COMMONWEALTH BIOMONITORING
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Wildcat Creek
Little Wildcat Creek
Kokomo Creek

Biological Monitoring Results
July 2008

Introduction

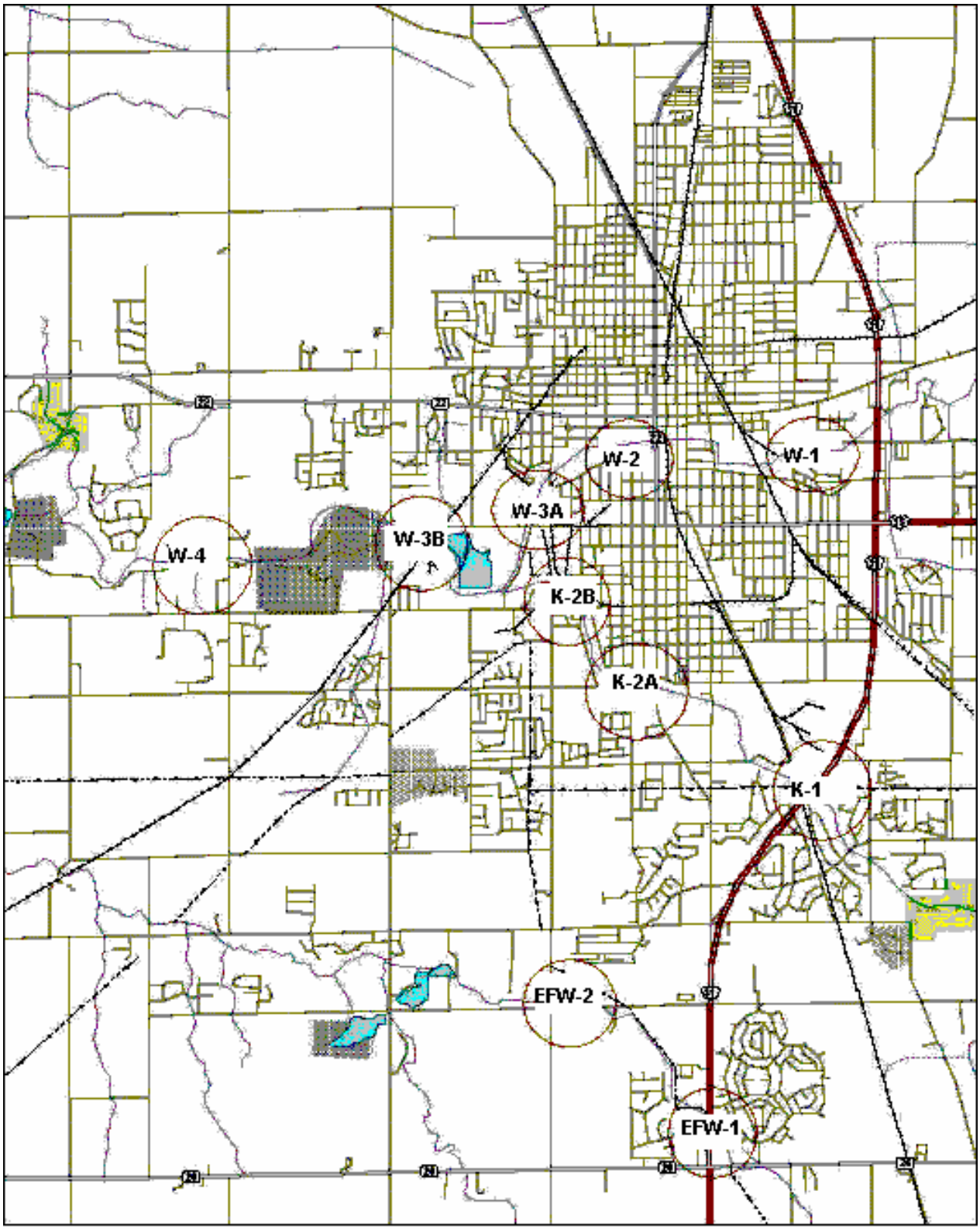
The City of Kokomo, Indiana has a combined sewer system. During 2001 and 2002, the City commissioned a biological study to measure potential effects of combined sewer overflows (CSOs) on fish communities. CSOs occur on three streams: Little Wildcat Creek, Kokomo Creek, and Wildcat Creek.

