

**Biological and Water Quality Survey
of the
Lower Scioto River
and
Selected Tributaries**

Franklin, Fairfield, Pickaway, Ross, Pike, and Scioto Counties,
Ohio

June 15, 2011

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Introduction

As part of the TMDL process and in support of the basin approach for NPDES permitting, an intensive ambient assessment will be conducted during the 2011 field sampling season within the lower Scioto River basin. The study area is composed 33 watershed assessment units (HUC 12s). A total of 107 sampling stations are allocated to this effort and will provide for the assessment of 50 named stream (Table 1). Ambient biology, macrohabitat quality, water column chemistry, and bacteriological data will be collected concurrently from most of these sites. Diel water quality (DO, pH, conductivity, and temperature), sediment chemistry (metals, organics, and particle size), nutrients, and fish tissue will be evaluated at selected sampling locations.

Sampling Objectives

- 1) Systematically sample and assess the principal drainage network of the lower Scioto River in support of both the TMDL process and NPDES permits,
- 2) Gather ambient environmental information (biological, chemical, and physical) from undesignated water bodies, so as to recommend an appropriate suite of Beneficial Uses (e.g., aquatic life, recreational, water supply),
- 3) Verify the appropriateness of existing, unverified, Beneficial Use Designations, and recommend appropriate use designation to undesignated waters.
- 4) Establish baseline ambient biological conditions at selected reference stations to evaluate the effectiveness of future pollution abatement efforts,
- 5) Document any changes in the biological, chemical, and physical conditions of the study areas where historical information exists, thus expanding the Ohio EPA data base for statewide trends analysis (e.g., 305[b]), and
- 6) Monitor and assess six public lakes within the lower Scioto River basin.

Issues

Total Maximum Daily Load (TMDL)

Information collected as part of this survey will support TMDL development for the study area. The objectives of the TMDL process are to estimate pollutant loads from the various sources within the basin, define or characterize allowable loads to support the various beneficial uses, and to allocate pollutant loads among different pollutant sources through appropriate controls (e.g., NPDES permitting, storm water management, 319 proposals, NPS controls or other abatement strategies).

The components of the TMDL process supported by this survey are primarily the identification of impaired waters, verification (and redesignation if necessary) of beneficial use designations, gathering ambient information that will factor into the wasteload allocation, and ascribing causes and sources of use impairment. These data

are necessary precursors to the development of effective control or abatement strategies.

Aquatic Life Use Designations

Many of the streams (named and unnamed) contained within the study area are unassessed. Previous Aquatic Life Use Designations for these waters were made prior to standardized approaches to the collection of in-stream biological data or numerical biological criteria. As a result, most of the existing Aquatic Life Use Designations for streams within the study area are classified as unverified. Furthermore, some water bodies within the study area are entirely unclassified (no existing Beneficial Use Designations). The Ohio EPA is obligated to review, evaluate, or recommend (where appropriate) Beneficial Uses prior to basing any permitting actions on existing, unverified designations, or wholly unclassified water bodies. Much of the sampling effort for this survey is allocated to fulfill this obligation.

NPDES Permits

Numerous major and minor NPDES permitted facilities will be evaluated as part of this study. These include both publically owned treatment works and private entities. A list of selected permitted facilities on the lower Scioto River mainstem is presented in Table 2.

Nutrients

In support of the ongoing process of nutrient criteria development and to provide more objective and robust characterization of the sources and effects of nutrient loads on the lower Scioto River, extensive nutrient monitoring is scheduled through the entire length of the Scioto River mainstem. Formal WQ survey work in 1997 and an ad hoc investigation in 2005, identified areas of inexplicable aquatic life use impairment or significant declines in ambient biological performance through an approximately 40 mile segment between RMs 83.0 and 33.0. To control and account for significant nutrient sources upstream of the formal limits of the 2011 study area, four sampling stations have been allocated between Columbus and Circleville. The resulting data, when combined with nutrient monitoring results from the remaining downstream reach, will yield a complete, continuous, and concurrent assessment of the nutrient loads and their potential effects to ambient WQ and instream biological performance.

Lakes

Six public lakes contained within the lower Scioto River basin are scheduled for monitoring and assessment in 2011. District Office staff are solely responsible for the field efforts supporting the Lakes monitoring program. Specifically, CDO staff will coordinate and execute WQ sampling on Hargus Lake and SEDO staff will likewise coordinate and execute sampling on Caldwell Lake, Pike Lake, Lake White, Ross Lake, and Stewart Lake. All efforts shall strictly conform to methods, protocols, and sundry details contained within the attached study plans for each of these waterbodies.

Sampling Effort

Field and Laboratory Load

Summarized field and laboratory load (stations, number of samples, and parameters for analysis, etc.) can be found in Table 3. All scheduled locations and necessary stipulations are provided in Tables 4. As lake monitoring efforts with the basin are ad hoc to the primary purpose and funding sources of the lower Scioto River survey, the reader is directed to the attached lake monitoring study plans and templates for station placement, sampling frequency, analytes, etc.. To aid field investigators in their compliance with flow dependent sampling protocols, USGS discharge statistics for the Scioto River are presented in Table 5. Potential points of access and landowner contacts are provided in Table 6.

Water Quality

Water column chemistry samples will be collected from 101 ambient stations and three NPDES outfalls (effluent samples) within the study areas. Water column grab samples and standard field parameters will be collected/measured five times from all locations. The collection of water samples for bacteriological analysis is scheduled for 47 stations (Tables 4). Sampling frequency, flow regime, and other field considerations shall comport with the most recent Recreational Use rule changes.

Datasonde deployment is requested for 34 locations, 19 sentinel and 16 nutrient monitoring sites and a single monitoring station immediately upstream from Paint Creek. If possible, the deployment of continuous monitors should coincide with typical low summer/fall flows (i.e., approaching Q_{710}). The Modeling section will be responsible for deployment of the data center units.

Analysis of biochemical oxygen demand ($cBOD_5$) is requested for all samples collected as part of the lower Scioto River study. Please see attached laboratory templates regarding the inclusion of this and other parameters.

Nutrients

Water column samples in support of nutrient monitoring and assessment efforts will be collected at 20 locations (Table 4). DSW Modeling staff is responsible for the collection of specific parameters supporting nutrient monitoring and assessment. Water column samples for the analysis of sestonic chlorophyll-a, dissolve phosphorus, alkalinity, and $cBOD_5$ must be collected concurrently with either the Datasonde set or retrieval or the interval between these two activities.

Sediment Chemistry

Sediment samples are to be collected from approximately eight locations within the study area. Analysis will include a full organic scan (BNAs, PCBs, TOC, and Pesticides), a full metals scan (excluding mercury), and sediment particle size. Please note, due to very limited practical benefit, demonstrated over many years, analysis for sediment VOCs is not recommended for any sediment samples. Given the limited laboratory allocation, sediment and metal-organic sampling stations were chosen to evaluate areas likely to demonstrate contamination, aid in elucidating longitudinal trends in sediment contamination relative to a known source(s), characterization of sentinel

sites, and characterization ecoregional sediment reference sites. Locations of selected sediment sampling stations are listed in Tables 4. The allocation and placement of additional sediment sampling within the study area will be at the discretion of CDO and SEDO field staff.

Benthic Macroinvertebrate Assessment

The condition of the macrobenthos will be evaluated at 101 locations. Artificial substrate samples (quantitative) will be collected by MEG staff at 50 stations within the study area. Qualitative benthic macroinvertebrate samples (natural substrates) will be collected at 51 locations. Locations of benthic macroinvertebrate sampling stations and type of sample required are listed in Tables 4.

Fish Community Assessment

The condition of the fish assemblages within the study area will be evaluated at 151 locations. Multiple pass fish community samples will be collected at 50 sites by OEPA FEG staff. Single pass fish community samples will be collected at 51 stations. Single pass evaluations are limited to headwaters, baring reference sites or significant permit issues. The locations of all fish sampling stations are listed in Tables 4. Given the size and scope of the lower Scioto River sampling effort, fish evaluation work is divided between three investigators: Charles Boucher and Holly Tucker (EAS) and Kelly Capuzzi (SEDO). Specifically, 61 fish sampling events are allocated the C. Boucher, 67 sampling events to H. Tucker and 22 event to K. Capuzzi. Stations are explicitly allocated to each of these investigators in Table 4.

Sentinel Sites

To aid in the development of a TMDL models(s), sentinel sites have been established at 19 designated locations. At each sentinel site, samples are collected monthly beginning prior to the routine field season that typically begins on June 15th to test for routine water chemistry parameters, pesticides (methods 525.2, 531.1, and 547) and stream stage is measured to the nearest 100th of a foot, as the water line against a designated bridge piling or abutment. Sampling events at sentinel sites should cover the range of stream flow from the 10th to 90th percentiles. If conditions warrant, Bacteriological sampling at all Sentinel Sites may be expanded beyond five runs. The locations of sentinel sites are indicated in Tables 4.

QUALITY ASSURANCE

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 2006), Biological Criteria for the Protection of Aquatic Life, Volumes II – III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment, Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2001), and Ohio EPA Fish Collection Guidance Manual (Ohio EPA 2004). All methods are summarized in Table 7.

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.

Recreational use attainment will be determined using *E. coli* bacteria. *E. coli* is now the primary 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, and 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).

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 from the upper 12 inches of river water into appropriate containers. Collected water will be 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 2006) and shipped overnight via courier to the Ohio EPA lab for analysis. Field measurements of dissolved oxygen, pH, temperature, and conductivity will be made using YSI 556MPS meters along with all grab samples for surface water chemistry. Datasonde® continuous recorders will be placed at select locations to evaluate diurnal measurements of dissolved oxygen, pH, temperature, and conductivity.

Bacteria

Water samples will be collected into appropriate containers, cooled to 4°C, and transported to and submitted to the lab for analysis within 6 hours of collection. All samples will be analyzed for *E. coli* bacteria using U.S.EPA approved methods (STORET Parameter Code 31648).

Field Quality Control Samples

Ten percent of the sediment, 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 2006). Matrix spike duplicates will be collected for organic water samples at a minimum of 5 percent.

