

BIOLOGICAL/WATER QUALITY
SURVEY OF THE PROPOSED McCUTCHEON
ROAD EXTENSION IN GAHANNA,
FRANKLIN COUNTY, OHIO

Prepared by

Jeffrey M. Reutter
Charles E. Herdendorf
C. Lawrence Cooper

Prepared for

Clyde E. Williams & Associates, Inc.
and
City of Gahanna, Ohio

THE OHIO STATE UNIVERSITY
CENTER FOR LAKE ERIE AREA RESEARCH
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INTRODUCTION

The following report documents the biological and water quality characteristics of Big Walnut Creek and McKenna Creek, a small tributary to Big Walnut Creek, and the immediate terrestrial environs in the vicinity of Gahanna, Franklin County, Ohio. The study area includes a 3,000-foot reach of Big Walnut Creek, a 2,500-foot reach of McKenna Creek, and associated wetlands within the corridor of four proposed alternate routes for extension of McCutcheon Road. In August and December 1980, field surveys were conducted to obtain the data necessary for this documentation and for an assessment of the potential environmental impacts of crossing these water courses with a new highway. Wetlands were not assessed as part of this investigation.

PROCEDURES

Ecosystem Description

The general features of the ecosystem in the vicinity of the site were documented through field reconnaissance surveys and review of pertinent literature. This included basic geological information such as bedrock, surface materials, topography and stream characteristics. The various habitats and biological communities present at the site were described and mapped. A search of scientific reports was conducted to obtain additional information on the site or nearby areas with similar characteristics. This information was integrated with data obtained from the present survey to present a comprehensive statement of the ecological status of the site.

Water Quality

Water quality determinations were made at three locations on Big Walnut Creek and two locations on McKenna Creek (Figure 1):

<u>Station No.</u>	<u>Location</u>
BW-1	Big Walnut Creek at Alternate No. 2 crossing
BW-2	Big Walnut Creek at Alternate Nos. 1 and 3 crossings
BW-3	Big Walnut Creek at Alternate No. 4 crossing
MC-1	McKenna Creek at Alternate Nos. 2 and 3 crossings
MC-2	McKenna Creek at Alternate No. 4 crossing

Seventeen field and laboratory parameters were measured at four of these stations (BW-1, BW-3, MC-1 and MC-2), while seven field parameters were

measured at one station (BW-2). Time dependent determinations (such as temperature, dissolved oxygen and pH) were made in the field. Water samples were collected for laboratory analysis for the other parameters. All tests were performed using techniques prescribed in Standard Methods for Water Analysis (APHA, 1975) or approved by the U.S. Environmental Protection Agency.

Aquatic Life

Plankton. Phytoplankton and zooplankton were sampled at two stations on each tributary, nos. BW-1, BW-3, MC-1 and MC-2 (Figure 1). Whole water samples were collected for phytoplankton species, preserved with Lugol's solution and transported to the laboratory for microscopic examination. Zooplankton samples were taken by passing a 20-liter water sample through a 32- mesh net and preserving the retained organisms in five percent formalin for microscopic examination. Fish larvae (ichthyoplankton) were sampled with a 0.5-meter diameter oceanographic plankton net (571- mesh) by towing the net upstream for five minutes in the vicinity of Station BW-3. Analysis was accomplished with the use of inverted and compound microscopes in conjunction with counting cells. Standard texts, which are listed in the "Literature Cited" section of this report were used to confirm plankton identification. All samples will be maintained until the completion of the project.

Rooted Aquatic Plants. A thorough visual search was conducted along the banks of Big Walnut Creek and McKenna Creek as well as within the confines of the wetland located between Ridenour Road and Big Walnut Creek. This search was conducted to locate and identify the resident species of vascular aquatic plants. Species lists and relative abundance information are presented. Standard texts and manuals, comparison with known herbarium specimens, and consultation with The Ohio State University Herbarium staff members were used to confirm identifications.

Benthic Macroinvertebrates. Samples were collected from Station BW-1, BW-2 and BW-3 in Big Walnut Creek using a 6-inch by 6-inch Ekman Dredge (Figure 1). In an effort to obtain a more representative sample in the variable-sized substrate in the bed of Big Walnut Creek, multiple grabs were taken at each station with the Ekman Dredge. This substrate and water depth did not allow quantitative analysis, but relative species abundance was presented. Qualitative samples were also collected using dip nets and by turning over and scraping rocks. At Stations MC-1 and MC-2 in McKenna Creek quantitative estimates (organisms/m²) were obtained using the Ekman Dredge (Figure 1). All samples were sieved through a standard United States number 40 soil sieve, preserved in 10 percent formalin and returned to the laboratory for identification. Identifications were to the lowest taxonomic level practicable. All samples will be maintained until completion of construction.

Fish. Seines of varying lengths were used to sample and describe the fishery communities of the streams. In addition to the classical fishery techniques described above, a literature survey was conducted in an effort to determine the historical populations of the streams. The streams were visually inspected for spawning habitats. The Fishes of Ohio by Trautman (1957) was used to confirm identifications.

In addition to identifying the fish and qualitatively defining the populations with species lists, all fish captured were weighed, measured, and enumerated. The species were ranked both by biomass and numerical abundance. The mean length and weight of each species is presented. A voucher collection of each species will be maintained until completion of construction.

Terrestrial Life

Flora. Trees, shrubs, and herbaceous vegetation were surveyed along the alternative alignments. Survey lines were restricted to floodplain forest, oldfields and roadside areas. Managed croplands were excluded. A visual search throughout the limits of the construction area was also conducted. The results of this survey are presented as a list of dominant species present along with a discussion of their relative abundance. Identification procedures were the same as those listed for rooted aquatic plants.

Fauna. Using classical field techniques, investigators conducted visual surveys of the study area on three dates, June 24 and August 25 and 26. Actual visual sightings and other evidence of local occurrence (scats, tracks, burrows) were recorded. Avifauna surveys were conducted at six (6) observation posts along the proposed alignments (Figure 2). The results of these surveys are presented as a list of avian species and a discussion of the species of mammals, birds, reptiles and amphibians sighted within or near the study area or believed occurring in the study area based on the physical evidence encountered. Identification of species encountered were confirmed with the use of standard field guides and/or manuals.

