

June 2010



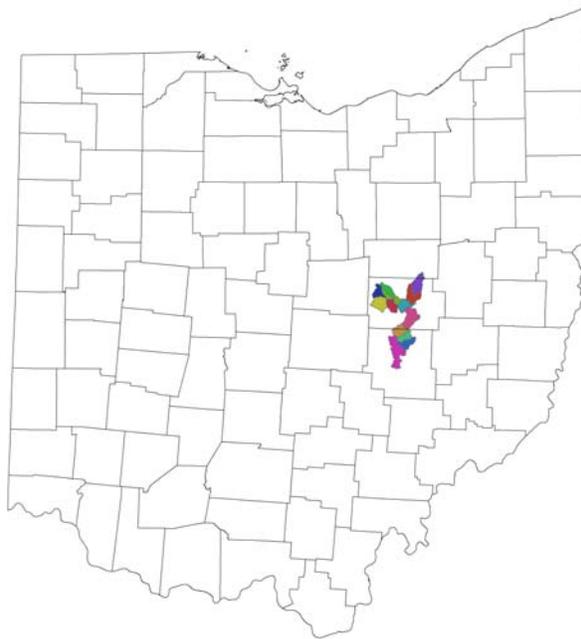
Environmental
Protection Agency

Division of Surface Water

2010 Study Plan for the Walhonding and Muskingum River Tributaries

Hydrologic Unit Codes 0504000309 and
0504000403

Coshocton and Muskingum Counties



Ted Strickland, Governor
Lee Fisher, Lt. Governor
Chris Korleski, Director

2010 Study Plan for the Walhonding/Muskingum River Tributaries

**Hydrologic Unit Codes (HUCs)
0504000309 and 0504000403**

Coshocton and Muskingum Counties, Ohio

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June 10, 2010

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Hospitals (maps attached at end)

- Coshocton County Memorial Hospital, 1460 Orange Street, Coshocton, OH 43812 (740-622-6411)
- Genesis-Good Samaritan Hospital, 800 Forest Avenue, Zanesville, OH 43701 (740-454-5000)
- Genesis-Bethesda Hospital, 2951 Maple Ave., Zanesville, OH 43701

INTRODUCTION

During the 2010 field season (July thru October) chemical, physical, and biological sampling will be conducted in the Walhonding/Muskingum River Tributaries watershed (HUCs 0504000309 and 0504000403) to assess and characterize water quality conditions.

Very little historical sampling has been conducted by Ohio EPA in this watershed; therefore 2010 will represent its first thorough assessment. Nearly all of the tributaries that are scheduled for sampling in 2010 either have unverified beneficial uses, or are undesignated. These streams are denoted by an asterisk in Table 2. The results of sampling on these streams in 2010 will be used to determine the appropriateness of existing beneficial uses, or to designate beneficial uses altogether.

Sampling Objectives:

- Monitor and assess the chemical, physical and biological integrity of the Walhonding/Muskingum River Tributaries.
- Determine the influences from known and/or potential pollution sources including point source dischargers.
- Assess physical habitat influences on stream biotic integrity.
- Determine recreational use attainment status.
- Verify the appropriateness of existing beneficial uses, and assign uses to undesignated streams.

SAMPLING ACTIVITIES

Chemical/Physical Water and Sediment

Chemical sampling locations within the study area are listed in Tables 2 and 3. Conventional chemical/physical water quality samples will be collected 5 times at each designated location during the survey. Sediment samples will be collected at 5 locations. Datasondes® will be deployed at 30 locations. Chemical parameters to be tested are listed in Table 4. Surface water sampling will occur across a variety of flow conditions, from lower flows to moderate and higher flows.

Bacteriological Sampling

Water samples will be collected at 15 sites for bacteriological analyses to determine the attainment status of the Primary Contact recreational use. Testing will include *Escherichia coli* (*E. coli*) bacteria. Each site will be sampled at least 5 times, with sentinel sites being sampled more often.

Macroinvertebrate and Fish Assemblages

Macroinvertebrate sampling methods will be used as listed in Table 2. Fish assemblages will be sampled as listed in Table 2. Habitat will be scored using the Qualitative Habitat Evaluation Index (QHEI) at all fish sampling locations, and at select streams as indicated in Table 2.

Fish Tissue

Fish tissue samples will be collected from one location as part of the Ohio Fish Tissue Consumption Monitoring Program. Fillet samples of edible size sport fish will be tested for organochlorinated pesticides, PCBs, mercury, lead, cadmium, arsenic, and selenium. Results will be used in the Ohio Sport Fish Consumption Advisory Program.