Since the earlier study, the City has implemented a combined sewer overflow operations plan and reduced the frequency and duration of CSOs. To measure potential improvements in water quality associated with implementation of the CSO operations plan, Commonwealth Biomonitoring re-sampled the 2001 and 20002 monitoring sites using the same sampling methods.

Study Sites

Site EFW-1. Little Wildcat Creek	Highway 31
Site EFW-2. Little Wildcat Creek	CR 100 W
Site K-1. Kokomo Creek	Highway 31
Site K-2A. Kokomo Creek	Highland Park, upstream from dam
Site K-2B. Kokomo Creek	Highland Park, downstream from dam
Site W-1. Wildcat Creek	Waterworks Park
Site W-2. Wildcat Creek	Foster Park
Site W-3A. Wildcat Creek	Upstream from WWTP
Site W-3B. Wildcat Creek	Downstream from WWTP
Site W-4. Wildcat Creek	YMCA Camp at CR 300 W

Sampling Sites for Fish Communities



Methods

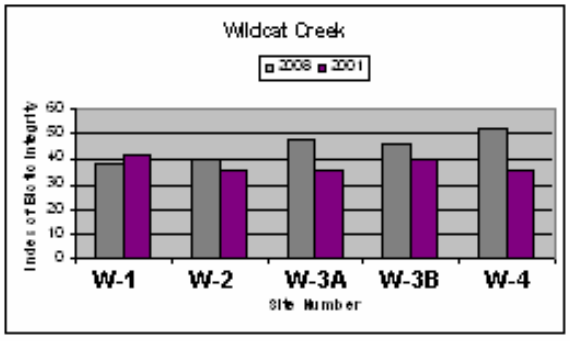
Fish were collected by DC electrofishing for a minimum collection time of 1800 seconds at each site. Fish were identified on site before being released, except for representative specimens that were kept as vouchers. Small minnows were preserved for laboratory analysis. Any anomalies present on the fish were noted. Preserved fish were identified using the taxonomic references of Eddy and Underhill (1978) and Page and Burr (1991). Index of Biotic Integrity (IBI) scores were calculated according to the method of Karr et al. (1986) and Simon and Dufour (1997). This method evaluates 12 metrics for a total possible score of 60. Metrics include total number of species, number of darter species, number of sucker species, number of sunfish species, and percent of catch considered to be species tolerant to degraded conditions.

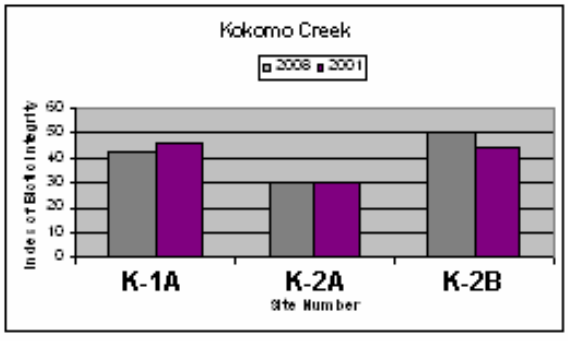
Results

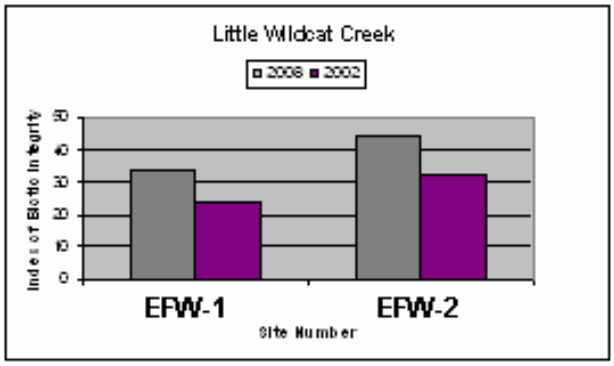
A total of 36 species of fishes was collected from the ten sampling sites in 2008. The fish community was dominated by Centrarchids (sunfish and bass) at most sites. Together, six species from this group made up 61% of all fish collected. Bluegills were the most common species. Cyprinids (minnows) were the next most common group, making up 19% of the fish community. Also present in smaller numbers were various sucker, perch, and catfish species.