GENERAL DESCRIPTION OF ECOSYSTEM

Geological Setting

The eastern portion of Franklin County is underlain by Devonian and Mississippian sedimentary rocks. The valley of Big Walnut Creek has been cut in shales of the Ohio and Bedford Formations. The Ohio Formation is a bituminous, hard, black shale with numerous concretions and the Bedford Formation is a bluish-gray to red clayey shale (Stauffer et al. 1911). The bedrock underlying the study area is believed to be the Ohio Shale, but no exposures were found within the proposed highway corridor.

The entire Big Walnut Creek watershed was glaciated by Illinoian and Wisconsin ice sheets. Throughout most of the region the glacial drift is thin, averaging not more than 20 feet (Stout, et al. 1943). In the valley, flood-plain deposits and stream alluvium covers the glacial deposits and the bedrock. North of Gahanna, on the east side of Big Walnut Creek, the surface deposits consist of glacial outwash material, largely sand and gravel. Near the mouth of McKenna Creek a north-south glacial esker accounts for a low ridge of sand and gravel. These materials are the primary deposits found in the beds of Big Walnut and McKenna Creeks within the study area.

Stream Characteristics

Big Walnut Creek has a length of 74.2 miles and a drainage area of 556.7 square miles. The elevation at its source is 1165 feet above sea level and the elevation of its mouth at the Scioto River in Pickaway County is 667 feet. This stream has an average fall (gradient) of 7.0 feet per mile (Krolezyles 1960). Hoover Reservoir, with a normal pool elevation of 890 feet has been constructed approximately 7 miles upstream of the study area. This reservoir has controlled the flow of water through the study area since September 1954.

Big Walnut Creek has an elevation of approximately 785 feet above sea level at the study site. Here this stream has a gradient of 6.3 feet per mile. McKenna Creek has an elevation of 810 feet at the upstream portion of the study area with a gradient of 62.5 feet per mile between there and its mouth at Big Walnut Creek. On the east, ridges framing the valley rise to 950 feet while on the west the crest is at only 860 feet. This provides a maximum local relief of 165 feet within approximately one mile of Big Walnut Creek.

The maximum discharge for Big Walnut Creek (as measured at Central College, 0.4 miles south of Hoover Reservoir, USGS Gage No. 03228500) was 23,800 cubic feet per second (cfs) on January 21, 1959. No flow was measured for many days in 1955. The mean flow for the period 1938 to 1978 was 184 cfs (U.S. Geological Survey 1979).

Biological Habitats

Aquatic. Big Walnut Creek in the construction corridor of the proposed McCutcheon Road extension near Gahanna, Ohio is a riffle/pool habitat typical of many Ohio streams. However, the stream is over 30 meters wide at many portions of this area and the only riffle encountered was at the southern most portion of the study area immediately south of Alternate No. 4 and intimately associated with a small wetland. This particular stretch of the stream is forested on both banks with many overhanging and fallen trees providing excellent cover for fish and other aquatic organisms. Small islands covered with Willows (*Salix* spp.) are common throughout this stretch of the stream. The banks slope (often steeply) to a depth of 4-5 feet at mid-stream. The stream bed is composed of sand and gravel. Many log snags and several boulders were encountered during the seining process.

McKenna Creek is a small tributary of Big Walnut Creek ranging from 3-10 feet in width and with a maximum depth of approximately 50 cm. It is a classic riffle/pool habitat with a high frequency of riffles. Most of the substrate is sand and gravel. The stream flows from the north through a small housing development north of the construction corridor where its banks are bare. In the vicinity of Alternate 2 (the northern boundary of the study area) the stream flows through a small Willow woods where the banks are very steep and the stream has eroded to a depth of 3-4 feet below the surrounding farmland. Many small shrubs overhang the stream beginning at this point and continuing throughout the remainder of the study area. These shrubs provide excellent cover for many fish species.

Wetlands. In the vicinity of the proposed alignments, wetland areas occur in an abandoned channel located between Ridenour Road and Big Walnut Creek and on an alluvial fan at the confluence of McKenna Creek and Big Walnut Creek.

Terrestrial. Four distinct terrestrial habitats occur within the study area: cultivated cropland, a small pasture area, old fields and hydric flood-plain forest.

WATER QUALITY

Table 1 contains the results of water quality determinations for samples collected at five stations on August 24, 1980. For comparison U.S. Geological Survey water quality records for 1976 and 1977 for Big Walnut Creek at Central College (approximately 7 miles upstream from the study area) are presented in Table 2. No previous information on the water quality of McKenna Creek could be located.

Big Walnut Creek. The USGS values and those obtained from the present study show good agreement indicating a rather consistent quality of the water in this stream. The quality of the water in this stream did not exceed any of the maximum permissible concentrations established by Ohio EPA (1978) for a warm water habitat on any of the dates sampled. Moderate industrial and cultural contamination was evident in the stream but not of serious concern.

McKenna Creek. This stream is considerably more mineralized than Big Walnut Creek (approximately twice the dissolved solids content), indicating that it is probably a spring-fed stream. Some nutrient enrichment, particularly phosphorus, was noted near the mouth (Station MC-2) which is likely due to fertilizers or domestic wastes. Even with its higher levels of dissolved substances, it still meets the Ohio EPA (1978) criteria for a warm water habitat.

AQUATIC LIFE

Plankton

Phytoplankton. Twenty-four genera of algae were identified from the two streams, twenty-one from Big Walnut Creek (Sta BW-1 and BW-3) and eleven from McKenna Creek (Table 3). Diatoms were the most abundant group of algae found at the upstream station (BW-1) of Big Walnut Creek; green and blue-green algae were common but less abundant. At the downstream station (BW-3) the algae population was more balanced between diatoms, green and blue-green algae. The total phytoplankton population at both stations was very similar (approximately 1100 cells per ml). Populations of this area were normal for moderately enriched streams but do not indicate gross nutrient pollution. The balanced population for the major algal groups indicates healthy stream conditions.

The algal populations in McKenna Creek were only 10-30% of the density in Big Walnut Creek. This is largely due to its faster flow and the more

shaded nature of McKenna Creek. The downstream station (MC-2) showed a 3-fold increase in population density (primarily green algae), presumably in response to the higher nutrient concentrations at this station as compared with the upstream station (MC-1).