Field Staff and Other Contacts

Ohio EPA-Central Office Charles Boucher: (614) 836-8776 Ed Moore: (614) 836-8783 Jack Freda (614) 836-8783 Jeff DeShon: (614) 836-8780 Holly Tucker: (614) 836-8777 Mohammad Asasi: (614) 644-2021 Beth Risley: (614) 728-2384 Chris Skalski: (614) 644-2144	County Wildlife Officers <u>District 1 HQ:</u> (614) 644-3925 Franklin: Brad Kiger:(614) 644-3929 x1205 Fairfield: Tony Zerkle:(614) 644-3929 x1203 <u>District 4 HQ:</u> (937) 372-9261 Pickaway: Ken Bebout: (614) 644-3929 x1212 Ross: Bob Nelson:(740) 589-9995 Pike: Matt Van Cleve:(740) 589-9994 Scioto: Brad Turner:(740) 589-9996
Ohio EPA-SEDO Joann Montgomery: (740) 380-5433 Kelly Capuzzi: (740) 380-5283 Randy Spencer: (740) 380-5240 Dan Imhoff: (740) 380-5232 Ohio EPA SEDO: 1-800-686-7330	County Sheriffs Franklin: James Karnes (614-462-3360) Pickaway: Dwight Radcliff (740-477-6000) RossGeorge Lavender (740-773-1186) Pike: Richard Henderson (740-947-2111) Scioto: Marty Donini (740-354-7566)
Ohio EPA-CDO Paul Vandermeer: (614) 728-3854 Jeff Bohne: (614) 728-3841 Jeff Lewis: (614) 728-3852 Vince Mazeika: (614) 728-3855 Mike Gallaway: (614) 728-3843 Ohio EPA CDO:1-800-686-2330	Police Departments Columbus: (614) 645-4760 Circleville: (740) 477-8208 Chillicothe: (740) 773-1191 Portsmouth: (740) 354-5268
	National Park Service Mound City Group National Monument Rick Perkins, Chief Ranger (740) 703-2717
Hospitals (see attached maps) <u>Riverside Methodist</u>, Columbus: ER: (614) 566-5321, Gen: 614-566-5000 <u>Berger Hospital</u>, Circleville: ER: (740) 474-2126, Gen: 740-474-2126 <u>Adena Regional Medical Center</u>, Chillicothe: ER (740) 779-7500, Gen: 740-779-7500 <u>Pike Community Hospital</u>, Waverly: ER (740) 947-2186, Gen: 740-947-2186 <u>Southern Ohio Medical Center</u>, Portsmouth: ER (740) 356-5000, Gen: 740-356-5000	

Table 1. Waterbodies and allocated sampling effort for each assessment unit (HUC 12)		
HUC 12	Name	Waterbodies^a
50600020401	Hargus Creek	Hargus Creek Hominy Creek
50600020403	Lick Run-Scioto River	Lick Run
50600020405	Scippo Creek	Scippo Creek
50600020404	Congo Creek	Congo Creek (Scippo trib.)
50600020402	Yellowbud Creek	Yellowbud Creek
50600020406	Blackwater Cree-Scioto River	Blackwater Creek
50600020501	Kinnikinnick Creek	Kinnikinnick Creek South Frk. Kinnikinnick Creek
50600020502	Dry Run-Scioto	Dry Run (RM 79.9) Dry Run (74.6)
50600020503	Lick Run-Scioto River	Lick Run
50600021002	Dry Run	Dry Run (RM 59.8)
50600021001	Indian Creek	Indian Creek N.Br. Indian Creek
50600021005	Stony Creek-Scioto River	Stoney Creek
50600021004	Lick Run-Walnut Creek	Walnut Creek Little Walnut Creek Piny Run
50600021105	Meadow Run-Scioto River	Meadow Run
50600021101	Carrs Run	Carrs Run
50600021104	Peepee Creek	Peepee Creek Haw Fork
50600021103	Crooked Creek	Crooked Creek
50600021102	Left Fork Crooked Creek	Left Fork Crooked Creek
50600021304	Boswell Run-Scioto River	NA ^b
50600021301	Noname Creek	Noname Creek
50600021302	Headwaters Big Beaver Creek	Big Beaver Creek Pecks Creek
50600021303	Little Beaver Creek	Big Beaver Creek Little Beaver Creek
50600021201	Sunfish Creek Headwaters	Sunfish Creek Kinkaid Creek
50600021204	Grassy Fork-Sunfish Creek	Sunfish Creek Grassy Fork
50600021206	Leeth Creek-Sunfish Creek	Sunfish Creek Leeth Creek
50600021205	Chenoweth Fork	Chenoweth Fork Carter Run
50600021203	Left Fork Morgan Fork-Morgan Fork	Morgan Fork Left Fork Morgon Fork
50600021202	Morgan Fork Headwaters	Right Frok Morgan Fork Middle Fork Morgan Fork
50600021601	Camp Creek	Camp Creek Left Fork Camp Creek

Table 1. continued.		
HUC 12	Name	Waterbodies ^a
50600021602	Big Run-Scioto River	Big Run Bear Creek
50600021603	Bear Creek-Scioto River	Miller Run Cockerell Run Candy Run
50600021605	Carroll Run-Scioto River	NA ^b
50600021604	Pond Creek	Pond Creek Dry Run
a - The Scioto River mainstem is large enough so as to exclude it from HUC 12 assessment, therefore water bodies listed represent those tributaries scheduled for evaluation in 2011.		
b - HUC 12s so identified do not contain tributaries meeting the minum drainage area assessment criterion, and thus will not be evaluated as part of the lower Scioto River survey.		

Table 2. Facilities regulated by the National Pollution Discharge Elimination System on the Scioto River mainstem.				
Facility Name	NPDES Permit No.	County	River Mile	Comments
Jackson Pike WWTP	4PF00000	Franklin	127.1	Wastewater (68 MGD)
Columbus CSOs	4PF00000	Franklin	132.1-129.4	23 CSO locations
Columbus Limestone	4IJ00016	Franklin	127.2-125.1	6 outfalls – limestone quarry
Columbus Southerly WWTP	4PF00001	Franklin	118.2	Wastewater (114 MGD)
Picway Generating Station	4IB00000	Pickaway	116.8	Cooling
Commercial Point WWTP	4PB00107	Pickaway	115.3	Wastewater (0.43 MGD)
South Bloomfield WWTP #2	4PC00101	Pickaway	109.3	Wastewater (0.50 MGD)
Green Investment Group	4IA00000	Pickaway	99.65	Lagoon treatment
Circleville WWTP	4PD00003	Pickaway	99.2	Wastewater (4.0 MGD)
DuPont Circleville	4IF00001	Pickaway	95.9	Organics (1.46 MGD)
Earnhart Hill Regional WWTP	4PQ00002	Pickaway	89.7	Wastewater (0.15 MGD)
Ross C. Water Co. WTP 2	0IX00052	Ross	79.9	Wash water/Brine effluent (0.20 MGD)
Ross C. Water Co. WTP South	0IZ00033	Ross	79.2	Wash water/Brine effluent (0.08 MGD)
Ross Correctional Institution	0PP00050	Ross	72.4	Wastewater (4.4 MGD)
Chillicothe Easterly WWTP	0PD00003	Ross	68.1	Wastewater (3.8 MGD)
PH Glatfelter Co.	0IA00002	Ross	63.5, 2.4	Paper mill (32.4 MGD) Paint Creek
Waverly WTP	0IW00170	Pike	39.3	Treatment plant sludge lagoon
Waverly WWTP	0PC00011	Pike	39.0	Wastewater (1.8 MGD)
Piketon WTP	0IY00103	Pike	33.9	Wash water
Pike County Water Inc.	0IY00052	Pike	32.3	Wash water
Piketon WWTP	0PB00031	Pike	30.9	Wastewater (1.8 MGD)
USEC Gaseous Diffusion Plant	0IS00023	Pike	25.38	Wastewater/Industrial (1.5 MGD)
Briar Berry MHP	0PV00023	Scioto	14.6	Wastewater (0.01 MGD)

Table 3. Ohio EPA laboratory and field sampling load for the 2011 Lower Scioto River basin survey. Total number of water column analytes does not include field parameters.

Sample Type	No. of Lab Parameters	No. Sites	Passes	Total Samples/Parameters
Conventional Water Quality (total)^a	35	110	5	305/19,250
Pathogen (<i>E. coli</i>)^b	1	47	5+	~235
Nutrients^c	4	20	1	80
Water Column Organics				-/-
BNA, Pesticides (including chlordane) and PCBs	–	-	-	-/-
Datasonde	–	34	1	NA
Sediment	–	8	1	-/-
Sediment Metals**	10	8	1	-/200
Sediment Organic	(Full Scan)#	8	1	-/Full Scan
Sediment Particle Size	NA	8	1	-/-
Fish Tissue				
Metals, including Hg	(FT Suite)	20	1	-/-
Organics, including chlordane	(Full Scan)	20	1	-/Full Scan
Fish Stations (total)	–	101	1-2	151/-
2x	–	50	2	100/-
1x	–	51	1	51/-
Macrobenthos (total)[†]	–	101	NA	67 (HDs and Equivalents)/-
Quantitative (Hester Dendy)	–	50	NA	50/-
Qualitative (Natural Substrates)	–	51	NA	51 (17 HD Equivalents)/-

a - Analysis for cBOD₅ is requested for all WQ samples on the lower Scioto River mainstem

b - Bacteriological measures will include a minimum of five *E. coli* runs for all stations.

c - Nutrient analysis shall include, dissolved phosphorus, alkalinity, cBOD₅, and sestonic chlorophyll-a.

Furthermore, water column sample for these parameters must be concurrent with either the set or retrieval of the datasonde, continuous monitor.

** - Ohio EPA sediment samples will be analyzed for the following metals: Al, As, Cd, Cr, Cu, Pb, Fe, Mn, Ni, and Zn.

- Full Scan includes BNAs, PCBs, Pesticides, and TOC. Please note, due to very limited utility, demonstrated over many years, analysis for sediment VOCs sediment samples.

† - The ratio of HD Equivalents and HD is 3:1.

