus	Intolerant	30
Bigmouth shiner	Notropis dorsalis	-	39
Sand shiner	Notropis ludibundus	-	340
White sucker	Catostomus commersoni	Tolerant	12
Northern hog sucker	Hypentelium nigricans	Intolerant	20
Shorthead redhorse	Moxostoma macrolepidotum	-	5
Golden redhorse	Moxostoma erythrurum	-	1
Channel catfish	Ictalurus punctatus	-	1
Yellow bullhead	Ameiurus natalis	Tolerant	1
Stonecat	Noturus flavus	-	1
Mottled sculpin	Cottus bairdi	Intolerant	19
Largemouth bass	Micropterus salmoides	-	2
Smallmouth bass	Micropterus dolomieu	Intolerant	45
Green sunfish	Lepomis cyanellus	Tolerant	2
Bluegill	Lepomis macrochirus	-	2
Johnny darter	Etheostoma nigrum	-	9
Banded darter	Etheostoma zonale	Intolerant	29
Total Number			1230
Total Species			28

Table B30. Station LRC-1 Mussel Collection, July 22, 2003

Common Name	Scientific Name	Tolerance *	Qty
Cylindrical papershell	<i>Anodontoides ferussacianus</i>	-	1
Plain pocketbook	<i>Lampsilis cardium</i>	-	5
Fat mucket	<i>Lampsilis siliquioidea</i>	-	1
Total Species		3	Total Number
			7

* Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

Little Rock Creek Station LRC-2

Little Rock Creek station LRC-2 was located on the south side of the Village of Hinckley, west of East Sandwich Road (Figure B4). The upper end of the station was approximately 600 feet downstream of the Village of Hinckley's wastewater treatment plant outfall.

The channel at LRC-2 appears to be widening as evidenced by substantial bank erosion. The channel gradient was moderate (5.9 ft/mi), typical of the upper reaches of Little Rock Creek (Illinois Stream Information System - ISIS). Substrate was predominantly gravel (approximately 50%). Sand (20%) and mud (5%) were present, with cobble (25%) providing substrate stability. The average depth at this station was 0.5 foot, with four pools (approximately 40% coverage) in the sample reach varying from 1.0 foot to 2.5 feet in depth. The dominant feature of this reach were the runs (n=5), which covered approximately 55% of the length of the station.

Aquatic habitat was comprised of large colonies of the aquatic plant elodea (*Elodea canadensis*, 15% coverage), a few boulders, a short area of undercut bank, and some brush and debris. The moderately abundant cobble was predominantly, although not entirely, embedded deep into the gravel and sand substrate, and provided minimal habitat value. Approximately 40% of this station is shaded during much of the day due to a heavily forested riparian border on the west side of the stream, and a woody edge along the east side. A narrow grass corridor (approximately 20 feet wide) along the east side separated the stream edge from agricultural fields.

Fish population sampling resulted in the collection of 3,017 fishes representing 26 native species and one non-native species (common carp) (Table B31). An IBI score of 45 was calculated for LRC-2 qualifying this reach of stream for a 'B' rating (Appendix A). LRC-2 exhibited the greatest fish abundance of any station in the Big Rock Creek Watershed survey. The number of fish is strongly influenced by the abundance of two omnivorous minnow species, the common shiner and the bluntnose minnow, together representing over 50% (n=1,511) of total fish abundance (Table B31). Four other minnow species were also abundant at this station; hornyhead chub (n=220), central stoneroller (n=198), bigmouth shiner (*Notropis dorsalis*, n=250), and sand shiner (n=242). These six minnow species together comprised over 80% (n=2,241) of the fish abundance in this sample. The lack of deeper pool habitat and the distance from the Fox River (18 miles) may account for the absence of predatory fish at LRC-2. Smaller minnow species typically dominate these shallow upstream areas.

Mussels were entirely absent at LRC-2 with no live, dead, or artifact shells collected. Stations with no evidence of mussels are classified as a Restricted Mussel Resource, that are unlikely to recover until conditions improve. Conditions preventing the establishment of a viable mussel population in this reach of stream are currently unknown.

Table B31. Little Rock Creek Station LRC-2 Fish Collection, August 12, 2002

COMMON NAME	SCIENTIFIC NAME	TOLERANCE *	QTY
Carp	Cyprinus carpio	Tolerant	4
Southern redbelly dace	Phoxinus erythrogaster	Intolerant	4
Creek chub	Semotilus atromaculatus	Tolerant	87
Hornyhead chub	Nocomis biguttatus	Intolerant	220
Central stoneroller	Campostoma anomalum	-	198
Largescale stoneroller	Campostoma oligolepis	-	1
Suckermouth minnow	Phenacobius mirabilis	-	1
Blacknose dace	Rhinichthys atratulus	-	20
Striped shiner	Luxilus chrysocephalus	-	149
Common shiner	Luxilius cornutus	-	683
Redfin shiner	Lythrurus umbratilis	-	23
Spotfin shiner	Cyprinella spiloptera	-	14
Bluntnose minnow	Pimephales notatus	Tolerant	828
Rosyface shiner	Notropis rubellus	Intolerant	5
Bigmouth shiner	Notropis dorsalis	-	250
Sand shiner	Notropis ludibundus	-	242
White sucker	Catostomus commersoni	Tolerant	136
Northern hog sucker	Hypentelium nigricans	Intolerant	4
Golden redbreast	Moxostoma erythrurum	-	3
Yellow bullhead	Ameiurus natalis	Tolerant	48
Stonecat	Noturus flavus	-	3
Smallmouth bass	Micropterus dolomieu	Intolerant	2
Green sunfish	Lepomis cyanellus	Tolerant	7
Bluegill	Lepomis macrochirus	-	1
Johnny darter	Etheostoma nigrum	-	55
Orangethroat darter	Etheostoma spectabile	-	15
Fantail darter	Etheostoma flabellare	-	14
Total Number			3,017
Total Species			27

*Tolerance reflects whether a species is Intolerant of habitat degradation and siltation, Tolerant of degraded habitat and silt or mud substrate, or (-) not designated as tolerant or intolerant.