Zooplankton. Fourteen taxa of zooplankters were found in the two streams, twelve in Big Walnut Creek and five in McKenna Creek (Table 4). There appears to be a strong correlation between stream velocity and abundance of planktonic invertebrates. At the slowest flow stations for each stream (BW-1 on Big Walnut Creek and MC-2 on McKenna Creek) the population densities were significantly lower. Rotifers were the most abundant group at all stations with the larger copepods being abundant only at the slow flow station on Big Walnut Creek (BW-1). All genera found are normal for moderately enriched streams.

Rooted Aquatic Vascular Plants

Vascular aquatic plants occur predominantly in the wetland area located in an abandoned watercourse located between Ridenour Road and the west bank of Big Walnut Creek. The open water portion of this wetland is nearly covered by duckweed (Lemna sp.). This open water area is partially covered by a canopy of sycamore (Platanus occidentalis) and black walnut (Juglans nigra). The stream course portion of this wetland is lengthy and contains narrow-leaved cattail (Typha angustifolia) and spatter-dock (Nuphar advena) predominantly. The adjacent wet meadow containing three species of bulrush (Scirpus spp.), one species of rush (Juncus sp.) and the twig-rush (Cladium mariscoides).

A second wetland area covers an alluvial fan in the water course of Big Walnut Creek at the mouth of McKenna Creek. This shallow water portion of Big Walnut Creek is covered predominantly by willows (Salix sp.) and smartweed (Polygonum sp.). Cattails (T. angustifolia) occur in small clumps about the margin of the wetland.

The periodically inundated old field area located between Cherry-bottom Road on the west and McKenna Creek on the east contains scattered bulrushes (Scirpus sp.). Other species of vascular water plants were not observed following an extensive survey of this area.

Benthic Macroinvertebrates

Ekman Dredge samples from Big Walnut Creek yielded few individuals. However, qualitative sampling done by overturning rocks and collecting specimens with forceps showed the area to contain a diverse benthic fauna dominated by caddis flies and capable of supporting the many darters which were observed (Table 5). No endangered species were collected.

Benthic macroinvertebrate populations in McKenna Creek were much larger and more diverse than those observed in Big Walnut Creek (Table 6). These populations were dominated by chironomids, but snails and fingernail clams were also very abundant. The two stations sampled were very similar in character. This type of benthic community is capable of supporting a

large and diverse fish community. No endangered species were collected and nothing extraordinary was observed in the benthic samples.

Fish

Trautman (1957) lists 44 species as occurring in this stretch of Big Walnut Creek and 32 from McKenna Creek (Tables 7 and 8). It should be noted that many of the species listed from McKenna Creek were actually collected by Trautman at a sampling station he positioned at the juncture of this stream and Big Walnut Creek.

Sampling during this study produced nine species from McKenna Creek and six species from Big Walnut Creek (Tables 9 and 10). Three of the nine species observed in McKenna Creek, the blacknose dace (Rhinichthys atratulus), the fathead minnow (Pimephales promelas) and the southern redbelly dace (Phoxinus erythrogaster), had not been previously observed by Trautman. This was also the case with one species, the orangespotted sunfish (Lepomis humilis), collected from Big Walnut Creek. However, these four species are all very common stream dwellers in Ohio. None of the species collected from either stream appears on either the federal or state lists of endangered species, and none of the species listed by Trautman appear on the federal list of endangered species. The paddlefish, listed by Trautman as occurring in Big Walnut Creek, is listed on the state list of rare and endangered species. However, it is unlikely that paddlefish inhabit this stream any longer.

Based on the substrate and habitat types available it is quite likely that all twelve species collected spawn at or near the point they were collected. Although no ichthyoplankters were collected in either stream, many young-of-the-year creek chubs were collected from McKenna Creek, and many young-of-the-year bluntnose minnows and darters were collected in Big Walnut Creek.

All species collected were typical of riffle/pool stream habitats. Furthermore, the many darters collected in Big Walnut Creek and the dace from McKenna Creek are indicative of relatively clean water habitats.

TERRESTRIAL LIFE

Flora

Excluding the cropland, the proposed alignments pass through a small pasture, old fields, and hydric flood plain forest. A small pasture area dominated by grasses (graminoids) and a periodically inundated streamside field are located between Cherrybottom Road and Route 62. This area, between Cherrybottom Road and Route 62, as well as the area between Stygler Road and Ridenour Road, contains home sites, cropland, and recently abandoned old fields. During the study period, dominant vegetation in the old fields was herbaceous vegetation including grasses, wild carrot (Daucus carota), common milkweed (Asclepias syriaca), ragweed (Ambrosia sp.), ironweed (Vernonica sp.), goldenrod (Solidago sp.) and thistle (Cirsium sp.).

The portion of the study area located between Ridenour Road and Big Walnut Creek encompassed wetland, an old field area similar to those described above and hydric flood plain forest. Vascular aquatic vegetation found in the wetland area is listed in Table 11. Flood plain forest and old field serve as limits to the wetland in this area. The dominant canopy vegetation in the flood plain forest includes sycamore (Platanus occidentalis), red maple (Acer rubrum), silver maple (Acer saccharinum), and black walnut (Juglans nigra). During the study period, stinging nettle (Urtica sp.) and jewelweed (Impatiens sp.) were the predominant herbaceous vegetation. Common, but less abundant, herbaceous vegetation included joe-pye weed (Eupatorium fistulosum) and coneflower (Rudbeckia sp.) located along the margins of the flood plain forest.

Fauna

The wetland located between Ridenour Road and Big Walnut Creek contained specimens of bullfrog (Rana catesbeiana) and green frog (Rana clamitans). Although not observed, the study area provides adequate habitat for other species of frogs (Hyla sp., Rana spp.), and toads (Bufo spp.) as well as the banded water snake (Natrix sipedon).

A census for avifauna utilizing the study area was conducted on two dates (Table 12). The results of these efforts indicate a predominance of passerine birds. The sighting of an immature black-crowned night heron (Nycticorax hoactli) and two species of ducks indicate portions of Big Walnut Creek serve as breeding and feeding habitat for wading birds and waterfowl.

An abundance of racoon (Procyon lotor) tracks were observed along Big Walnut Creek. The eastern gray squirrel is common throughout most of the study area. Although not observed, ample habitat to support the cottontail rabbit (Sylvilagus floridanus) exists within the study area.