Table 4. Lower Scioto sampling stations, 2011.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5'Quad.
Scioto River (02-001)							
600810	119.9	1697.0	(F,M,C,N,D)*	SR 665-Shadeville	39.8325 -83.0083	Dst. Jackson Pike (Recovery) Ust. Col. Southerly WWTP	Commercial Point
600900	115.3	2275	(F,M,C,N,D,)*	SR 762	39.7742 -83.0071	Dst. Columbus Southerly WWTP	Commercial Point
600910	109.2	2311.0	(F,M,C,N,D)*	SR 316	39.7172 -83.0108	Historical site	Darbyville
V07W45	105.2	2615.0	(F,M,C,N,D)*	Dst. Walnut Cr.	39.6708 -82.9892	Historical	Ashville
600960	100.0	3217.0	(F,M,C,B,N,D,S,T) ^{SS}	SR 22	39.6042 -82.9561	Dst. Big Darby Creek	Circleville
V07S28	99.2	NA	(E)	Cricleville WWTP 001	NA	Effluent sample	Circleville
V07S01	97.9	3221.0	(F,M,N,D)	Dst. old wicket dam	39.5883 -82.9708	Dst. Circleville WWTP Ust. DuPont	Circleville
V07S62	96.48	3227.0	(C,B)	Ust. DuPont, Dst. Earnhart Trib.	39.5697 -82.9642	Ust. DuPont	Circleville
V07S20	95.9	NA	(E)	DuPont 001	NA	Effluent sample	Circleville
V07K01	94.6	3232.0	(C)	Adj. Canal Rd.	39.5569 -82.9953	Dst. DuPont	Circleville
201818	94.2	3242.0	(F,M,T)	Near Westfall, ust. B&E landfill/dst. DuPont	39.5547 -83.0008	Dst. DuPont Circleville	Williamsport
V07S58	89.5	3341.0	(F,M,C,N,D,T)	Dst. Scippo Creek	39.5039 -82.9833	Historical	Circleville
600940	86.4	3348.0	(F,M,C,B)	Kellenberger Road	39.4728 -82.9961	Water quality status	Kingston
V13P05	83.0	3762.0	(F,M,C,N,D,T)	Near Junction of Orr Rd. and Grouse Chapel Rd.	39.4418 -82.9788	Dst. Deer Creek	Kingston
301543	78.8	3825.0	(B)	SR 207	39.4125 -82.9862	Bacteria only	Kingston
201813	77.4	3828.0	(F,M,C,N,D)	Dst. Delano Road	39.3936 -82.9814	Ust. Ross Correctional WWTP	Kingston
600760	70.4	3849.0	(F,M,C,B,N,D,S,T) ^{SS}	Dst. Bridge St., Chillicothe	39.3419 -82.9667	Dst. Ross Correctional WWTP	Chillicothe East
V13S09	67.5	3853.0	(F,M,C,N,D)	0.6 miles dst. Chillicothe WWTP	39.3283 -82.9347	Dst. Chillicothe Easterly WWTP	Chillicothe East
600920	64.2	3865.0	(F,M,C,T,D)	US 35, Ust. Paint Creek	39.3056 -82.9203	Ust. Paint Cr/PH Glatfelter	Chillicothe East
V13W06	60.0	5055.0	(F,M,C,N,D,T)	Near Three Locks	39.2519 -82.9050	Dst. Paint Cr./ PH Glatfelter	Chillicothe East
600770	56.0	5131.0	(F,M,C,B,N,D,S,T) ^{SS}	Higby Road	39.2122 -82.8647	Dst. Paint Cr./ PH Glatfelter	Richmond Dale
V15S10	50.9	5694.0	(F,M,C,B,N,D)	SW of Richmond Dale	39.1864 -82.8311	Dst. Salt Creek	Richmond Dale

Table 4. continued

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Scioto River (02-001)							
V15S10	50.9	5694.0	(F,M,C,B,N,D)	SW of Richmond Dale	39.1864 -82.8311	Dst. Salt Creek	Richmond Dale
V15K07	46.0	5721.0	(F,M,C,B,T)	SR 335	39.1381 -82.8911	Historical	Waverly South
201807	40.0	5750.0	(F,M,C,B,N,D,T)	Ust. SR 220, ust. Omega	39.1111 -82.9686	Ust. Waverly WWTP	Waverly South
201805	37.1	5837.0	(F,M,C,N,D,T)	Gregg's Hill	39.0978 -83.9747	Dst. Waverly WWTP	Waverly South
201805	33.0	5837.0	(F,M,C,N,D)	SR 23, Piketon	39.0797 -83.0283	Historical Impairment	Piketon
601010	30.08	5846	(C,N,D,B,S) ^{SS}	SR 124 at Jasper	39.0472 -83.0503	Sentinel Site	Piketon
V15S15	28.6	5864.0	(F,M)	Dst. SR 124	39.0269 -83.0428	Ust. USEC Facility Ust. Beaver Creek	Wakefield
V15P16	23.9	6089.0	(F,M,C,T)	Dst. Sunfish Creek	38.9822 -83.0406	Dst. USEC Facility Diffusion Plant	Wakefield
V15S11	20.5	6134.0	(F,M,C)	Adj. SR 23	38.9386 -83.0325	Historical Site	Wakefield
V15K02	15.0	6168.0	(F,M,C,B,N,D,T)	SR 348, ust. Lucasville	38.8811 -83.0178	Water quality status	Wakefield
V15K01	9.0	6471.0	(F,M,C,B)	Near Rushtown	38.8333 -83.0192	Dst. Scioto Brush Cr. "Rushtown Riffle"	West Portsmouth
V15W01	5.4	6495.0	(F,M,C,B,S)	Adj. SR 23	38.7861 -82.9969	Historical	New Boston
Hargus Creek (02-074)							
V07S87	2.08	9.6	(F,M,C) ^a	At Fairgrounds Rd.	39.5969 -82.9233	ust Hominy Creek	Circleville
300804	0.4	19.7	(F,M,C,D,B) ^{a,SS}	High St.	39.6061 -82.9490	Near mouth	Circleville
Hominy Creek (02-075)							
203280	0.2	6.2	(F,M,C) ^a	Adj. E Main St./SR56, at RR Crossing	39.5947 -82.9283	Near mouth	Circleville
Lick Run (02-073)^{HT}							
301558	0.2	-	(F,M,C,B) ^a	Sisk Rd./Westfall Rd.	39.5599 -83.0017	HUC Coverage	Circleville
Yellowbud Creek (02-071)^{HT}							
301559	7.08	-	(F,M,C) ^a	Rector Rd.	39.5618 -83.0634	Historical	Willamsport
301320	1.1	36.2	(F,M,C,B,D) ^{SS}	CR 1046	39.4593 -83.0102	Historical	Willamsport

Table 4. continued.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Scippo Creek (02-069)^{HT}							
V07S82	14.8	5.6	(F,M,C) ^a	Tarlton N. Rd, at County Line	39.5819 -82.8406	Historical	Stoutville
V07S81	11.1	19.4	(F,M,C) ^a	SR 56	39.5397 -82.8456	Historical	Stoutville
V07K07	5.28	32.0	(F,M,C,T)	Kingston Pike	39.5544 -82.9325	Ust. PPG, Historical	Circleville
V07S19	4.55	NA	(E)	PPG Effluent	NA	PPG Effluent	Circleville
V07S16	4.45	32.5	(F,M,C,T)	Dst. PPG, Lane at RR Crossing	39.5461 -82.9422	Dst. PPG, Historical	Circleville
601250	1.60	33.8	(F,M,C,B,D,S,T) ^{SS}	River Rd.	39.5233 -82.9714	Historical	Circleville
Congo Creek (02-070)^{HT}							
V07S70	2.2	11.0	(F,M,C,B) ^a	SR 361	39.5081 -82.9528	Historical	Circleville
Blackwater Run (02-047)^{HT}							
203296	0.7	8.1	(F,M,C,B) ^a	Orr Rd.	39.4594 -82.9794	Historical	Kingston
Kinnikinnick Creek (02-068)^{KC/HT}							
V13K07	7.5	11.1	(F,M,C) ^a ^{KC}	Kingston Hallsville Pike	39.4600 -82.8714	Historical	Hallsville
V13S10	2.95	31.6	(F,M,C,B,D) ^{SS,HT}	Sulfer Springs Rd.	39.4297 -82.9391	Historical	Kingston
South Fork Kinnikinnick Creek (02-068-001)^{KC}							
301515	0.8	7.12	(F,M,C,D,B) ^a	SR 180	39.4355 -82.8904	HUC Coverage	Kingston
Dry Run (West @RM 79.9)(02-067)^{KC}							
301539	0.6	11.1	(F,M,C) ^a	Ust. SR 104, at private lane	39.4152 -83.0126	HUC Coverage	Andersonville
Dry Run (East@RM 74.6)(02-066)^{KC}							
301516	0.6	5.7	(F,M,C,B) ^a	TR 292 near Hopetown (RM74.6)	39.3790 -82.9798	HUC Coverage	Kingston
Lick Run (02-065)^{b, KC}							
301517	0.64	5.4	(F,M,C,B) ^a	Schrader Rd/RR Crossing	39.3137 -82.9119	HUC Coverage	Chillicothe East
Indian Creek (02-063)^{HT}							
301332	1.2	21.57	(F,M,C,B,D) ^{SS}	Massieville Rd.	39.2798 -82.9539	Historical	Chillicothe East
North Br. Indian Creek (02-064)^{KC}							
301540	0.1	6.63	(F,M,C) ^a	Adj Trego Rd.	39.2697 -82.9666	HUC Coverage	Chillicothe East

