2011 Study Plan for the Tenmile Ottawa Watershed (Fulton and Lucas Counties, OH)

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Introduction:
During the 2011 field season (June thru October) biological, physical, and chemical sampling will be conducted in the Tenmile Ottawa watershed to assess and characterize water quality conditions. Sample locations were selected to characterize known potential pollution sources, to ensure adequate representation of principal stream reaches, or to evaluate conditions specific to dam removal and associated restoration projects. In addition, some "sentinel" sites were selected to support development of Total Maximum Daily Load (TMDL) models.

Two small municipal wastewater treatment plants (WWTP) and some permitted industrial discharges exist in the study area (Table 1). Beyond assuring that sample locations were adequate to assess these potential influences, the survey was broadly structured to characterize possible effects from unsewered areas, agricultural or industrial activities, and from mineral extraction.

Streams, locations, and types of sampling planned are listed in Table 2. Sample effort is detailed in Table 3. Water and sediment chemical test methods are listed in Table 4.

Sampling Objectives:

- Sufficiently evaluate study area streams to determine aquatic community status.
- Characterize any aquatic resource degradation and determine the extent it is attributable to particular stressors.
- Assess physical habitat influences on stream biotic integrity.
- Determine recreational water quality status.

Background:
The Maumee Remedial Action Plan (RAP) began with a 1987 meeting and achieved an initial milestone in 1990 when the Stage 1 report was affirmed by the International Joint Commission. Incorporating the Ottawa River within its Area of Concern (AOC), the RAP is the lead organization for all Toledo area stream restoration activities. The RAPs long list of success may be reviewed at the sponsoring Partners for Clean Streams, Inc. web site: http://www.partnersforcleanstreams.org/

Ohio EPA had a formative role in RAP creation and has maintained a commitment to its environmental improvement process through funding and collaborative personnel involvement. Within the Ottawa AOC, Ohio EPA has conducted nine water quality assessments providing RAP support data. Results of these inquiries are available at Ohio EPAs web site: http://www.epa.state.oh.us/dsw/document_index/psdindx.aspx

The 1991 Ohio EPA report *Fish Tissue, Bottom Sediment, Surface Water, Ottawa River / Tenmile Creek* based on 1986, 1988, and 1990 sampling efforts provided foundation

Table 1. Selected NPDES permitted entities in the 2011 Ten Mile Ottawa study area.

Facility	MGD	Discharge to	RM	Note
Lyons WWTP	0.065	Bear C	12.49	Controlled discharge lagoon
Metamora WWTP	0.2	Tenmile C	15.50	Controlled discharge lagoon
Hanson Aggregates	8.9	Tenmile C (trib.)	5.33	May increase conductivity
Hanson Aggregates	2.34	Tenmile C (trib.)	3.75	002
General Motors	1.8	Silver C	5.01	Multiple stormwater outfalls
Hoffman R Landfills	0.073	Mud C	0.72	Multiple outfalls
Libbey Glass	0.068	Mud C (trib.)	0.80	Recent avg. flow 0.082 MGD

for issuance of a primary contact and fish consumption advisory for the Ottawa River by the Ohio Department of Health. This advisory, applicable to 19 miles of the 19.75 mile long River, cautions against any wading, swimming or fishing in the Ottawa. Ohio State University researchers, Leroy Hushak and Mary Bielen completed a 1999 report, *Valuing the Ottawa River: the Economic Values and Impacts of Recreational Boating* to gain better understanding of public perceptions and interests in dredging and pertinent environmental issues (available at the Partners website). While their report confirmed local support for improving recreational opportunities, it also clarified significant economic losses had occurred subsequent to the advisory posting.

The lower reach of the Ottawa River was severely contaminated with PCB's, PAH's and metals (lead). The RAP produced reports summarizing where these sediments persisted and prioritized specific reaches for remediation. Sibley Creek joins the Ottawa River (RM 5.59) after flowing through an industrial area adjacent to the Dura Avenue landfill. Having evaluated the Stream in 1996, Ohio EPA confirmed acutely toxic conditions were still present in 2002 (OEPA 2003). Beneath a silty ooze surface, the bottom urban grit substrates released an oily sheen and creosote odors when disturbed.

In 2007, Ohio EPA assessed the Lake Erie influenced part of the Ottawa River (downstream from RM 9.0). Biological performance at 10 locations was poor. Sediments from these sites were contaminated. Fish tissue evaluation confirmed the continuation of the consumption advisory.

A two year lower Ottawa River dredging project was completed in 2010. Nearly 10,000 yd^3 of Sibley Creek sediment were removed among 240,000 yd^3 of material dredged during the project. After treatment, some of the most contaminated material was placed in a Michigan hazardous waste landfill. Otherwise, the dredged sediment was placed in the Hoffman Road landfill (RM 4.0).

Additionally, several other ill conceived landfills along the lower Ottawa River have been remediated in the last fifteen years. These sites were formerly known to leach toxins into the River. Thus with proper closure of these facilities and the removal of contaminated sediment, it is hoped that the environmental improvements observed in other areas will be expedited in the lower Ottawa River.

Recognizing natural attenuation is facilitated in time, it is deemed premature to revisit the lower reach of the Ottawa during the 2011 survey. Instead, this study will focus on water quality conditions upstream from the Lake influence. Since previous Ohio EPA assessments, two low head dams have been removed upstream from the University of Toledo (Secor Avenue in 2007) and at Boy Scout Camp Miakonda (2003).