IMPACT ASSESSMENT

As currently proposed there are four alternative routes for the proposed McCutcheon Road extension to State Route 62. Alternatives 2 and 3 join prior to crossing McKenna Creek so there are only three potential crossings of this stream. Moving from north to south on Big Walnut Creek the alternatives are encountered in the following sequence: 2, 3, 1 and 4.

Within McKenna Creek, bridge construction will create little more than a turbidity problem as no mid-stream support piers will be required. In Big Walnut Creek, two or three in-stream piers will be required. Those small portions of the stream beds which are disrupted by construction will recolonize rapidly (probably within one year, two years at most) with benthic macroinvertebrates and plants. Those portions of the stream covered by the in-stream piers represent a very small percentage of the similar habit available within this region. Consequently, fish which are displaced by construction should be able to locate similar habit nearby. Modification of the stream banks and margins will be limited to those areas more than six inches above mean water level. No rare or endangered species

of plants or animals should be affected by construction on any of the four alternatives.

Moving from north to south, Alternate 2 does not intersect a wetland in the vicinity of either stream, but it does cross a large portion of flood plain habitat along the east bank of Big Walnut Creek. Alternates 2 and 3 cross small sections of flood plain habitat on the east bank of Big Walnut Creek and large sections on the west bank. Alternate 4 crosses a large wetland on the west side of Big Walnut and passes immediately north of a wetland which extends out into Big Walnut Creek from the mouth of McKenna Creek. The presence of these wetlands, although they have not been assessed, make Alternate 4 the least desirable of the four. Alternative 4 would be even less desirable if significant amounts of stream bank grading were required.

In summary, the impact of the proposed construction should be temporary and very localized. Recolonization by both benthic macro-invertebrates and plants should be very rapid. Fish should be able to find similar habitats nearby and temporary increases in turbidity should be the only water quality change. Ecologically, Alternatives 1-3 are preferable to Alternative 4 due to the presence of fragile wetland environments along Alternate 4.

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TABLE 1

WATER QUALITY MEASUREMENTS FOR BIG WALNUT
CREEK AND MCKENNA CREEK IN THE VICINITY
OF GAHANNA, OHIO
AUGUST 24, 1980

PARAMETER	UNITS	STATIONS				
		BW-1	BW-2	BW-3	MC-1	MC-2
Time	hrs.	1000	1015	1030	1145	1300
Depth	cm	90	120	60	52	47
Temperature	°C	23.4	23.3	23.2	21.5	21.8
Dissolved Oxygen	mg/l	8.3	8.3	8.2	9.1	10.0
Conductivity	µmhos/cm	315	320	315	610	590
Turbidity	NTU	24	24	25	19	23
Transparency	cm	45	45	50	50	43
pH	std. units	7.5	7.4	7.4	7.5	7.5
Total Hardness	mg/l	172	--	178	342	382
Total Phosphorus	mg/l	0.107	--	0.089	0.099	0.411
Soluble Phosphorus	mg/l	0.011	--	0.014	0.034	0.320
Ammonia Nitrogen	mg/l	0.16	--	0.13	0.10	0.15
Nitrate Nitrogen	mg/l	2.30	--	2.06	0.62	0.62
Chloride	mg/l	18	--	17	30	32
Total Iron	µg/l	260	--	140	216	200
Sulfate	mg/l	21.2	--	30.4	56.0	50.0
Alkalinity	mg/l	76	--	68	166	172
Flow	cm/sec	73.3	--	126.9	30.0	8.2

TABLE 2

WATER QUALITY MEASUREMENTS FOR BIG WALNUT CREEK
AT CENTRAL COLLEGE, OHIO (USGS GAGE NO. 03228500)

PARAMETER	UNIT	SAMPLING DATE			
		APR 15, 1976	JUN 21, 1976	MAR 21, 1977	JUN 30, 1977
Time	hrs	1415	1230	1345	1000
Discharge	cfs	129	99	105	106
Conductivity	µmhos/cm	350	365	420	390
pH	std. units	9.0	7.8	8.6	8.0
Temperature	°C	12.5	17.5	7.5	16.5
Dissolved Oxygen	mg/l	13.8	9.2	13.8	9.6
Oxygen Saturation	%	130	96	120	98
BOD (5 day)	mg/l	1.2	0.5	2.8	1.5
Hardness	mg/l	140	160	180	160
Dissolved Calcium	mg/l	39	40	47	43
Dissolved Magnesium	mg/l	11	14	16	13
Dissolved Sodium	mg/l	11	12	13	10
Dissolved Potassium	mg/l	2.9	2.7	3.9	3.6
Alkalinity	mg/l	78	95	100	101
Carbon Dioxide	mg/l	0.1	2.9	0.5	2.0
Dissolved Sulfate	mg/l	52	59	48	47
Dissolved Chloride	mg/l	21	20	30	21
Dissolved Fluoride	mg/l	0.2	0.2	0.1	0.1
Dissolved Silica	mg/l	3.0	1.7	2.2	2.3
Total Dissolved Solids	mg/l	187	207	220	201
Total Nitrate	mg/l	2.4	1.7	1.8	2.2
Total Nitrite	mg/l	0.04	0.01	0.03	0.00
Total Ammonia	mg/l	0.04	0.07	0.09	0.00
Total Phosphorus	mg/l	0.00	0.05	0.03	0.03
Total Arsenic	µg/l	0	2	1	3
Total Chromium	µg/l	<10	<10	10	<10
Total Copper	µg/l	10	0	3	6
Dissolved Iron	µg/l	90	60	30	0
Total Lead	µg/l	3	1	0	8
Dissolved Manganese	µg/l	20	20	10	30
Total Mercury	µg/l	<0.5	<0.5	0.4	0.0
Total Zinc	µg/l	10	20	70	30
Total Organic Carbon	µg/l	5.7	6.5	--	7.5

Data Source: U.S. Geological Survey (1977, 1978)

TABLE 3

PHYTOPLANKTON ANALYSIS FOR BIG WALNUT CREEK AND McKENNA CREEK
IN THE VICINITY OF THE PROPOSED McCUTCHEON ROAD
EXTENSION NEAR GAHANNA, OHIO*