Table 4. continued.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Dry Run (RM 59.8) (02-062)^{KC}							
301518	4.6	11.32	(F,M,C,B) ^a	Concord Church Road	39.3046 -82.8889	HUC Coverage	Chillicothe East
Stoney Creek (02-061)^{KC}							
301519	0.23	10.64	(F,M,C,B) ^a	Three Locks Rd.	39.2339 -82.8952	HUC Coverage	Waverly North
Walnut Creek (02-056)^{HT}							
301557	14.4	-	(F,M,C) ^a	Rout Rd.	39.3694 -82.8196	HUC Coverage	Londonderry
301520	11.3	22.3	(F,M,C,B)	Mt. Nebo Rd.	39.3309 -82.8444	Ust. Little Walnut Cr/dst. Spud Run	Londonderry
V13S12	5.16	47.6	(F,M,C)	Schoolery Station Rd.	39.2677 -82.8361	Dst Sugar Creek	Londonderry
301331	1.3	58.0	(F,M,C,B,D,T) ^{SS}	Old SR 35	39.2316 -82.8591	Near Mouth	Richmond Dale
Piny Run (02-060)^{KC}							
301541	0.34	4.88	(F,M,C) ^a	Piny Creek Rd./CR 220	39.3579 -82.8181	HUC Coverage	Londonderry
Little Walnut Creek (02-058)^{HT}							
301542	0.25	13.2	(F,M,C) ^a	Mittler Lane (Cottril Rd)	39.3335 -82.8521	HUC Coverage	Londonderry
Carrs Run (02-050)^{HT}							
V15S24	1.52	12.7	(F,M,C,B) ^a	N. River Rd	39.1398 -82.8642	Historical	Richmand Dale
Meadow Run (02-047)^{HT}							
301521	0.26	7.8	(F,M,C,B) ^a	River Rd	39.1257 -82.9226	HUC Coverage	Waverly North
Peepee Creek (02-035)^{HT}							
301556	11.5	-	(F,M,C) ^a	Nipgen Rd.	39.1784 -83.0906	HUC Coverage	Summith Hill
301325	7.65	21.7	(F,M,C,B,D) ^{SS}	CR 37	39.1003 -83.9992	Historical	Summit Hill
V15P12	0.4	79	(F,M,C,T)	SR 104	39.1053 -83.0079	Dst. Lake White	Piketon
Haw Fork (02-042)^{HT}							
301547	0.4	8.4	(F,M,C) ^a	Adj. Turkey Run Rd	39.1517 -83.0991	HUC Cverage	Summit Hill
Crooked Creek (02-036)^{KC/HT}							
301545	10.7	8.3	(F,M,C) ^{a,HT}	Blaine Hwy./SR 167, West of Alma	39.1874 -82.9822	HUC Coverage	Waverly North
301544	8.0	19.65	(F,M,C) ^{a,KC}	Farm Lane off Alma Omega Rd., near Pike Co. Airport	39.1634 -82.9501	HUC Coverage	Waverly North

Table 4. continued.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Crooked Creek (02-036)^{HT}							
301330	2.3	40.8	(F,M,C,B,D) ^{SS, HT}	At SR 220	39.1259 -82.9872	Historical	Waverly North
301546	0.1	42.8	(F,M,C) ^{HT}	At Mouth, adj. SR 104	39.1067 -83.0078	HUC Coverage and stream relocation	Piketon
Left Fork Crooked Creek (02-037)^{HT}							
301522	2.65	13.2	(F,M,C,B) ^a	CR 47/Denver Rd	39.1565 -83.0152	HUC Coverage	Summit Hill
No Name Creek (02-031)^{HT}							
301328	0.8	13.2	(F,M,C,B,D) ^{a,SS}	SR 32, ust Long Run	39.0510 -83.0591	Historical	Piketon
Big Beaver Creek (02-022)^{b,HT/CEB}							
301549	19.8	8.98	(F,M,C) ^{a,HT}	Gravel Washer Rd.	39.0183 -82.8201	HUC Coverage	Beaver
301523	16.01	24.4	(F,M,C,B) ^{HT}	Red Hollow Rd./CR 76	39.0219 -82.8786	HUC Coverage	Waverly South
V15K14	5.5	59.0	(F,M,C)	Shyville Rd.,ust. Little Beaver Creek	39.0597 -82.9986	Historical	Waverly South
V15K13	3.15	62.0	(F,M,C,T,B,D,S) ^{SS}	CR 84 Wakefield Mound Rd.	39.0427 -83.0232	Historical	Piketon
Pecks Creek (02-027)^{HT}							
301548	1.5	6.8	(F,M,C) ^a	Germany Rd./CR 66	39.0114 -82.9156	HUC Coverage	Waverly South
Little Beaver Creek (02-023)^{KC}							
V15S05	0.06	6.3	(F,M,C) ^a	Wakefield Mound Road	39.0325 -83.0256	Historical	Piketon
Sunfish Creek (02-800)^{HT}							
203310	23.3	17.7	(F,M,C,B) ^a	SR 124, ust. Byington	39.0847 -83.3027	Historical	Byington
203308	19.9	38.5	(F,M,C,T)	Grassy Fork Rd.	39.0948 -83.2484	Historical	Latham
301323	16.23	52.3	(F,M,C,B,D) ^{SS}	Red Bridge Rd.	39.0919 -83.1873	Historical	Latham
V15S01	8.15	132.0	(F,M,C,T)	Tennyson Rd.	39.0466 -83.1287	Historical	Latham
301329	4.85	137.0	(F,M,C,B,D) ^{SS}	CR 21, Sunfish Creek Rd.	39.0128 -83.1287	Historical	Piketon
Kincaid Creek (02-815)^{KC}							
203307	0.8	10.5	(F,M,C) ^a	Lapperell Rd. near spring house	39.1031 -83.2681	Historical	Byington
Grassy Fork (02-814)^{KC}							
203372	0.01	6.0	(F,M,C) ^a	Adj Grassy Fork Road at mouth	39.0940 -83.2482	Historical	Byington

Table 4. continued.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Morgan Fork (02-809) ^{HT}							
203306	1.7	31.3	(F,M,C,B,D) ^{SS}	Adj CR 3 Morgan Fork Rd	39.1182 -83.1906	Historical	Latham
Right Fork Morgan Fork (02-811) ^{KC}							
203301	1.3	19.8	(F,M,C) ^a	Dst from Middle Fork	39.1433 -83.1939	Historical	Morgantown
Middle Fork (02-817) ^{KC}							
203299	1.5	4.7	(F,M,C,B) ^a	Dst Pike Lake (0.5 miles)	39.1539 -83.2153	Historical	Morgantown
Left Fork Morgan Fork (02-810) ^{KC}							
203303	1.2	7.79	(F,M,C) ^a	Firetower Road	39.1297 -83.2150	Historical	Morgantown
Leeth Creek (02-808) ^{KC}							
203367	1.5	5.1	(F,M,C) ^a	Adj Leeth Creek Rd	39.1016 -83.1440	Historical	Latham
Chenoweth Fork (02-802) ^{HT}							
203312	8.1	6.8	(F,M,C) ^a	Dst. Long Run, adj. SR 32 and Chenoweth Fork Rd.	39.0400 -83.2406	Historical	Latham
203361	1.7	28.9	(F,M,C,B)	Chenoweth Rd./CR25, dst. Spoon River	39.0469 -83.1389	Historical	Latham
Carter Run (02-804) ^{HT}							
203366	0.4	7.5	(F,M,C) ^a	UST SR 32	39.0406 -83.1717	Historical	Latham
Camp Creek (02-015) ^{HT}							
203354	5.2	18.7	(F,M,C,B,D) ^{a,SS}	CR 25 Coldicott Rd	38.9737 -83.1199	Historical	Wakefiled
301555	0.2	32.0	(F,M,C)	SR 104, near mouth	38.9683 -83.0683	HUC Coverage	Wakefiled
Left Fork Camp Creek (02-017) ^{HT}							
301554	1.4	-	(F,M,C) ^a	Left Fork Rd	38.9746 -83.1584	HUC Coverage	Rarden
Big Run (02-001-026) ^{HT}							
301553	2.0	8.1	(F,M,C) ^a	Wakefield Mound Road	38.9721 -83.0204	Huc Coverage	Wakefield
Bear Creek (02-014) ^{HT}							
200351	2.4	8.9	(F,M,C,B) ^a	Adj Bear Creek Rarden Rd	38.9273 -83.0745	Historical	Wakefiled
Miller Run (02-009) ^{HT}							
301524	0.93	13.7	(F,M,C,B) ^a	CR 55/Fairground Road	38.9052 -83.0034	HUC Coverage	Wakefield

Table 4. continued.

River STORET	River Mile	Drain Area (mile ²)	Sample Type	Location	Lat. Long.	Purpose	USGS 7.5' Quad.
Cockrell Run (02-010) ^{HT}							
301552	2.6	4.59	(F,M,C) ^a	Beloat Road	38.9303 -83.0001	HUC Coverage	Wakefield/ Lucasville
Candy Run (02-008) ^{KC}							
V15S28	1.04	8.05	(F,M,C) ^a	Ust. Lucasville WWTP	38.8572 -82.9858	Ust. Lucasville WWTP	New Boston
V15S27	0.87	8.8	(F,M,C) ^a	SR 23, dst. Lucasville WWTP	38.8558 -82.9881	Dst. Lucasville WWTP	New Boston
Pond Creek (02-002) ^{KC}							
301550	8.4	8.0	(F,M,C) ^a	SR 49	38.7902 -83.0786	HUC Coverage	West
301321	4.8	18.0	(F,M,C,B,D) ^{a,SS}	Primrose Lane (Alley Rd)	38.8062 -83.0290	Historical	West Portsmouth
Dry Run (02-003) ^{KC}							
301551	1.2	4.51	(F,M,C) ^a	SR 73/SR 104	38.7739 -83.0142	HUC Coverage	West Portsmouth

* - Stations so identified support extralimital nutrient monitoring to control for or characterize the potential effects of nutrient loads from Columbus. Water column chemical monitoring will be limited to field parameters, nutrients [total phosphorus, and standard array of nitrogenous parameters (TKN, ammonia, nitrate/nitrite, etc.)] and alkalinity

a - Stations draining an area less than 20 miles²: 1X fish and qualitative Macrobenthos sampling. Unless otherwise indicated all other stations drain an area greater than 20 miles², and thus 2X Fish and quantitative Macrobenthos sampling is prescribed.

b - River miles have not been adjusted to account for the capture of the lower ~0.5 mile of both Beaver Creek and Lick Run by the Scioto River mainstem.

SS – WQ Modeling Sentinel Site

☐ - Water column, sediment, and bacterial monitoring for shaded waterbodies or sampling stations are the responsibility of CDO DSW staff. Unless otherwise indicated, all other waterbodies or stations are the responsibility of SEDO DWS staff.