QUALITY ASSURANCE/SAMPLING METHODS

Ohio EPA Manuals

All biological, chemical, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2008), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), and The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment.

Use Attainment

Attainment/non-attainment of aquatic life uses will be determined by using biological criteria codified in Ohio Administrative Code (OAC) 3745-1-07, Table 7-17. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community.

Performance expectations for the basic aquatic life uses (Warmwater Habitat [WWH], Exceptional Warmwater Habitat [EWH], and Modified Warmwater Habitat [MWH] were developed using the regional reference site approach (Hughes et al. 1986; Omernik 1987). This fits the practical definition of biological integrity as the biological performance of the natural habitats within a region (Karr and Dudley 1981). Attainment of an aquatic life use is FULL if all three indices (or those available) meet the applicable criteria, PARTIAL if at least one of the indices did not attain and performance did not fall below the fair category, and NON if all indices either fail to attain or any index indicates poor or very poor performance. The results will be compared to WWH biocriteria for the Eastern Corn Belt Plains ecoregion.

Recreational use attainment will be determined using *E. coli* bacteria. *E. coli* is an indicator organism for the potential presence of pathogens in surface water resulting from the presence of untreated human or animal wastes, and is the basis for recreational use water quality criteria in Rule 3745-1-07 of the Ohio Administrative Code (OAC).

Stream Habitat Evaluation

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 were generally conducive to the establishment of warmwater faunas while those which scored in excess of 75-80 often typify habitat conditions which have the ability to support exceptional faunas.

Biological Community Assessment

Macroinvertebrates will be collected from artificial substrates and from the natural habitats. Quantitative sampling will be conducted at reference sites and at sites with drainage areas in excess of 20 mi². Qualitative sampling will be conducted in headwater sites with drainages smaller than 20 mi². The artificial substrate collection provides quantitative data and consists of a composite sample of 5 modified Hester-Dendy (HD) multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample is also collected. This sampling effort consists of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Fish will be sampled at each sampling location with pulsed DC current. Two passes will be

conducted at sites larger than 20 mi² and at reference sites. Detailed biological sampling protocols are documented in the Ohio EPA manual Biological Criteria for the Protection of Aquatic Life, Volume III (1989).

Fish Tissue

Tissue fillet samples will be collected from fish of edible size, and species preferred for analysis may include spotted bass, largemouth bass, smallmouth bass, flathead catfish, walleye, saugeye, white bass, common carp, freshwater drum, and channel catfish. When possible, composite samples (by species) will be collected using a minimum of three fish and a minimum of 150 grams of material. At each sampling location, an attempt will be made to collect five fish species for fillet tissue analysis. Fish will be sampled using electrofishing boat methods at the reservoir and wading method at the remainder sites. Sampling locations are listed in Table 3.

Fish used for tissue analysis will be filleted in the field using decontaminated stainless steel fillet knives. Filleted samples will be wrapped in aluminum foil, placed in a sealed plastic bag, and placed on dry ice. Sampling and decontamination protocols will follow those listed in the Ohio EPA Fish Collection Guidance Manual (2004). Fish tissue samples will be stored in chest freezers at the Ohio EPA Groveport Field Facility prior to delivery to DES.

Sediment

Fine grained multi-incremental sediment samples will be collected in the upper 4 inches of bottom material using either decontaminated stainless steel scoops or Ekman dredges. Collected sediment will be placed into appropriate containers, placed on ice (to maintain 4°C) and shipped to the Ohio EPA lab. Sampling and decontamination protocols will follow those listed in the Ohio EPA Sediment Sampling Guide and Methodologies, November, 2001.

Surface Water

Surface water grab samples will be collected and preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2009) and delivered to the Ohio EPA lab for analyses. Datasonde[®] continuous recorders will be placed at select locations to evaluate diurnal measurements of dissolved oxygen, pH, temperature, and conductivity.

Bacteria

Water samples for bacterial analysis will be collected and preserved in accordance with the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2009). All samples will be analyzed for *E. coli* bacteria using U.S.EPA approved methods.

Field Quality Control Samples

Ten percent of the water and bacteria samples will be submitted to the lab as field duplicates. One Datasonde[®] recorder site will have two instruments placed in the river as field duplicates. Field blanks will occur at a minimum of 5 percent of the water samples. Field instruments will be calibrated daily, using manufacturer guidelines and requirements noted in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2009).