Taxa	Station			
	BW-1	BW-3	MC-1	MC-2
BLUE-GREENS				
<u>Chroococcus limneticus</u>	120	60		
<u>Microcystis minutissima</u>		320	70	
<u>Oscillatoria limnetica</u>	—	—	70	
Total Blue-Greens	120	380	70	
GREENS				
<u>Chlamydomonas sp.</u>	20	25		
<u>Closterium gracile</u>		5		
<u>Eudorina sp.</u>		320		
<u>Kirchneriella lunaris</u>	15	4	40	168
<u>Oocystis sp.</u>	25	5		5
<u>Paradoxia multisetata</u>	8			
<u>Scenedesmus bicaudatus</u>		16		
<u>S. quadricauda</u>	8			
<u>Scenedesmus sp.</u>	16			
<u>Selenastrum sp.</u>	40			
<u>Shroederia sp.</u>	12	20		8
Green Cells	16	4	12	64
Total Greens	160	399	52	245
DIATOMS				
Centric (4.3 μ diameter)	20	16	8	
Centric (7.2 μ diameter)		4	8	
Centric (21 μ diameter)	5			
<u>Gomphonema sp.</u>	5	5	5	
<u>Melosira granulata var.</u>				
<u>angustissima</u>	89	15		
<u>Melosira islandica</u>	670	210		
<u>M. varians</u>	10	10		
<u>Navicula sp.</u>	5	8	15	50
<u>Nitzschia sp.</u>	—	—	15	10
Total Diatoms	804	268	51	60
CHRYSOPHYTES				
<u>Chrysochromulina parva</u>	8			8
<u>Dinobryon sp.</u>				4
<u>Pseudokephyrion sp.</u>	4			
<u>Trachelomonas sp.</u>	5	5	5	5
Total Chrysophytes	17	8	5	17

TABLE 3 (continued)

PHYTOPLANKTON ANALYSIS FOR BIG WALNUT CREEK AND MCKENNA CREEK
 IN THE VICINITY OF THE PROPOSED McCUTCHEON ROAD
 EXTENSION NEAR GAHANNA, OHIO*

Taxa	Station			
	BW-1	BW-3	MC-1	MC-2
EUGLENOIDS				
<u>Euglena sp.</u>	<u>5</u>			
Total Euglenoids	5			
CRYPTOPHYTES				
<u>Cryptomonas erosa</u>	8			
<u>Rhodomonas minuta</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>24</u>
Total Cryptophytes	16	8	8	24
DINOFLAGELLATES				
<u>Gymnodinium sp.</u>	<u>5</u>	<u>5</u>		
Total Dinoflagellates	5	5		
TOTAL ALGAE	<u>1127</u>	<u>1065</u>	<u>121</u>	<u>346</u>

*Samples collected on August 25, 1980; phytoplankters reported in number of cells per milliliter (#/ml).

TABLE 4

ZOOPLANKTON ANALYSIS FOR BIG WALNUT CREEK AND MCKENNA CREEK
 IN THE VICINITY OF THE PROPOSED McCUTCHEON ROAD
 EXTENSION NEAR GAHANNA, OHIO*

Taxa	Station			
	BW-1	BW-3	MC-1	MC-2
ROTIFERS				
<u>Collotheca</u> sp.		500		
<u>Keratella cochlearis</u>	2500	1000		
<u>Lecane</u> sp.		500		500
<u>Monostyla</u> sp.				500
<u>Polyarthra</u> spp.	47500			
<u>Synchaeta</u> spp.	14500			
<u>Trichocerca</u> sp.	1000	3000		
Unknown rotifers	<u>1500</u>	<u>500</u>	<u>250</u>	<u>500</u>
Total rotifers	27000	5500	250	1500
CLADOCERANS				
<u>Ceriodaphnia</u> sp.	<u>500</u>			
Total Cladocerans	500			
COPEPODS				
Calanoid copepodid	500			
Cyclopoid copepodid	500		250	
Copepod nauplii	<u>6500</u>		<u>250</u>	
Total copepods	7500		250	
OTHERS				
Oligochaete		500		
Nematode			250	
TOTAL ZOOPLANKTON	<u>35000</u>	<u>6000</u>	<u>750</u>	<u>1500</u>

*Samples collected on August 25, 1980; zooplankters reported in number per cubic meter (#/m³).

TABLE 5

BENTHIC MACROINVERTEBRATE DENSITIES* FROM
BIG WALNUT CREEK NEAR GAHANNA, OHIO - 24 AUGUST AND 7 DECEMBER 1980

TAXA	STATION	BW-1	BW-2	BW-3	MEAN
Platyhelminthes					
Turbellaria					X
<u>Dugesia</u> sp.					
Arthropoda					
Decapoda					X
<u>Orconectes</u> sp.					
Isopoda					X
<u>Asellus</u> sp.					
Chironomidae					X
<u>Chironomus</u> sp.					
<u>Polypedilum</u> sp.			86		29
Tricoptera					X
<u>Hydropsyche</u> sp.			43		X
<u>Macronemum</u> sp.					X
<u>Chimarra</u> sp.					X
Ephemeroptera					X
<u>Ephemera</u> sp.					X
<u>Stenonema</u> sp.					
Coleoptera					X
<u>Psephenus</u> sp.		43			14
Notonectidae					
Mollusca					
Gastropoda					X
<u>Ferrisia</u> sp.					X
<u>Goniobasis</u> sp.				43	
Pelecypoda					X
<u>Sphaerium</u> sp.					

*These numbers do not represent a number per unit area due to inability to obtain accurate quantitative samples in the bed of Big Walnut Creek. These numbers were collected with an Ekman Dredge and should be used to show relative abundance at each of the stations. An "X" indicates the presence of a particular taxa in qualitative samples collected with forceps along the entire proposed construction corridor.