KC - Fish community monitoring for stations or streams so indicated are the responsibility of **Kelly Capuzzi, SEDO, DSW.**

HT - Fish community monitoring for stations or streams so indicated are the responsibility of **Holly Tucker, CO, EAS, DSW.**

F - Fish Community

M - Macrobenthos

C - Water Column Chemistry :

- For the Scioto River mainstem, analytes shall include those specified in Large River monitoring template (see attached)
- Analytes for all other waters shall include those specified in Stream Monitoring template (see attached)

N - Nutrients: samples in support of nutrient monitoring are the responsibility of DSW Modeling staff and at a minimum must include the following parameters:

- Water Column/Sestonic Chlorophyll-a, Dissolve Phosphorus, Alkalinity, and cBOD₅.

D - Datasonde

T - Fish Tissue, standard suite of metals and organics, including chlordane.

B - Bacteria sampling in support of recreational use assessment.

S – Sediment:

- Full Organic Scan [Pesticides (including Chlordane), BNAs, TOC and PCBs], Full Metals Scan (excluding Hg), Percent Solids

Table 5. Scioto River summer discharge statistics at three USGS gaging stations.			
Flow Gage	20%ile (cfs)	50%ile (cfs)	80%ile (cfs)
Columbus 03227500	145	212	553
Chillicothe 032316500	331	591	1430
Higsby 03234500	483	833	1930

Table 6. Known and potential points of access on the lower Scioto River, 2011.						
Locale	River Mile	River Side	Latitude	Longitude	Type/Contact	Locked
Scioto River (mainstem)						
Scioto Canoe Livery dst. SR 665	119.3	Right	39.82463	83.01125	[REDACTED]	■
SR762	115.3	Left	39.7742	-83.0075	[REDACTED]	■
SR 316 (~0.5-1.0 mile ust.)	109.0	Right	-	-	[REDACTED]	■
SR 316/S. Bloomfield WWTP	109.0	Left	39.71508	-83.01054	[REDACTED]	■
US 22 Circleville	99.9	Right	39 36 08	82 57 21	[REDACTED]	■
Pickway Historical society	97.9	Right	39 35 17.7	82 58 14.9	[REDACTED]	■
Circleville Canal Wildlife Area	95.2	Right	-	-	[REDACTED]	■
Pickway Historical Society Canal	94.6	Right	39.55785	82.99467	[REDACTED]	■
Pickway Co. Airport	89.7	Left	39 30 19.9	82 58 56.3	[REDACTED]	■
Kellenberger Rd.	86.4	Right	39 28 23.0	82 59 47.8	[REDACTED]	■
Between Deer Creek and Kinnikinnick Creek	~86.0	Left	-	-	[REDACTED]	■
Ross Co. Engin. Yard/SR 207	78.8	Right	39.41227	82.98674	[REDACTED]	■
Gravel Quarry	77.4	-	-	-	[REDACTED]	■
Yountangee Park- Chillicothe	71.3	Right	39.34106	82.98161	[REDACTED]	■
Lane off US 35/50 to City Well Field	67.5	Right	-	-	[REDACTED]	■
Three Locks Gravel	63.3	Right	39.29153	82.92974	[REDACTED]	■

Table 6.continued.

Locale	River Mile	River Side	Latitude	Longitude	Type	Locked
Higby Rd. bridge	56.2	Left	39 12 46.3	82 51 52.8		
Farm Lane SR 335	46.8	Right	-	-		
Bethel Ramp	40.9	Left	39.11779	82.95236		
Adj. US 23 between Omega and Greggs Hill	~38.0	Left	-	-		
Piketon ramp	34.7	Left	39.07027	83.01039		
Jasper – SR 124	30.2	Right	39 02 50	83 03 03		
Bernard ramp	21.75	Right	38 57 11	83 02 42		
Industrial-Warehouse Facility North of Wakefield off west side of us 23	23.9	Left	-	-		
Lucas Sand and Gravel	14.1	-	-	-		
Off SR 104 between SR 348 and Scioto Brush	~9.2	Right	-	-		
Access/ramp?	9.1	Right	38.8333	-83.0183		
South of Rushtown off SR 104	~8.0	Right	-	-		
@ Rosemont	5.4	-	-	-		
Portsmouth Raceway	0.1	Right	38 43 53	83 00 53		
Portsmouth – Ohio R.	NA	Right	-	-		
Hominy Creek						
Adj. Landowner	0.2	-	-	-		
Crooked Creek						
Adj. Landowner	8.0	-	-	-		

Table 7. List of chemical/physical water quality parameters to be analyzed/measured in surface water, sediment, and fish tissue from the Lower Scioto River basin sampling locations. Not all sites will be samples for all parameters. Water samples will be collected 5 times (organics once), sediment once. Bacteria samples will be collected 5 times during the recreation season (5-10 times at sentinel sites). Select sampling locations will be monitored for dissolved oxygen, pH, temperature, and conductivity using Datasonde© continuous recorders.

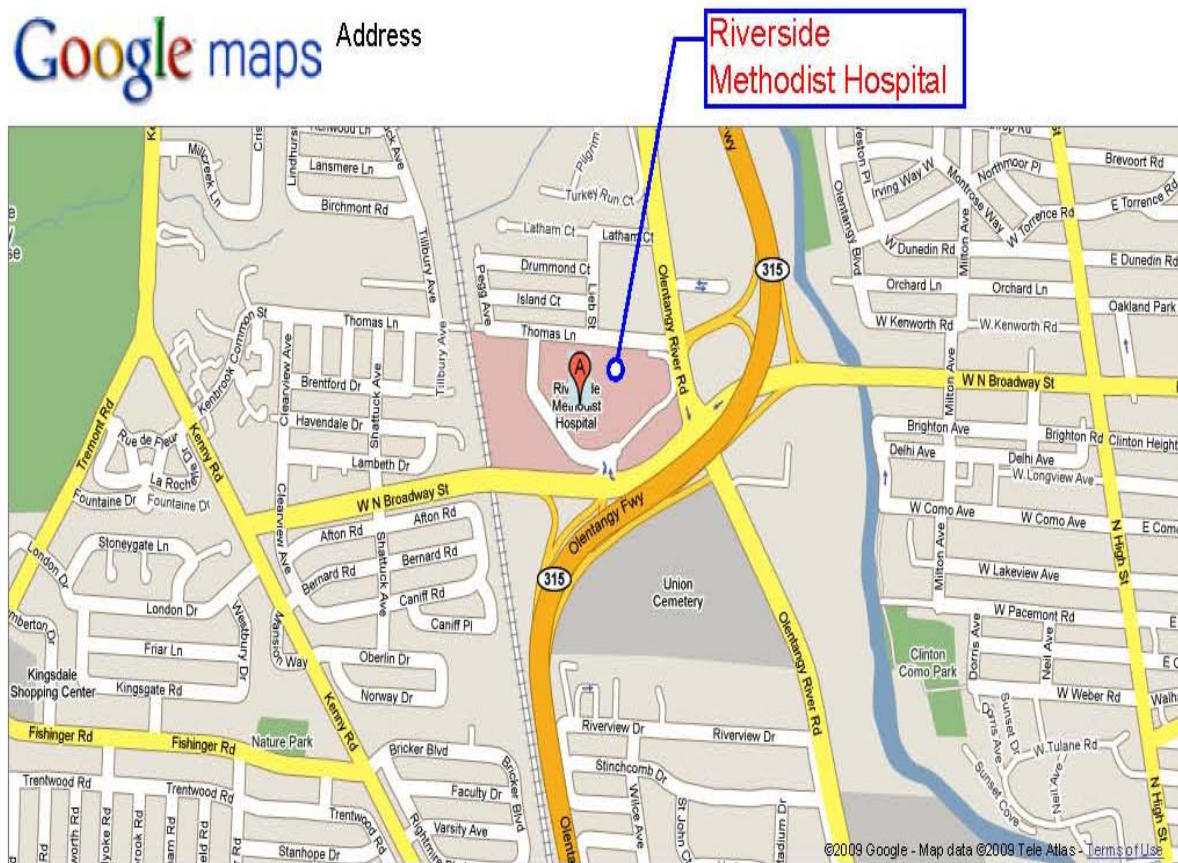
Parameters	Test Method	Water	Sediment	Fish Tissue
cBOD, 5 day	SM 5210B	X		
SOLIDS, DISSOLVED (TDS)	USEPA 160.1	X		
SOLIDS, SUSPENDED (TSS)	USEPA 160.2	X		
AMMONIA	USEPA 350.1	X		
Alkalinity	USEPA 305.1	X		
TKN	USEPA 351.2	X		
NITRATE-NITRITE	USEPA 353.1	X		
Nitrite	USEPA 354.1	X		
Chloride	USEPA 325.1	X		
COD	USEPA 410.4	X		
TOTAL PHOSPHORUS	USEPA 365.4	X		
DISSOLVED PHOSPHORUS	USEPA 365.4	X		
GLYPHOSATE	USEPA 547	X		
ICP 1 (Al,Ba,Ca, Fe, Mg, Mn, Na, Ni, K, Sr, Zn, Hardness)	USEPA 200.7	X		
Water Column chlorophyll-a	USEPA 455	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	USEPA 525.2	X		
SVOCs (BNAS)	USEPA 625/ USEPA 8270C	X	X	
Pesticides/PCBs/ Chlordane	USEPA 608/ USEPA 8081A, 8082	X (PCBs only)	X	X (OEPA 590.1)
<i>E. coli</i>	USEPA 1103.1/ 640.1	X		
Percent Solids	SM 2540G		X	X