Table 1. Facilities regulated by the National Pollution Discharge Elimination System in the Walhonding/Muskingum Tributaries study area.

Ohio EPA Permit #	Facility Name	Type	Design Flow	Average Flow	Receiving Stream	River Mile
0IN00128	Smurfit Stone Container Enterprises Inc. – Mill Creek Landfill	Industrial	--	0.032 (002) 0.007 (003)	Unnamed Trib. to Turkey Run at RM 0.4	2.00
0IN00216	Coshocton Landfill	Industrial	--	0.15	Robinson Run	3.53
0IN00260	Coshocton Ethanol	Industrial	0.3482	0.056 (001) 0.16 (002) 0.064 (003) 0.034 (004) 0.044 (005) 0.055 (006) 0.13 (007)	Robinson Run	0.74
0PV00022	Edgewood Terrace Mobile Home Park	Municipal	0.01	0.014	Crooked Run	0.8
0IJ00043	Luburgh Shale Pit	Industrial	--	--	Mill Run	0.17
0IJ00044	James Brother Sand and Gravel LTD	Industrial	--	--	Mill Run	1.9
0PR00154	Echoing Hills	Municipal	0.01	0.004	Unnamed Trib to Mohawk Creek at RM 4.27	1.9

Table 2. Sampling locations, arranged by 12-digit HUC, including sampling parameters and purpose associated with each site.

Storet	Stream	RM ¹	DA ²	Sampling	Location	Purpose
HUC 050400030901 – Mohawk Creek						
301011	Mohawk Creek*	4.10	9.47	F,M,C,D	TR 409 – 1 st bridge off SR 79	HUC coverage/ALU assessment
300887	Mohawk Creek*	1.48	22.60	F2,MT,C,D,B,O,S	CR 82	Sentinel
301012	UT to Mohawk @ RM 2.93*	0.60	6.38	F,M,C,D	TR 373	HUC coverage/ALU assessment
HUC 050400030902 – Dutch Creek-Walhonding River						
301013	Dutch Run*	0.15	5.44	F,M,C,D,B	TR 144/TR 338	HUC coverage/ALU assessment
301014	Honey Run*	0.60	1.86	M,Q,C	TR 359	ALU assessment
HUC 050400030903 – Beaver Run						
301015	Beaver Run^	2.60	8.36	F,M,C,D	CR 22	HUC coverage
200633	Beaver Run^	0.17	14.10	F,M,C,D,B,O,S	SR 36 @ Warsaw	Sentinel
HUC 050400030904 – Simmons Run						
301016	Simmons Run*	2.97	9.29	F,M,C,D	TR 78	HUC coverage/ALU assessment
301017	Simmons Run*	0.60	16.30	F,M,C,D,B	TR 41B	HUC coverage/ALU assessment
301018	Flint Run*	0.40	2.25	M,Q,C	SR 60 @ vacant house driveway near bridge crossing	ALU assessment
HUC 050400030905 – Darling Run-Walhonding River						
301019	Darling Run*	0.10	3.82	F,M,C,D,B	TR 340 at Nellie Cemetery	HUC coverage/ALU assessment
HUC 050400030906 – Headwaters Mill Creek						
301020	Mill Creek^	12.50	8.84	F,M,C,D	TR 215	HUC coverage
R04S29	Mill Creek^	8.50	18.50	F,M,C,D,B	TR 206	HUC coverage
200632	Little Mill Creek^	0.10	8.40	F,M,C,D	Driveway off TR 206 # 28305	HUC coverage
301021	Beards Run*	0.03	2.72	M,Q,C	CR 12	ALU assessment
HUC 050400030907 – Spoon Creek-Mill Creek						
300978	Mill Creek^	7.9	27.20	F2,MT,C,D,B,O,S	At gage; farm lane off CR 12 @ "Block O" mailbox # 28371	Sentinel
300888	Mill Creek^	3.54	39.90	F2,MT,C,D,B	TR 322	HUC coverage/ALU assessment