Discussion

The index of biotic integrity or IBI, a measure of ecological health, has clearly improved at most sites since the 2001-2002 sampling period. Comparisons of 2001 and 2008 IBI results for each stream are shown below:







The average IBI score for the ten sites has improved from 37 (fair ecological condition) to 42 (good ecological condition). The greatest improvement has occurred in Wildcat Creek at site **W-4**, downstream from the city at the YMCA camp. The IBI score here has improved 16 points, from "fair" to "excellent" (among the best fish communities in Indiana).

The "metrics" showing the greatest degree of improvement since the previous study are (1) the number of sunfish species [the number has increased], (2) the percentage of tolerant individuals [the percentage has decreased], and (3) the percentage of omnivore individuals [the percentage has decreased]. Improved metric scores are associated with improved water quality (e.g. higher dissolved oxygen, lower ammonia and suspended solids, and fewer toxic substances).

CSOs are known to contribute to water quality degradation. Improved fish communities since 2001 show that combined sewer overflow operations plan carried out by the City of Kokomo has been effective in improving water quality in local streams.

Sensitive fish present in increasing numbers in local streams

Greenside darter

Smallmouth bass

Longear sunfish

References

Eddy, S. and Underhill, J.C. 1978. How to Know the Freshwater Fishes. Third Edition. Wm. C. Brown Company Publishers. Dubuque, Iowa. 215 pp.

Karr, J.R., Fausch, K.D., Angermeier, P.L., Yant, P.R. and Schlosser, I.J. 1986. Assessing biological integrity in running waters: a method and its rationale. Illinois Natural History Survey Special Publication 5. 28 pp.

Page, L.M. and Burr, B.M. 1991. A Field Guide to Freshwater Fishes. Houghton Mifflin Company, New York. 432 pp.

Plafkin. J.L., M.T. Barbour, K.D. Porter, S.K. Gross, and R.M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers. U.S. EPA Office of Water, Washington, D.C. EPA/444/4-89-001.

Simon, T. P. and Dufour, R. 1997. Development of Index of Biotic Integrity expectations for the Ecoregions of Indiana. V. Eastern Cornbelt Plain. U.S. Environmental Protection Agency. Region V. Water Division. Watershed and Non-Point Source Branch, Chicago, Illinois EPA 905/R-96/002.

Site Number	EFW-1	EFW-2	K-1	K-2A	K-2B	W-1	W-2	W-3A	W-3B	W-4
creek chub	11	35	17							
hornyhead chub								3		1
silver chub									14	16
emerald shiner						1	1		1	
common shiner							1	1		12
bigeye shiner										1
sand shiner		7	13	4	28	4	7	3	8	5
silverjaw minnow		3								1
bluntnose minnow	7	26	8	39	2					2
central stoneroller	1	18			3				3	
suckermouth minnow					1				2	
carp			2	1		1	2	14		2
blackstripe topminnow	1	2	1	2		1	6			
green sunfish	8	13	20	11	3	28	22	14	11	2
bluegill	40	19	14	24	36	34	9	12	23	11
longear sunfish				1	4	9	12	79	36	34
rockbass	1	1			2	15	3	8	10	13
pumpkinseed			23	9	3	6	7	20	6	5
orangespotted sunfish						2		2		
white crappie							2	1		1
black crappie							1			
smallmouth bass		1	1	1	4	16	8	2	4	4
largemouth bass					1	3	1	3	2	1
yellow bullhead	1			1				1		
brown bullhead				1						
johnny darter	5	5	3		2	4				1
greenside darter		2	1		3			1	13	4
fantail darter		6	2		1				7	2
orangethroat darter	1	3							4	1
logperch								1		
walleye					4	1	1	4		
white sucker		7	1		3		2		1	
northern hogsucker		1			3			17	2	8
spotted sucker							1	1		
golden redhorse								2	1	2
gizzard shad						1	2	2		
sampling date	6/19/2008	6/19/2008	6/19/2008	6/20/2008	6/20/2008	7/15/2008	7/15/2008	7/2/2008	7/2/2008	7/2/2008
total	76	149	106	94	103	126	88	191	148	129
IBI	34	44	42	30	50	38	40	48	46	52