REFERENCES

- Hughes, R. M., D. P. Larsen, and J. M. Omernik. 1986. Regional reference sites: a method for assessing stream pollution. *Env. Mgmt.* 10(5): 629-635.
- Karr, J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Env. Mgmt.* 5(1): 55-68.
- Ohio Environmental Protection Agency. 2006. Ohio EPA manual of surveillance methods and quality assurance practices, updated edition. Division of Environmental Services, Columbus, Ohio. <http://www.epa.state.oh.us/dsw/documents/Field%20Manual%203-6-06%20revision.pdf>
- Ohio EPA. 2004. State of Ohio Cooperative Fish Tissue Monitoring Program, Fish Collection Guidance Manual
Final.March 2004
<http://www.epa.state.oh.us/dsw/fishadvisory/FishCollectionGuidanceManual05.pdf>
- Ohio EPA. 2001. Sediment sampling guide and methodologies, 2nd edition. Nov. 2001. Division of Surface Water, Columbus, Ohio.
<http://www.epa.state.oh.us/dsw/guidance/sedman2001.pdf>
- Ohio EPA. 1997. Draft. Biological Criteria for the Protection of Aquatic Life: Volume IV: Fish and Macroinvertebrate Indices for Ohio's Lake Erie Nearshore Waters, Harbors, and Lacustuaries. Division of Surface Water, Ecological Assessment Unit, Ohio EPA, Columbus, Ohio, USA.
- Ohio EPA. 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio.
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>
- Ohio EPA. 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>
- Ohio EPA. 1989a. Addendum to biological criteria for the protection of aquatic life: Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Planning and Assessment, Surface Water Section, Columbus, Ohio.
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>
- Ohio EPA. 1989b. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Division of Water Quality Planning and Assessment, Columbus, Ohio.
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>
- Omernik, J.M. 1987. Ecoregions of the conterminous United States. *Ann. Assoc. Amer. Geogr.* 77(1): 118-125.
- Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Division of Water Quality Planning and Assessment, Columbus, Ohio.
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>