Storet	Stream	RM ¹	DA ²	Sampling	Location	Purpose
R04S28	Mill Creek^	0.40	51.10	F,MT,C,D,T	CR 24	HUC coverage
R04S31	Turkey Run^	0.19	5.50	F,M,C,D	CR 12	HUC coverage
R04S30	Spoon Creek	0.60	7.85	F,M,C,D	CR 193	HUC coverage
HUC 050400030908 – Crooked Run-Walhonding River						
301024	Crooked Run*	0.98	8.03	F,M,C,D,B	CR 23 driveway @ #'s 45333, 45329, 45325	HUC coverage/ALU assessment, ust WWTP
301023	Crooked Run*	0.06	8.97	F,M,C,D,B	End TR 495	HUC coverage/ALU assessment, dst WWTP
HUC 050400040301 – Robinson Run-Muskingum River						
300289	Robinson Run*	1.35	3.81	F,M,C,D,B	CR 271	HUC coverage/ALU assessment; ust Coshocton Ethanol; dst landfill
301028	Robinson Run*	0.70	4.29	F,M,C,D	Access Coshocton Ethanol	HUC coverage/ALU assessment; dst Coshocton Ethanol
HUC 050400040302 – Village of Adamsville-Muskingum River						
301029	Monroe Basin Creek*	1.80	5.84	F,M,C,D,B	SR 16 @ Graham Farm	HUC coverage/ALU assessment
HUC 050400040303 – North Branch Symmes Creek						
301031	North Branch Symmes Creek*	4.25	8.16	F,M,C,D	Road off SR 208 – Steel Hill Rd	HUC coverage/ALU assessment
301030	North Branch Symmes Creek*	0.10	15.00	F,M,C,D,B	Madison Hall Road	HUC coverage/ALU assessment
HUC 050400040304 –South Branch Symmes Creek						
301034	Symmes Creek*	5.65	8.30	F,M,C,D	Steel Hill Road @ oil rig	HUC coverage/ALU assessment
301033	Symmes Creek*	4.35	15.30	F,M,C,D	Mutton Ridge Road off Mollies Rock Road	HUC coverage/ALU assessment
300889	Symmes Creek*	2.35	31.50	F2,MT,C,D,B,O,S	Mollies Rock Road	Sentinel
301032	South Branch Symmes Creek*	0.15	4.33	F,M,C,D	Sheck Road/Valley Road – TR 156	HUC coverage/ALU assessment
HUC 050400040305 –Blount Run-Muskingum River						
300890	Blount Run*	0.31	7.70	F,M,C,D,B,O,S	SR 666	Sentinel
301035	Blunt Run*	0.10	2.80	M,Q,C	CR 418	ALU assessment
301036	Mill Run*	0.45	3.38	F,M,C,D	Coal Run Rd behind Nighthawk Repair building	HUC coverage/ALU assessment

* - unverified Warmwater Habitat (WWH) or unassigned aquatic life use

¹ - River Mile

² - Drainage Area (mi²)

^ - Verified Exceptional Warmwater Habitat (EWH) aquatic life use

C – Conventional chemistry
 F – Fish, one pass
 F2 – Fish, two pass
 M – Macroinvertebrate, qualitative only
 MT – Macroinvertebrate, quantitative
 B – Bacteria
 D – Datasonde© (continuous recorder sampler for D.O., pH, temperature, and conductivity)
 S – Sediment
 T – Fish tissue
 O – Organics
 Op – Organics, with method 525pesticides

Type	Number of Sites
Chemistry	34
Bacteria	15
Fish, one pass	25
Fish, two pass	5
Macroinvertebrate, qualitative only	29
Macroinvertebrate, quantitative	5
Datasonde©	30
Sediment	5
Organics	5
Fish tissue	1

Table 3. Sampling locations, arranged alphabetically, with coordinates.