TABLE 6

BENTHIC MACROINVERTEBRATE DENSITIES* FROM
MCKENNA CREEK NEAR GAHANNA, OHIO - 24 AUGUST 1980

TAXA	STATION	MC-1	MC-2	Mean
Annelida				
Oligochaeta				
no hair setae			430	215
Arthropoda				
Chironomidae				
Chironomus sp.			43	22
Metriocnemus sp.	2,107	1,806		1,957
Unidentifiable			129	65
Odonata				
Aeschna sp.	43			22
Coleoptera				
Psephenus sp.	43			22
Decapoda				
Orconectes sanborni	present**			
Mollusca				
Gastropoda				
Goniobasis sp.	817	86		452
Physa sp.	43			22
Pelecypoda				
Sphaerium sp.	215			108
TOTAL		3,268	2,494	2,885

*Results presented as number of organisms per square meter

**These individuals were collected in the shore seine
not the Ekmen Dredge

TABLE 7

HISTORICAL REVIEW* OF FISH SPECIES
INHABITING BIG WALNUT CREEK IN GAHANNA, OHIO

COMMON NAME	SCIENTIFIC NAME**
Paddlefish	<u>Polyodon spathula</u>
Longnose Gar	<u>Lepisosteus osseus</u>
Gizzard Shad	<u>Dorosoma cepedianum</u>
Grass Pickerel	<u>Esox americanus vermiculatus</u>
Quillback	<u>Carpiodes cyprinus</u>
Silver Redhorse	<u>Moxostoma anisurum</u>
Black Redhorse	<u>M. duquesnei</u>
Golden Redhorse	<u>M. erythrum</u>
Northern Hog Sucker	<u>Hypentelium nigricans</u>
White Sucker	<u>Catostomus commersoni</u>
Spotted Sucker	<u>Minytrema melanops</u>
Carp	<u>Cyprinus carpio</u>
Golden Shiner	<u>Notemigonus crysoleucas</u>
Hornyhead Chub	<u>Nocomis biguttatus</u>
Bigeye Chub	<u>Hybopsis amblops</u>
Creek Chub	<u>Semotilus atromaculatus</u>
Suckermouth Minnow	<u>Phenacobius mirabilis</u>
Silver Shiner	<u>Notropis photogenis</u>
Rosyface Shiner	<u>N. rubellus</u>
Rosefin Shiner	<u>N. ardens</u>
Striped Shiner	<u>N. chrysocephalus</u>
Spotfin Shiner	<u>N. spilopterus</u>
Sand Shiner	<u>N. stramineus</u>
Mimic Shiner	<u>N. volucellus</u>
Silverjaw Minnow	<u>Ericymba buccata</u>
Bluntnose Minnow	<u>Pimephales notatus</u>
Stoneroller	<u>Camptostoma anomalum</u>
Channel Catfish	<u>Ictalurus punctatus</u>
Yellow Bullhead	<u>I. natalis</u>
Stonecat	<u>Noturus flavus</u>
Brindled Madtom	<u>N. miurus</u>
Brook Silverside	<u>Labidesthes sicculus</u>
White Crappie	<u>Pomoxis annularis</u>
Rock Bass	<u>Ambloplites rupestris</u>
Smallmouth Bass	<u>Micropterus dolomieu</u>
Green Sunfish	<u>Lepomis cyaneellus</u>
Longear Sunfish	<u>L. megalotis</u>
Blackside Darter	<u>Percina maculata</u>
Johnny Darter	<u>Etheostoma nigrum</u>
Greenside Darter	<u>E. blennioides</u>
Banded Darter	<u>E. zonale</u>
Variegated Darter	<u>E. variatum</u>
Rainbow Darter	<u>E. caeruleum</u>
Fantail Darter	<u>E. flabellare</u>

*From Trautman (1957)

**Bailey et al. (1970)

TABLE 8

HISTORICAL REVIEW* OF FISH SPECIES
INHABITING M^CKENNA CREEK IN GAHANNA, OHIO

COMMON NAME	SCIENTIFIC NAME**
Longnose Gar	<u>Lepisosteus osseus</u>
Gizzard Shad	<u>Dorosoma cepedianum</u>
Golden Redhorse	<u>Moxostoma erythrurum</u>
Northern Hog Sucker	<u>Hypentelium nigricans</u>
White Sucker	<u>Catostomus commersoni</u>
Carp	<u>Cyprinus carpio</u>
Golden Shiner	<u>Notemigonus crysoleucas</u>
Bigeye Chub	<u>Hybopsis amblops</u>
Creek Chub	<u>Semotilus atromaculatus</u>
Suckermouth Minnow	<u>Phenacobius mirabilis</u>
Silver Shiner	<u>Notropis photogenis</u>
Rosyface Shiner	<u>N. rubellus</u>
Rosefin Shiner	<u>N. ardens</u>
Striped Shiner	<u>N. chrysocephalus</u>
Spotfin Shiner	<u>N. spilopterus</u>
Sand Shiner	<u>N. stramineus</u>
Silverjaw Minnow	<u>Ericymba buccata</u>
Bluntnose Minnow	<u>Pimephales notatus</u>
Stoneroller	<u>Campostoma anomalum</u>
Yellow Bullhead	<u>Ictalurus natalis</u>
Black Bullhead	<u>I. melas</u>
Brindled Madtom	<u>Noturus miurus</u>
Troutperch	<u>Percopsis omiscomaycus</u>
White Crappie	<u>Pomoxis annularis</u>
Rock Bass	<u>Ambloplites rupestris</u>
Smallmouth Bass	<u>Micropterus dolomieu</u>
Green Sunfish	<u>Lepomis cyanellus</u>
Longear Sunfish	<u>L. megalotis</u>
Johnny Darter	<u>Etheostoma nigrum</u>
Greenside Darter	<u>E. blennioides</u>
Banded Darter	<u>E. zonale</u>
Fantail Darter	<u>E. flabellare</u>

*From Trautman (1957). Many of these species were collected at the juncture of McKenna and Big Walnut Creeks.

**Bailey et al. (1970)

TABLE 9

SUMMARY OF SHORE SEINING CATCH
FROM MCKENNA CREEK - 24 AUGUST 1980

SPECIES	NO. CAPTURED	% OF TOTAL NO.	LENGTH (mm)		WEIGHT (g)		% OF TOTAL BY WEIGHT
			MEAN	RANGE	MEAN	TOTAL	
Blacknose Dace	2	2	63	58- 68	2	3	2
Bluntnose Minnow	1	1	57		1	1	1
Creek Chub	87	80	41	24-107	1	90	65
Fathead Minnow	3	3	56	52- 65	1	4	3
Green Sunfish	1	1	54		1	1	1
Johnny Darter	1	1	40		1	1	1
Southern Redbelly Dace	1	1	50		1	1	1
Stoneroller	8	7	67	45- 84	2	13	9
White Sucker	5	5	82	60-112	5	25	18
TOTAL	109	100				139	100