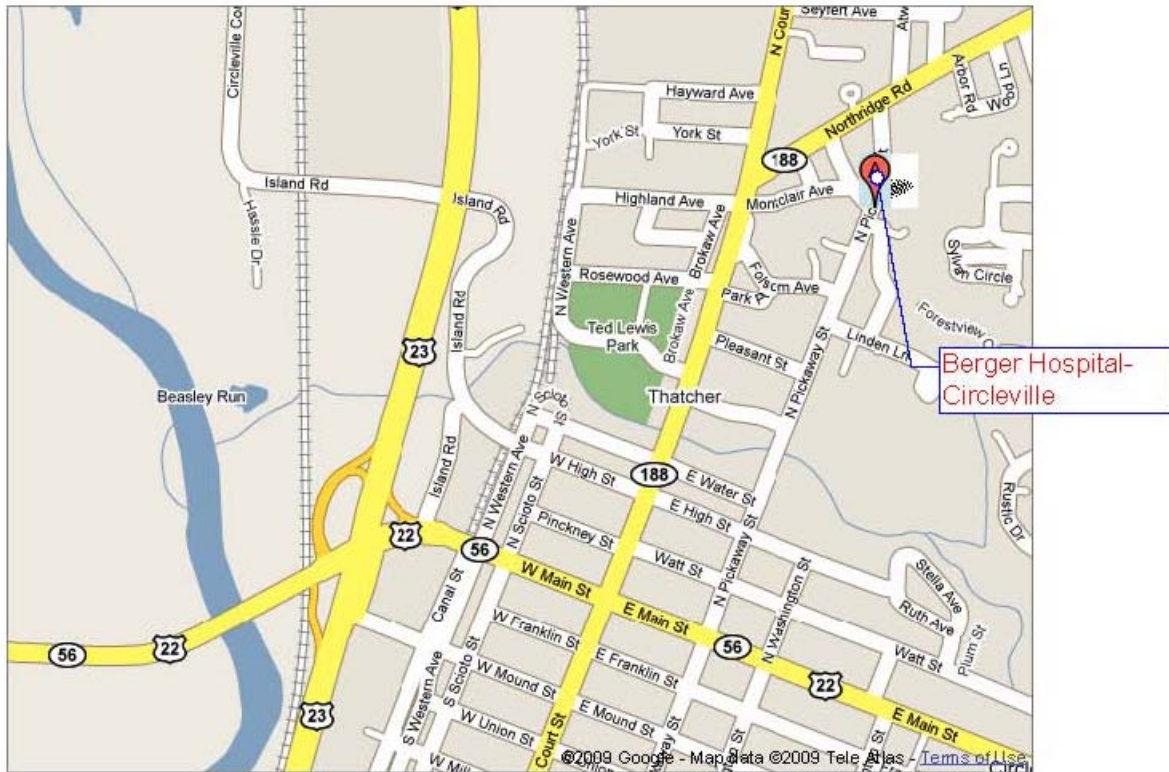
Medical Services

Riverside Methodist Hospital
Columbus: ER: (614) 566-5321



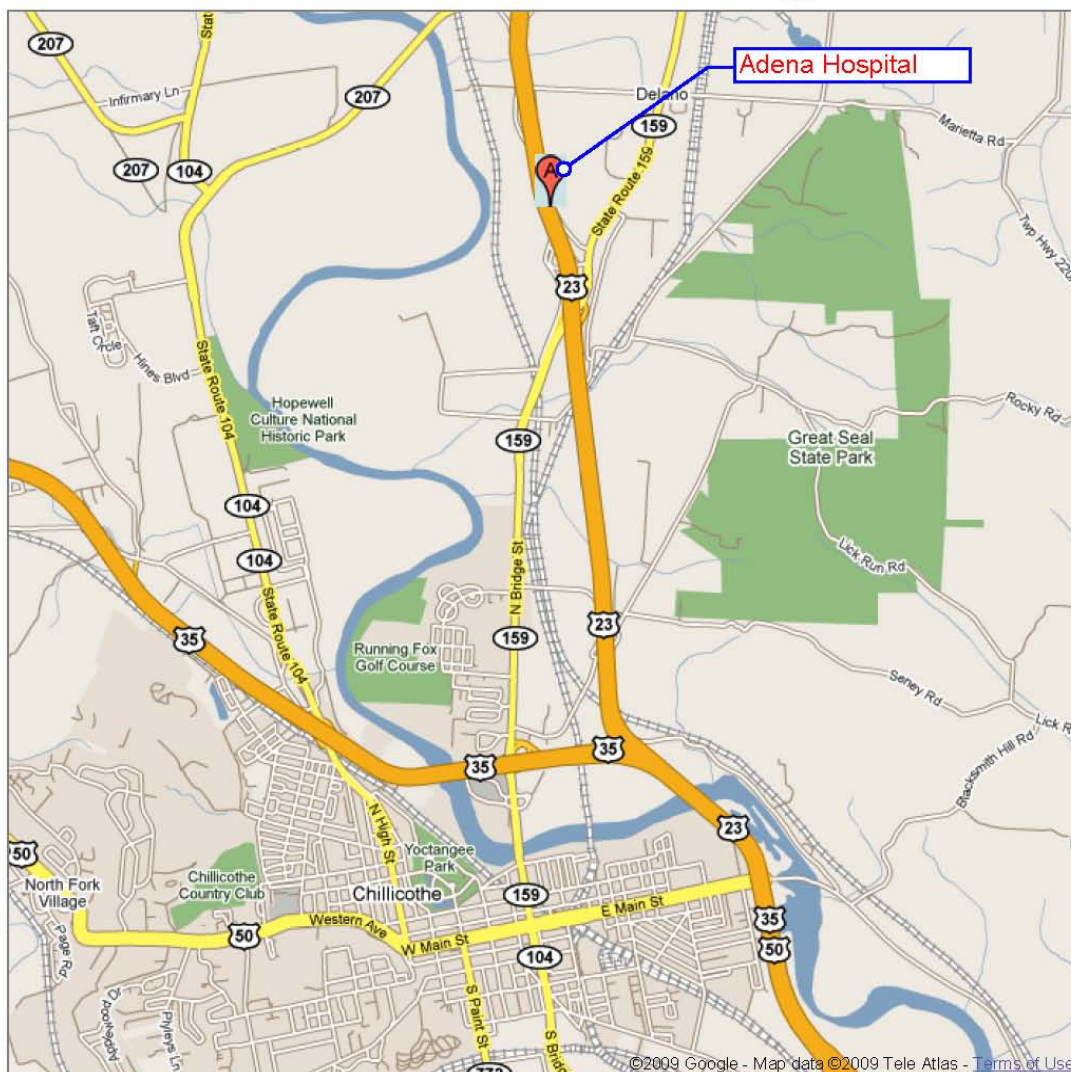
Berger Hospital

Circleville: ER: (740) 474-2126



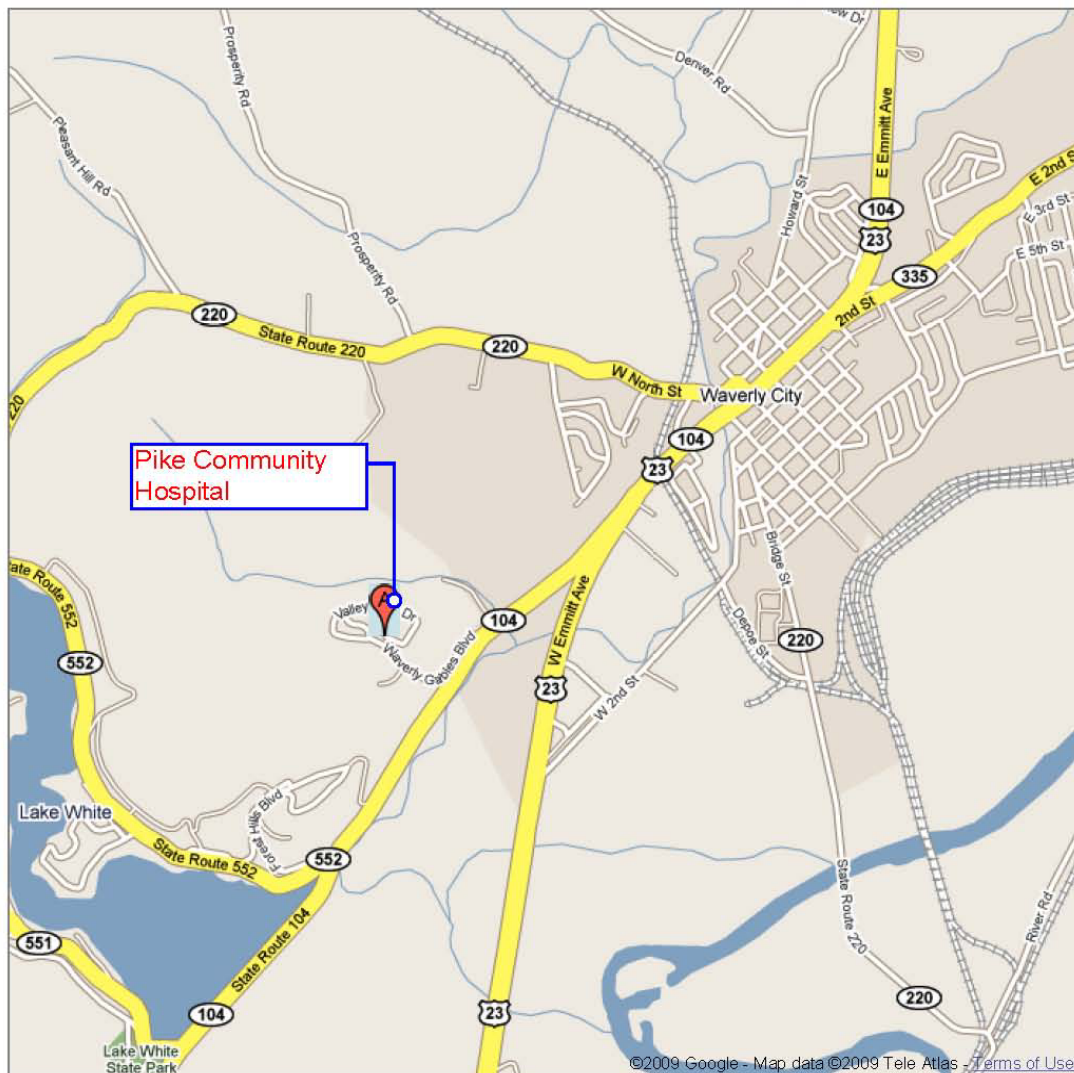
Adeana Hospital

Chillicothe: ER (740) 779-7500

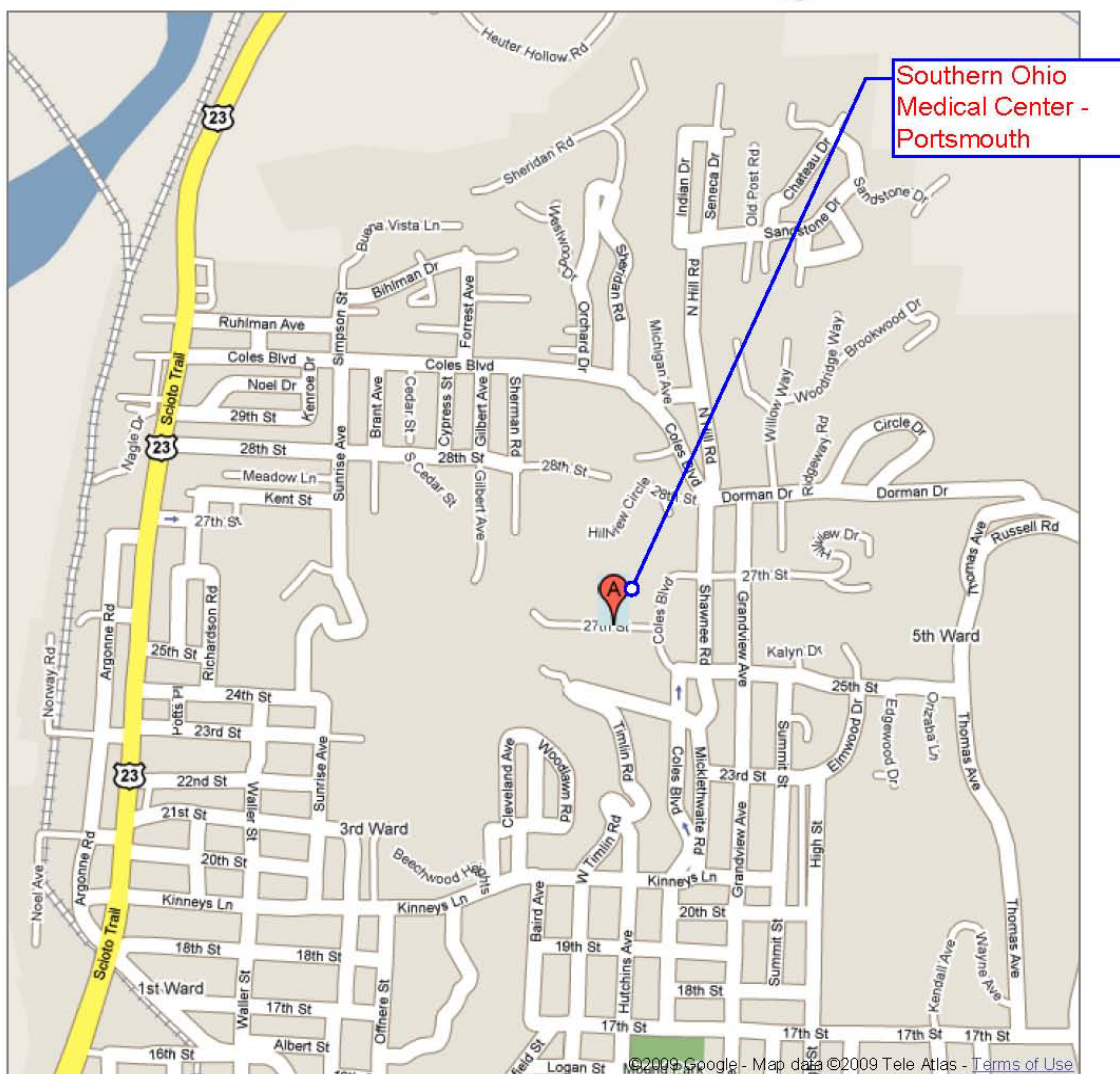


Pike County Hospital

Waverly: ER (740) 974-2186



Southern Ohio Medical Center
Portsmouth: ER (740) 356-5000



2011 Lake WQ Monitoring: Study Plans and Laboratory Template

Hargus Lake (CDO)
Caldwell Lake (SEDO)
Lake White (SEDO)
Pike Lake (SEDO)
Ross Lake (SEDO)
Stewart Lake (SEDO)

2011 Study Plan for Caldwell Lake

Ross County

Ohio EPA
Southeast District Office
Division of Surface Water
2195 East Front Street
Logan, Ohio 43138

Introduction

During the 2011/2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Lower Scioto River basin to assess and characterize water quality conditions. The Long Term Monitoring Schedule web address can be found in the References section. As a Total Maximum Daily Load (TMDL) basin, this survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. A description of Ohio EPA's TMDL process can be found at the Ohio EPA website found in the References section. As part of the assessment and field sampling during the 2011 and 2012 field season, Caldwell Lake will be assessed. This plan addresses the assessment of Caldwell Lake.

Objectives:

- Identify causes and sources of impairment
- Determine attainment status of beneficial uses for the 303d list
- Support of, coordination with, and incorporation of Division of Drinking and Groundwater Public Water Supply sampling.
- Support of, coordination with, and incorporation of modeler BATHTUB sampling requirements if initial sampling indicates potential non-attainment.
- Track status and trends for the Integrated Report
- Recommend actions for improvement

Lake size: 10 acres

Maximum Depth: 20 feet

Location of Dam: 39.22794,-82.95035

Watershed size: 638 acres

Impoundment of: Stony Creek

Year completed: 1937

Caldwell Lake has one boat launch. No gasoline boat engines are allowed. There is a swimming beach. The Lake is part of Scioto Trail State Park.

SAMPLING

Five sampling events will occur in 2011 and five in 2012. These sampling events will occur during stratification of the lake (typically June through September). Samples will be taken from the historical L-1 sampling location, at the deepest part of the lake. Sampling will be done according to the Ohio EPA Lake Sampling Manual. The Lakes Sampling Manual can be found at the website listed in the References section.

USE ATTAINMENT

Attainment/non-attainment of lake habitat uses will be determined by using criteria codified in Ohio Administrative Code (OAC) 3745-1-43(F)(8).

REFERENCES

Ohio EPA TMDL

<http://www.epa.state.oh.us/dsw/tmdl/index.html>

Ohio EPA Surface Water Assessment and Protection

<http://www.epa.state.oh.us/ddagw/pdu/swap.html>

Ohio EPA 305(b) reports (Ohio Water Resource Inventory)

http://www.epa.state.oh.us/dsw/document_index/305b.html

The Lakes Sampling Manual

2011 Study Plan for Lake White

Pike County

Ohio EPA
Southeast District Office
Division of Surface Water
2195 East Front Street
Logan, Ohio 43138

Introduction

During the 2011/2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Lower Scioto River basin to assess and characterize water quality conditions. As a Total Maximum Daily Load (TMDL) basin, this survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. A description of Ohio EPA's TMDL process can be found at the Ohio EPA website found in the References section. As part of the assessment and field sampling during the 2011 and 2012 field season, Lake White will be assessed. This plan addresses the assessment of Lake White.

Objectives:

- Identify causes and sources of impairment
- Determine attainment status of beneficial uses for the 303d list
- Support of, coordination with, and incorporation of Division of Drinking and Groundwater Public Water Supply sampling.
- Support of, coordination with, and incorporation of modeler BATHTUB sampling requirements if initial sampling indicates potential non-attainment.
- Track status and trends for the Integrated Report
- Recommend actions for improvement

Lake size: 350 acres

Maximum Depth: 23 feet

Location of Dam: 39.101991,-83.013339

Watershed size: 22,464 acres

Impoundment of: Pee Pee Creek

Year completed: 1935

Lake White is part of Lake White state Park and has has one boat launch. Unlimited horsepower engines are allowed. There is a swimming beach.

SAMPLING

Five sampling events will occur in 2011 and five in 2012. These sampling events will occur during stratification of the lake (typically June through September). Samples will be taken from the historical L-1 sampling location, at the deepest part of the lake. Sampling will be done according to the Ohio EPA Lake Sampling Manual. The Lakes Sampling Manual can be found at the website listed in the References section.

USE ATTAINMENT

Attainment/non-attainment of lake habitat uses will be determined by using criteria codified in Ohio Administrative Code (OAC) 3745-1-43(F)(8).