Stream	RM	DA	Location	Topo	County	Latitude	Longitude	HUC 12
Beards Run	0.03	2.72	CR 12	New Bedford	Coshocton	40.394744	-81.845742	050400030906
Beaver Run	2.60	8.36	CR 22	Warsaw	Coshocton	40.354395	-82.022752	050400030903
Beaver Run	0.17	14.10	SR 36 @ Warsaw	Warsaw	Coshocton	40.333241	-82.001720	050400030903
Blount Run	0.31	7.70	SR 666	Adamsville	Muskingum	40.021977	-81.976587	050400040305
Blunt Run	0.10	2.80	CR 418	Adamsville	Muskingum	40.029141	-81.995868	050400040305
Crooked Run	0.98	8.03	CR 23 driveway @ mailbox #'s 45333, 45329, 45325	Randle	Coshocton	40.296996	-81.908822	050400030908
Crooked Run	0.06	8.97	End of TR 495	Randle	Coshocton	40.299699	-81.895220	050400030908
Darling Run	0.10	3.82	TR 340 at Nellie Cemetery	Warsaw	Coshocton	40.343730	-82.049205	050400030905
Dutch Run	0.15	5.44	TR 344/TR 338	Warsaw	Coshocton	40.366860	-82.096240	050400030902
Flint Run	0.40	2.25	SR 60 @ vacant house driveway near bridge	Warsaw	Coshocton	40.323260	-82.016509	050400030904
Honey Run	0.60	1.86	TR 359	Warsaw	Coshocton	40.364621	-82.115316	050400030902
Little Mill Creek	0.10	8.40	Driveway off TR 206 #28305	Coshocton	Coshocton	40.366702	-81.854767	050400030906
Mill Creek	12.50	8.84	TR 215	New Bedford	Coshocton	40.411979	-81.833722	050400030906
Mill Creek	8.50	18.50	TR 206	Coshocton	Coshocton	40.367468	-81.855589	050400030906
Mill Creek	7.9	27.20	At gage farm lane off CR 12 @ "Block O" mailbox # 28371	Coshocton	Coshocton	40.362738	-81.862685	50400030907
Mill Creek	3.54	39.90	TR 322	Coshocton	Coshocton	40.324026	-81.857908	050400030907
Mill Creek	0.40	51.10	CR 24	Coshocton	Coshocton	40.296901	-81.872277	050400030907
Mill Run	0.45	3.38	Coal Run Rd behind Nighthawk Repair building	Zanesville East	Muskingum	39.952870	-81.989500	050400040305
Mohawk Creek	4.10	9.47	TR 409 – 1 st bridge off SR 79	Warsaw	Coshocton	40.290820	-82.086286	050400030901
Mohawk Creek	1.48	22.60	CR 82	Warsaw	Coshocton	40.320576	-82.074001	050400030901
Monroe Basin Creek	1.80	7.28	SR 16 @ Graham Farm	Conesville	Coshocton	40.152998	-81.979272	050400040302