TABLE 10

SUMMARY OF SHORE SEINING CATCH FROM
BIG WALNUT CREEK - 24 AUGUST AND 7 DECEMBER 1980

SPECIES	NO. CAPTURED	% OF TOTAL NO.	LENGTH (mm)		WEIGHT (g)		% OF TOTAL BY WEIGHT
			MEAN	RANGE	MEAN	TOTAL	
Bluntnose Minnow	8	19	33	25-38	1	4	9
Fantail Darter	15	36	46	34-64	1	14	30
Johnny Darter	2	5	40	37-43	1	1	2
Orangespotted Sunfish	1	2	93		15	15	32
Rainbow Darter	14	33	45	39-61	1	11	23
Stoneroller	2	5	58	56-60	1	2	4
TOTAL	42	100				47	100

TABLE 11

LISTING OF VASCULAR FLORA
 McCutcheon Road Extension - Gahanna, Ohio

Common Name	Scientific Name
Old Field Herbaceous Vegetation	
Raspberry	<u>Rubus</u> sp.
Multiflora Rose	<u>Rosa multiflora</u>
Clover	<u>Trifolium</u> sp.
Grape	<u>Vitus</u> sp.
Queen Anne's Lace	<u>Daucus carota</u>
Common Milkweed	<u>Asclepias syriaca</u>
Field Bindweed	<u>Convolvulus arvensis</u>
Ground Ivy	<u>Glechoma hederacea</u>
Teasel	<u>Dipsacus sylvestris</u>
Great Lobelia	<u>Lobelia siphilitica</u>
Ironweed	<u>Vernonia</u> sp.
Joe-Pye-Weed	<u>Eupatorium purpureum</u>
Common Boneset	<u>Eupatorium perfoliatum</u>
Goldenrod	<u>Solidago</u> sp.
Fleabane	<u>Erigeron</u> sp.
Greater Ragweed	<u>Ambrosia trifida</u>
Coneflower	<u>Rudbeckia</u> sp.
Bur-marigold	<u>Bidens</u> sp.
Thistle	<u>Cirsium</u> sp.
Chicory	<u>Cichorium intybus</u>
Dandelion	<u>Taraxacum officinalis</u>
Big Walnut Creek Floodplain Vegetation	
Trees	
Black Willow	<u>Salix nigra</u>
Willow	<u>Salix</u> sp.
Cottonwood	<u>Populus deltoides</u>
American Elm	<u>Ulmus americana</u>
Sycamore	<u>Platanus occidentalis</u>
Black Locust	<u>Robinia pseudo-acacia</u>
Ash	<u>Fraxinus</u> sp.
Black Walnut	<u>Juglans nigra</u>
Red Maple	<u>Acer rubrum</u>
Silver Maple	<u>Acer saccharinum</u>
Shrubs	
Poison Ivy	<u>Rhus toxicodendron</u>
Common Elderberry	<u>Sambucus canadensis</u>

TABLE 11 (continued)
 LISTING OF VASCULAR FLORA
 McCutcheon Road Extension - Gahanna, Ohio

Common Name	Scientific Name
Herbaceous Vegetation	
Stinging Nettle	<u>Urtica sp.</u>
Dock	<u>Rumex sp.</u>
Spotted Touch-Me-Not	<u>Impatiens capensis</u>
Virginia Creeper	<u>Parthenocissus quinquefolia</u>
Joe-Pye-Weed	<u>Eupatorium purpureum</u>
Crooked-Stemmed Aster	<u>Aster prenanthoides</u>
McKenna Creek Vegetation	
Trees	
Black Willow	<u>Salix nigra</u>
Cottonwood	<u>Populus deltoides</u>
American Elm	<u>Ulmus americana</u>
Red Mulberry	<u>Morus rubra</u>
Sycamore	<u>Platanus americana</u>
Crab	<u>Pyrus sp.</u>
Black Locust	<u>Robinia pseudo-acacia</u>
Ash	<u>Fraxinus sp.</u>
Black Walnut	<u>Juglans nigra</u>
Silver Maple	<u>Acer saccharinum</u>
Red Maple	<u>Acer rubrum</u>
Box Elder	<u>Acer negundo</u>
Ohio Buckeye	<u>Aesculus glabra</u>
Shrubs	
Red Bud	<u>Cercis canadensis</u>
Poison Ivy	<u>Rhus toxicodendron</u>
Honeysuckle	<u>Lonicera sp.</u>
Common Elderberry	<u>Sambucus canadensis</u>
Herbaceous Vegetation	
Bulrush	<u>Scirpus sp.</u>
Asiatic Dayflower	<u>Commelina communis</u>
Dock	<u>Rumex sp.</u>
Pokeweed	<u>Phytolacca americana</u>
Raspberry	<u>Rubus sp.</u>
Multiflora Rose	<u>Rosa multiflora</u>
Grape	<u>Vitus sp.</u>
Wood Sorrel	<u>Oxalis sp.</u>

TABLE 11 (continued)

LISTING OF VASCULAR FLORA
 McCutcheon Road Extension - Gahanna, Ohio

Common Name	Scientific Name
Herbaceous Vegetation (continued)	
Queen Anne's Lace	<u>Daucus carota</u>
Spotted Touch-Me-Not	<u>Impatiens capensis</u>
Purple Dead-Nettle	<u>Lamium purpureum</u>
Bedstraw	<u>Galium sp.</u>
Teasel	<u>Dipsacus sylvestris</u>
Ironweed	<u>Vernonia sp.</u>
Goldenrod	<u>Solidago sp.</u>
Coneflower	<u>Rudbeckia sp.</u>
Bur-marigold	<u>Bidens sp.</u>
Chicory	<u>Cichorium intybus</u>
Rooted Aquatic Vascular Plants	
Narrow-leaved Cattail	<u>Typha angustifolia</u>
Reed Canary Grass	<u>Phalaris arundinacea</u>
Rice Cutgrass	<u>Leersia oryzoides</u>
Bulrush	<u>Scirpus atrovirens</u>
Bulrush	<u>Scirpus sp.</u>
Bulrush	<u>Scirpus sp.</u>
Twig-rush	<u>Cladium mariscoides</u>
Duckweed	<u>Lemna sp.</u>
Rush	<u>Juncus sp.</u>
Dock	<u>Rumex sp.</u>
Smartweed	<u>Polygonum sp.</u>
Spatter-Dock	<u>Nuphar advena</u>