REFERENCES

Ohio EPA TMDL

<http://www.epa.state.oh.us/dsw/tmdl/index.html>

Ohio EPA Surface Water Assessment and Protection

<http://www.epa.state.oh.us/ddagw/pdu/swap.html>

Ohio EPA 305(b) reports (Ohio Water Resource Inventory)

http://www.epa.state.oh.us/dsw/document_index/305b.html

The Lakes Sampling Manual

http://www.epa.state.oh.us/dsw/inland_lakes/Lake%20sampling%20Procedures%206-19-06_2.pdf

2011 Study Plan for Pike Lake

Pike County

Ohio EPA
Southeast District Office
Division of Surface Water
2195 East Front Street
Logan, Ohio 43138

Introduction

During the 2011/2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Lower Scioto River basin to assess and characterize water quality conditions. As a Total Maximum Daily Load (TMDL) basin, this survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. A description of Ohio EPA's TMDL process can be found at the Ohio EPA website found in the References section. As part of the assessment and field sampling during the 2011 and 2012 field season, Pike Lake will be assessed. This plan addresses the assessment of Pike Lake.

Objectives:

- Identify causes and sources of impairment
- Determine attainment status of beneficial uses for the 303d list
- Support of, coordination with, and incorporation of Division of Drinking and Groundwater Public Water Supply sampling.
- Support of, coordination with, and incorporation of modeler BATHTUB sampling requirements if initial sampling indicates potential non-attainment.
- Track status and trends for the Integrated Report
- Recommend actions for improvement

Lake size: 11 acres

Maximum Depth: 10 feet

Location of Dam: 39.159383,-83.219697

Watershed size: 2112 acres

Impoundment of :unnamed tributary of Right Fork Morgan fork

Year completed: 1937

Pike Lake is part of Lake White state Park. No gasoline engines are allowed. There is a swimming beach.

SAMPLING

Five sampling events will occur in 2011 and five in 2012. These sampling events will occur during stratification of the lake (typically June through September). Samples will be taken from the historical L-1 sampling location, at the deepest part of the lake. Sampling will be done according to the Ohio EPA Lake Sampling Manual. The Lakes Sampling Manual can be found at the website listed in the References section.

USE ATTAINMENT

Attainment/non-attainment of lake habitat uses will be determined by using criteria codified in Ohio Administrative Code (OAC) 3745-1-43(F)(8).

REFERENCES

Ohio EPA TMDL

<http://www.epa.state.oh.us/dsw/tmdl/index.html>

Ohio EPA Surface Water Assessment and Protection

<http://www.epa.state.oh.us/ddagw/pdu/swap.html>

Ohio EPA 305(b) reports (Ohio Water Resource Inventory)

http://www.epa.state.oh.us/dsw/document_index/305b.html

The Lakes Sampling Manual

http://www.epa.state.oh.us/dsw/inland_lakes/Lake%20sampling%20Procedures%206-19-06_2.pdf

2011 Study Plan for Ross Lake

Ross County

Ohio EPA
Southeast District Office
Division of Surface Water
2195 East Front Street
Logan, Ohio 43138

Introduction

During the 2011/2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Lower Scioto River basin to assess and characterize water quality conditions. The Long Term Monitoring Schedule web address can be found in the References section. As a Total Maximum Daily Load (TMDL) basin, this survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. A description of Ohio EPA's TMDL process can be found at the Ohio EPA website found in the References section. As part of the assessment and field sampling during the 2011 and 2012 field season, Ross Lake will be assessed. This plan addresses the assessment of Ross Lake.

Objectives:

- Identify causes and sources of impairment
- Determine attainment status of beneficial uses for the 303d list
- Support of, coordination with, and incorporation of Division of Drinking and Groundwater Public Water Supply sampling.
- Support of, coordination with, and incorporation of modeler BATHTUB sampling requirements if initial sampling indicates potential non-attainment.
- Track status and trends for the Integrated Report
- Recommend actions for improvement

Lake size: 140 acres

Maximum Depth: 24 feet

Location of Dam: 39.334994, -82.905536

Watershed size: 2,451 acres

Impoundment of: Lick Run

Year completed: 1967

Ross Lake has one boat launch. No gasoline boat engines are allowed. The Lake is surrounded by the Ross Lake Wildlife area.

SAMPLING

Five sampling events will occur in 2011 and five in 2012. These sampling events will occur during stratification of the lake (typically June through September). Samples will be taken from the historical L-1 sampling location, at the deepest part of the lake. Sampling will be done according to the Ohio EPA Lake Sampling Manual. The Lakes Sampling Manual can be found at the website listed in the References section.

USE ATTAINMENT

Attainment/non-attainment of lake habitat uses will be determined by using criteria codified in Ohio Administrative Code (OAC) 3745-1-43(F)(8).

REFERENCES

Ohio EPA TMDL

<http://www.epa.state.oh.us/dsw/tmdl/index.html>

Ohio EPA Surface Water Assessment and Protection

<http://www.epa.state.oh.us/ddagw/pdu/swap.html>

Ohio EPA 305(b) reports (Ohio Water Resource Inventory)

http://www.epa.state.oh.us/dsw/document_index/305b.html

2011 Study Plan for Stewart Lake

Ross County

Ohio EPA

Southeast District Office

Division of Surface Water

2195 East Front Street

Logan, Ohio 43138

Introduction

During the 2011/2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Lower Scioto River basin to assess and characterize water quality conditions. As a Total Maximum Daily Load (TMDL) basin, this survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. A description of Ohio EPA's TMDL process can be found at the Ohio EPA website found in the References section. As part of the assessment and field sampling during the 2011 and 2012 field season, Stewart Lake will be assessed. This plan addresses the assessment of Stewart Lake.

Objectives:

- Identify causes and sources of impairment
- Determine attainment status of beneficial uses for the 303d list
- Support of, coordination with, and incorporation of Division of Drinking and Groundwater Public Water Supply sampling.
- Support of, coordination with, and incorporation of modeler BATHTUB sampling requirements if initial sampling indicates potential non-attainment.
- Track status and trends for the Integrated Report
- Recommend actions for improvement

Lake size: 6 acres

Maximum Depth: 10 feet

Location of Dam: 39.217742,-82.961186

Watershed size: 211 acres

Impoundment of: Unnamed tributary to Stony Creek

Year completed: 1939

Stewart Lake is part of Scioto Trail State Park. No gasoline engines are allowed.

SAMPLING

Five sampling events will occur in 2011 and five in 2012. These sampling events will occur during stratification of the lake (typically June through September). Samples will be taken from the historical L-1 sampling location, at the deepest part of the lake. Sampling will be done according to the Ohio EPA Lake Sampling Manual. The Lakes Sampling Manual can be found at the website listed in the References section.

USE ATTAINMENT

Attainment/non-attainment of lake habitat uses will be determined by using criteria codified in Ohio Administrative Code (OAC) 3745-1-43(F)(8).

REFERENCES

Ohio EPA TMDL

<http://www.epa.state.oh.us/dsw/tmdl/index.html>

Ohio EPA Surface Water Assessment and Protection

<http://www.epa.state.oh.us/ddagw/pdu/swap.html>

Ohio EPA 305(b) reports (Ohio Water Resource Inventory)

http://www.epa.state.oh.us/dsw/document_index/305b.html

The Lakes Sampling Manual

http://www.epa.state.oh.us/dsw/inland_lakes/Lake%20sampling%20Procedures%206-19-06_2.pdf

OhioEPA

Division of Environmental Services

Report for Test Schedule INLAND_LAKES_WATER

Modified On 5/16/2011 12:01:58

Modified By RKHIDEKEL

Description DSW Inland lakes water samples--Inorganic analysis

Group Name INORGANIC

Analysis / Schedule	Instrument	Replicates	Standard	Analysis
Ammonia		1	☒	☒
Conductivity		1	☒	☒
ICP_1		1	☒	☒
ICPMS_1		1	☒	☒
Nitrate		1	☒	☒
Nitrite		1	☒	☒
Orthophosphate		1	☒	☒
pH		1	☒	☒
SoI_Tot_Vol		1	☒	☒
Solids_Diss		1	☒	☒
Solids_Susp		1	☒	☒
Solids_Tot		1	☒	☒
Sulfate		1	☒	☒
TKN		1	☒	☒
TOC		1	☒	☒
TP		1	☒	☒

WQ Monitoring Laboratory Templates:
Standard Stream Parameters
and
Large River Parameters



Division of Environmental Services

Report for Test Schedule LARGE_RIVER

Modified On 5/11/2010 09:41:53

Modified By LFRIEDMAN

Description Samples submitted for large rivers by DSW

Group Name INORGANIC

Analysis / Schedule	Instrument	Replicates	Standard	Analysis
Alkalinity		1	☒	☒
Ammonia		1	☒	☒
BOD-5		1	☒	☒
Chloride		1	☒	☒
COD		1	☒	☒
Conductivity		1	☒	☒
ICP_1		1	☒	☒
ICPMS_1		1	☒	☒
Nitrate		1	☒	☒
Nitrite		1	☒	☒
Solids_Diss		1	☒	☒
Solids_Susp		1	☒	☒
Sulfate		1	☒	☒
TKN		1	☒	☒
TOC		1	☒	☒
TP		1	☒	☒



Division of Environmental Services

Report for Test Schedule LARGE_RIVER

Modified On 5/11/2010 09:41:53

Modified By

LFRIEDMAN

Description

Samples submitted for large rivers by DSW

Group Name

INORGANIC

Analysis / Schedule	Instrument	Replicates	Standard	Analysis
Alkalinity		1	☒	☒
Ammonia		1	☒	☒
BOD-5		1	☒	☒
Chloride		1	☒	☒
COD		1	☒	☒
Conductivity		1	☒	☒
ICP_1		1	☒	☒
ICPMS_1		1	☒	☒
Nitrate		1	☒	☒
Nitrite		1	☒	☒
Solids_Diss		1	☒	☒
Solids_Susp		1	☒	☒
Sulfate		1	☒	☒
TKN		1	☒	☒
TOD		1	☒	☒
TP		1	☒	☒