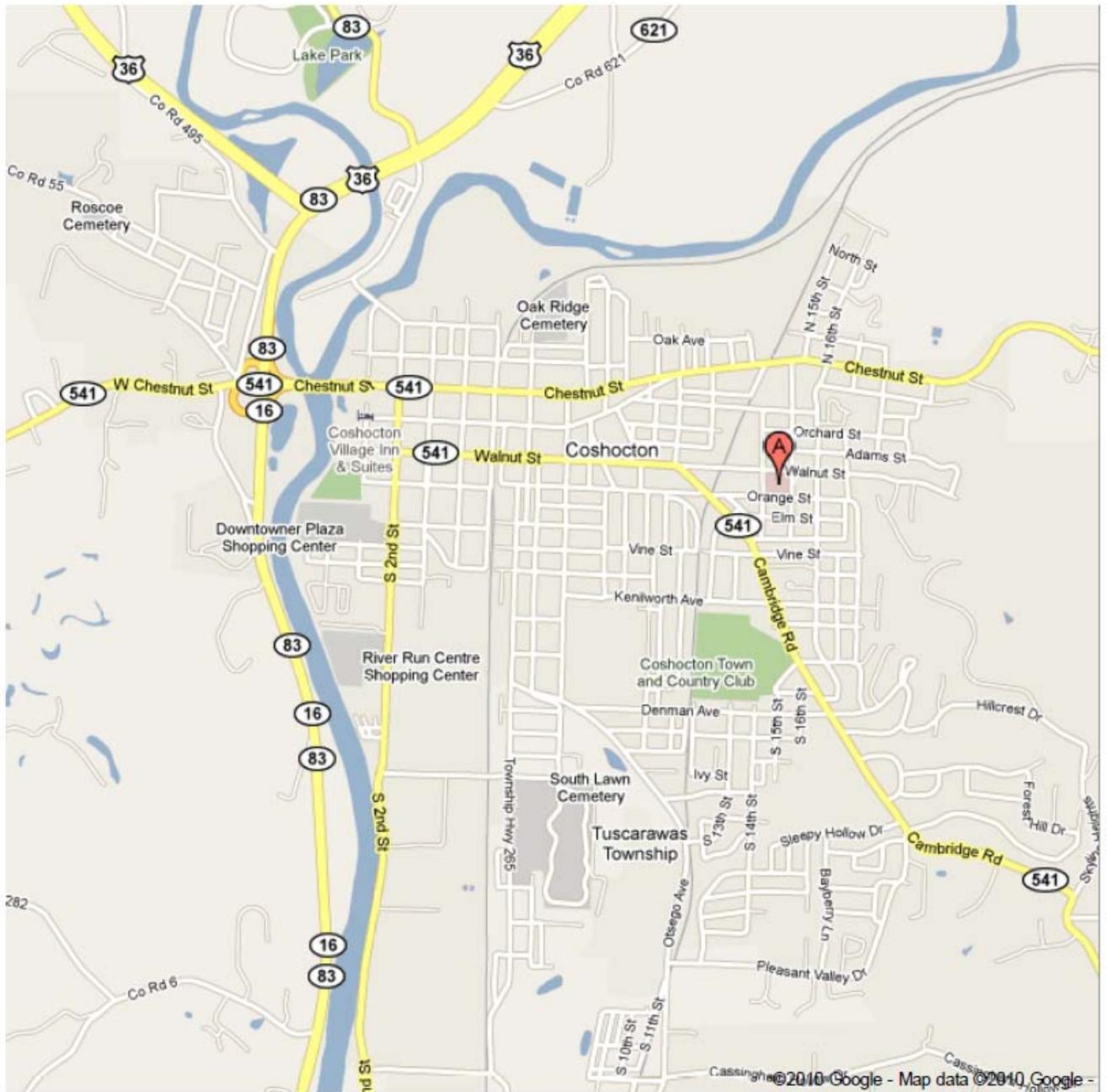
Stream	RM	DA	Location	Topo	County	Latitude	Longitude	HUC 12
North Branch Symmes Creek	4.25	8.16	Road off SR 208 – Steel Hill Road	Adamsville	Muskingum	40.083749	-81.953617	050400040303
North Branch Symmes Creek	0.10	15.00	Madison Hall Road	Adamsville	Muskingum	40.083749	-81.953617	050400040303
Robinson Run	1.35	3.81	CR 271	Wills Creek	Coshocton	40.213551	-81.857998	050400040301
Robinson Run	0.70	4.29	Access Coshocton Ethanol	Wills Creek	Coshocton	40.213605	-81.867943	050400040301
Simmons Run	2.90	9.29	TR 78	Warsaw	Coshocton	40.297333	-82.006045	050400030904
Simmons Run	0.60	16.30	TR 41B	Warsaw	Coshocton	40.326325	-82.008951	050400030904
South Branch Symmes Creek	0.15	4.33	Sheck Road/Valley Road – TR 156	Adamsville	Muskingum	40.066307	-81.924647	050400040304
Spoon Creek	0.60	7.85	CR 193	Coshocton	Coshocton	40.327162	-81.846075	050400030907
Symmes Creek	5.65	8.30	Steel Hill Road @ oil rig	Adamsville	Muskingum	40.077523	-81.920167	050400040304
Symmes Creek	4.35	15.30	Mutton Ridge Road off Mollies Rock Road	Adamsville	Muskingum	40.069945	-81.933584	050400040304
Symmes Creek	2.35	31.50	Mollies Rock Road	Adamsville	Muskingum	40.083272	-81.953805	050400040304
Turkey Run	0.19	5.50	CR 12	Coshocton	Coshocton	40.360910	-81.870900	050400030907
UT to Mohawk @ RM 2.93	0.60	6.38	TR 373	Warsaw	Coshocton	40.308870	-82.094327	050400030901

Table 4. List of chemical/physical water quality parameters to be analyzed/ measured in surface water, from the Walhonding/Muskingum River Tributaries watershed, 2010. Water samples will be collected 5 times (metals 5 times). Bacteria samples will be collected 5 times from July – October 15, 2009. Select sampling locations will be monitored for dissolved oxygen, pH, temperature, and conductivity using Datasonde© continuous recorders (Table 3).