TABLE 12

LISTING OF AVIFAUNA AT SIX OBSERVATION STATIONS WITHIN THE PROPOSED McCUTCHEON ROAD EXTENSION STUDY AREA

COMMON NAME	SCIENTIFIC NAME	OBSERVATION STATION										
		1		2		3		4		5		6
		6/24	8/26	6/24	8/26	6/24	8/26	6/24	8/26	6/24	8/26	6/24
Black-Crowned Night Heron	<u>Nycticorax nycticorax</u>					X	X					
Mallard	<u>Anax platyrhynchos</u>											
Wood Duck	<u>Aix sponsa</u>				X							
American Kestrel	<u>Falco sparverius</u>		X	X	X						X	
Mourning Dove	<u>Zenaidura macroura</u>							X		X		
Common Nighthawk	<u>Chordeiles minor</u>					X			X	X		X
Chimney Swift	<u>Chactura pelagica</u>					X	X	X	X			
Common Flicker	<u>Colaptes auratus</u>			X	X						X	
Barn Swallow	<u>Hirundo rustica</u>				X	X	X		X		X	
Blue Jay	<u>Cyanocitta cristata</u>					X			X		X	
Common Crow	<u>Corvus brachyrhynchos</u>			X		X						
Chickadee	<u>Parus sp.</u>	X										
House Wren	<u>Troglodytes aedon</u>				X			X		X		
Gray Catbird	<u>Dumetella carolinensis</u>	X	X	X		X	X	X		X	X	X
Robin	<u>Turdus migratorius</u>						X					
Cedar Warwing	<u>Bombycilla cedrorum</u>							X	X			
Starling	<u>Sturnus vulgaris</u>											
Yellow Warbler	<u>Dendroica petechia</u>			X				X		X		
Common Yellowthroat	<u>Geothlypis trichas</u>										X	
House sparrow	<u>Passer domesticus</u>		X					X		X		
Red-winged Blackbird	<u>Agelaius phoeniceus</u>			X		X				X		
Common Grackle	<u>Quiscalus quiscula</u>			X		X		X		X		
Cardinal	<u>Richmondia cardinalis</u>			X		X		X		X		
Indigo Bunting	<u>Passerina cyanea</u>			X		X			X		X	
American Goldfinch	<u>Spinus tristis</u>	X										
Chipping Sparrow	<u>Spizella passerina</u>	X						X				
Field Sparrow	<u>Spizella pusilla</u>											

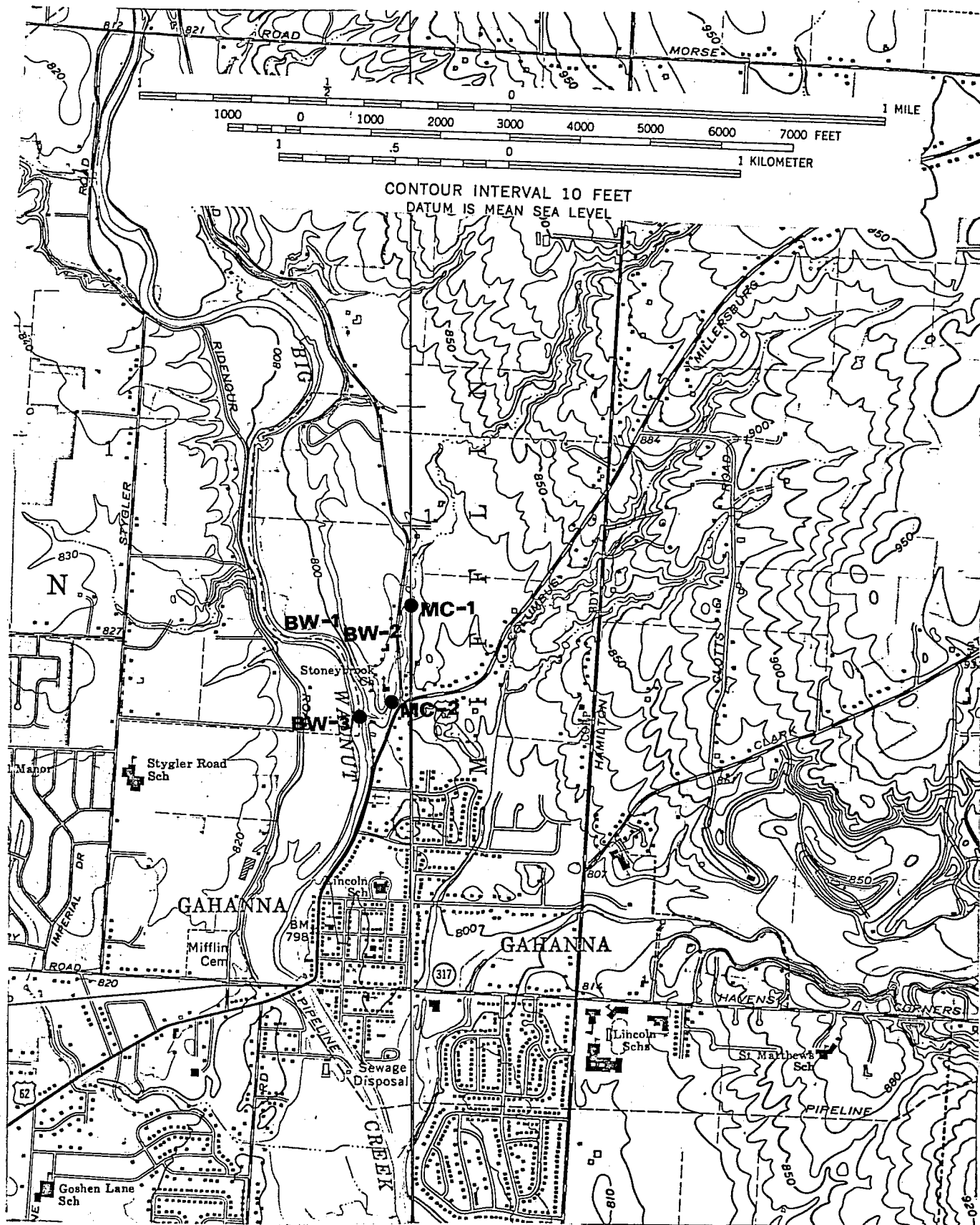


Figure 1. Location Map of Study Area Showing Sampling Stations (USGS 7½ min quadrangle topographic maps for New Albany and Northeast Columbus, Ohio).