Parameters	Test Method	Water	Sediment	Fish Tissue
Cbod, 20 day (modeling only)	?	X		
SOLIDS, DISSOLVED (TDS)	USEPA 160.1	X		
SOLIDS, SUSPENDED (TSS)	USEPA 160.2	X		
AMMONIA	USEPA 350.1	X		
TKN	USEPA 351.2	X		
NITRATE-NITRITE	USEPA 353.1	X		
Nitrite	USEPA 354.1	X		
Chloride	USEPA 325.1	X		
COD	USEPA 410.4	X		
TOTAL PHOSPHORUS	USEPA 365.4	X		
ICP 1 (Al,Ba,Ca, Fe, Mg, Mn, Na, Ni, K, Sr, Zn, Hardness)	USEPA 200.7	X		
ICP 3 (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)	USEPA 200.7		X	
ICPMS 1 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B	X		X
ICPMS 2 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B		X	
MERCURY, TOTAL	USEPA 245.1,7470A,7471A	X	X	X (245.1)
pH – grab	YSI 556MPS meter	X – field		
Conductivity – grab	YSI 556MPS meter/ USEPA 120.1	X – field / lab		
Dissolved Oxygen – grab	YSI 556MPS meter	X – field		
Temperature – grab	YSI 556MPS meter	X – field		
VOCs	USEPA 624/USEPA 8260	X	X	
Herbicides, Glyphosate	USEPA 525.2, 547	X		
SVOCs (BNAS)	USEPA 625/ USEPA 8270C	X	X	
Pesticides/PCBs/ Chlordane	USEPA 608/ USEPA 8081A, 8082	X (PCBs only)	X (PCBs only)	X (OEPA 590.1)
E.coli	USEPA 1103.1/ 640.1	X		
Percent Solids	SM 2540G		X	X

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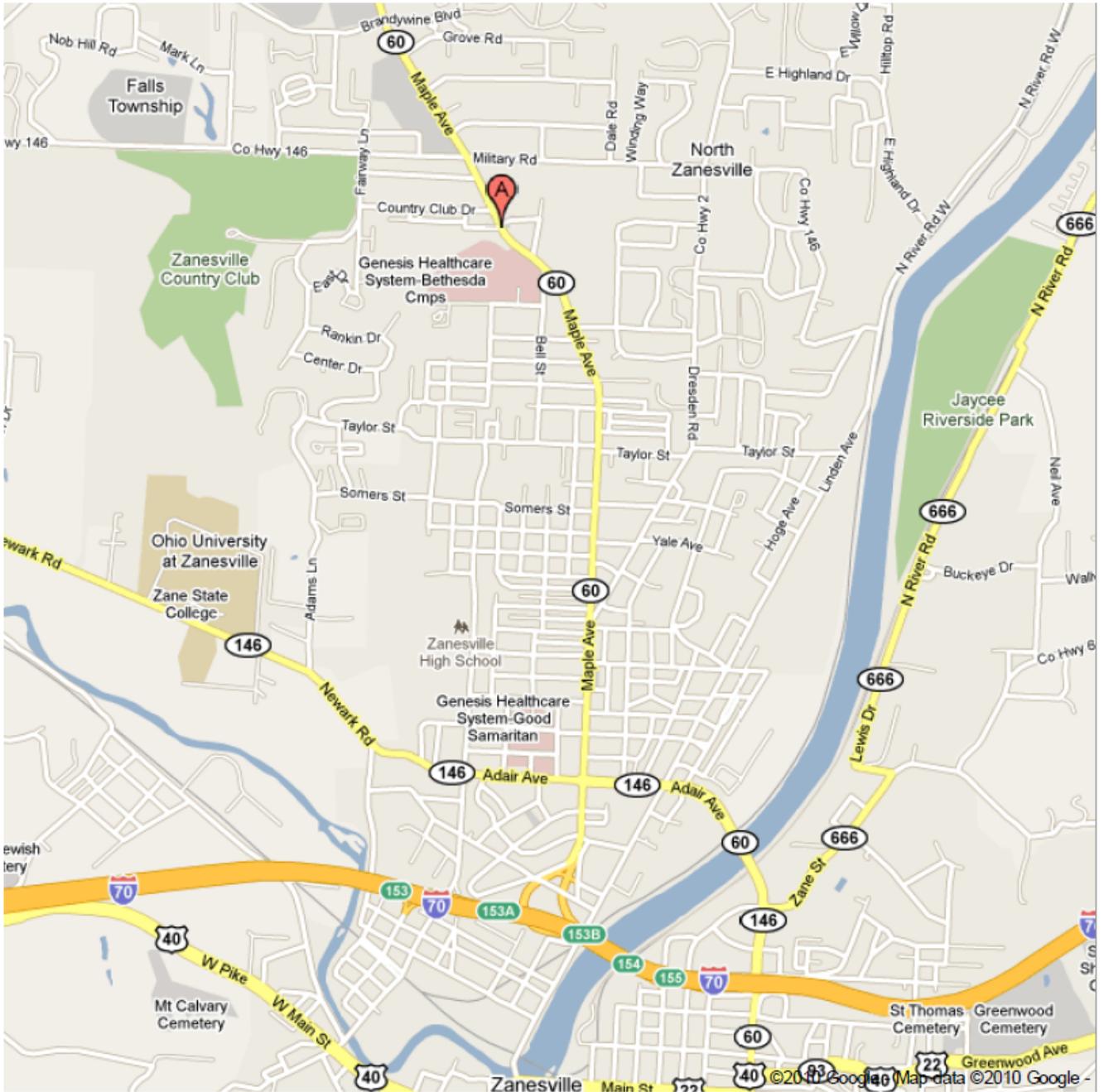
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A. **Coshocton County Memorial Hospital**
1460 Orange Street, Coshocton, OH -
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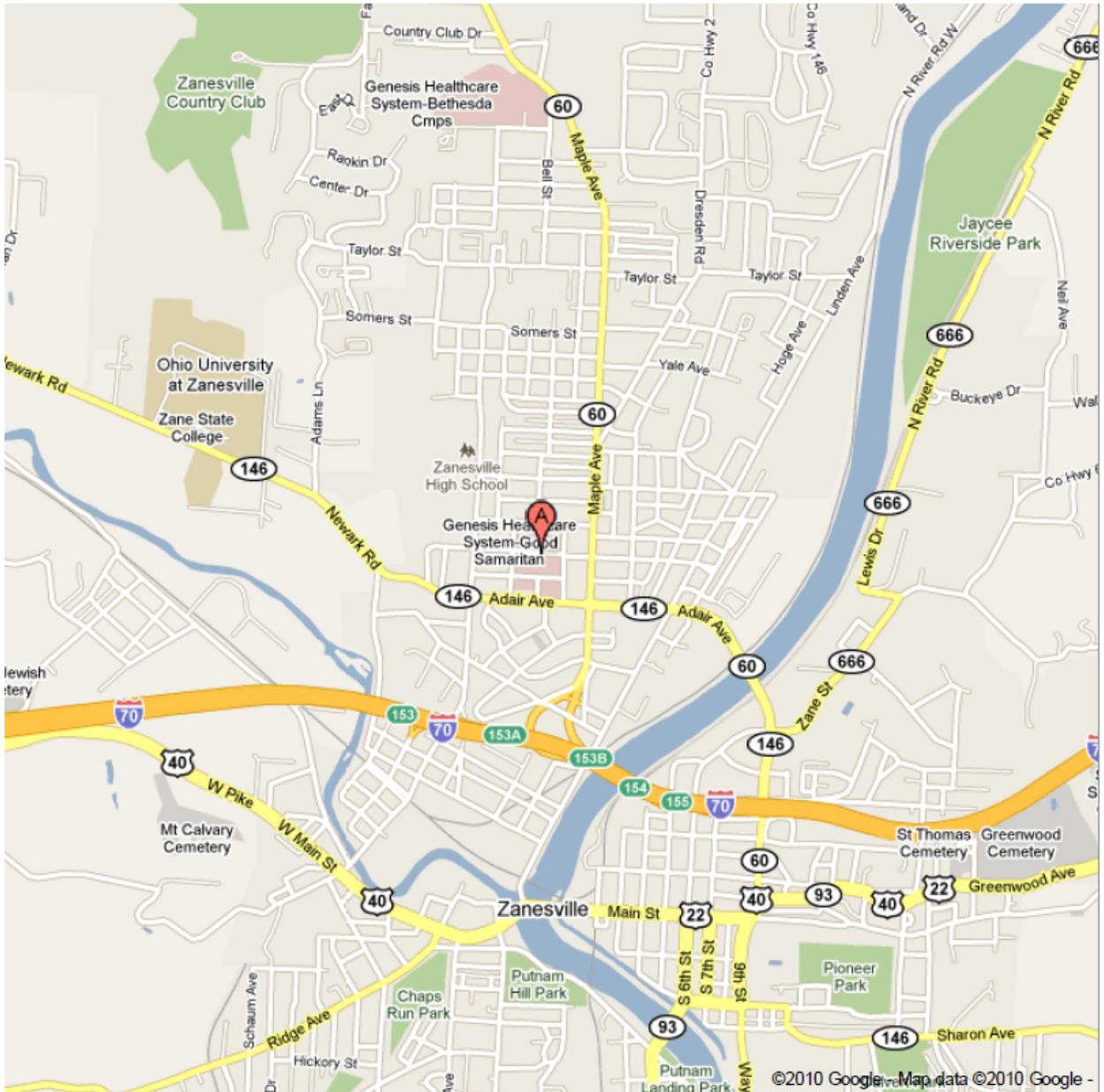


Address **800 Forest Ave**
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