Researchers from Bowling Green State University, Sheila Roberts and James Evans, from the University of Toledo, Johan Gottgens and Alison Spongberg, and Norman Levine from the College of Charleston studied the Ottawa River conditions prior to the Secor dam removal. Their 2007, "Assessing Potential Removal of Low-Head Dams in Urban Settings: An Example from the Ottawa River, NW Ohio" article in *Environmental Management* (39)1 appeased numerous concerns regarding unintended consequences resulting from dam removal projects. Dr. Gottgens has evaluated fish community response to the Secor dam removal. His findings are available at his University of Toledo web site: http://www.eeescience.utoledo.edu/faculty/gottgens/default.htm and at the Partners site.

Todd Crail's work with Dr. Gottgens is depicted in the 2010 UT Discovers, Focus on Environmental Research publication. Crail (http://www.farmertodd.com/) conducted a comparison of vegetation types associated with Tenmile Creek fish assemblages in 2006. Todd Crail's discovery of a large least darter population in Tenmile Creek is especially noteworthy as an indication of improving water quality conditions in the upper watershed area.

In 2010, the Michigan Department of Environmental Quality conducted macroinvertebrate assessments in the portions of Tenmile Creek within their State. Aquatic Biologist, Molly Rippke (rippkem@michigan.gov) can provide further information about this effort.

Current Events:
Construction of a bike path along the Ottawa River in the vicinity of Harroun Road and I-475 is anticipated this summer. Sampling locations may need to be adjusted to avoid interfering with this project.

Zinc Ditch at Dorr Street was evaluated in 1993 (May appear as Heldman Ditch with a RM above 5.5 in some databases). Some channel modification has occurred in the vicinity which may provide opportunity to evaluate the so called two stage design. Sampling to characterize the success of this approach is desired. This area has experienced expansive subdivision growth. One of the upstream developments is presently subject to OEPA Directors Findings and Orders. Broad characterization of local stream conditions is unrelated to this specific case. However, information obtained in this survey may inform that interest.

In May this year, Lucas County created a seven township stormwater utility. Residents in the basin will be assessed to pay for stormwater pollution abatement. This Clean Water Act, USEPA phase 2 initiative was developed and planned over many years.

Even so, it is still a potentially divisive local issue. While this survey is unrelated to the stormwater improvement tasks, sampling crews are encouraged to become familiar with topical themes.

Sampling Methods and 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, Biological Criteria for the Protection of Aquatic Life, Volumes II - III, The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application, and Ohio EPA Sediment Sampling Guide and Methodologies.

Biological Sampling

Two fish sampling passes will be completed and quantitative macroinvertebrate sampling methods will be conducted at larger drainage sites on principal streams (16 locations). One fish sampling pass and qualitative macroinvertebrate sampling will be conducted at sites with smaller drainage areas (16 locations). Habitat assessment will occur at all fish sampling locations using the QHEI form and protocols. In Table 2, 2x or a capital HD indicates where two passes or quantitative methods are requested while 1x or a Q indicates where qualitative sampling or one pass is expected. Ottawa River and Lake Orlander fish tissue will be collected at 6 locations indicated by a capital T in Table 2.

Fish will be collected with pulsed DC current. All species or hybrids will be identified and counted. Representative weights will be obtained as needed for calculation of appropriate biological indexes. Vouchers will be retained of unique specimens. Otherwise, fish will be returned to the stream after data recording.

Macroinvertebrates will be collected from artificial substrates and from the natural habitats. The artificial substrate collection, five modified Hester-Dendy (HD) multiple-plate samplers colonized for six weeks, provides quantitative data. A qualitative multihabitat composite sample will be obtained from all study sites. This consists of an inventory of all observed macroinvertebrate taxa present among the natural habitats at each site with general notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin).

Water Column Chemical Sampling

Conventional chemical/physical water quality samples will be collected five times at 27 locations (denoted by a capital C in Table 2). Previous sampling has indicated metal concentrations in rural, agricultural land use influenced areas are likely to be inconsequential and unrelated to any water quality concerns. Therefore, metal parameters will not be evaluated at eight of the chemistry sites where nutrients are potentially most influential (specified by C_N in Table 2).

Organic water samples will be collected once at 5 locations specified in Table 2 with a

Table 2. List of sampling locations in the 2011 Tenmile Ottawa watershed study area.

Location	RM	Site #	Sample Types	Rationale / Notes
			Bear Creek	
Fulton CR 10	12.98	P11S24	1x Q C_N	Ust. Lyons WWTP
SR 120	11.56	P11S23	2x HD C_N *Ec*	Dst. Lyons WWTP
Fulton CR 7	8.44	301452	2x HD C_N *Ec*	Ohio / Michigan Border
			Tenmile Creek	
CR T	18.25	301445	1x Q C_N	
SR 64	16.03	P11S15	1x Q C_N D	Ust. Metamora WWTP
Fulton CR 1	15.00	301446	2x HD C_N D	Dst. Metamora WWTP
Kilburn R	9.17	P11K65	2x HD C_N D *Ec*	Dst. Agricultural area
Herr R	**5.94**	**P11S76**	**2x HD C D Cl_A *Ec* S**	**Ust. Hanson Aggregates**
Brint R	2.97	P11K64	2x HD C O S D	Dst. Hanson Aggregates
Silica D	0.47	P11K63	2x HD C *Ec*	Dst. Highland Meadows CC
			Ottawa River	
Harroun R	19.50	301440	2x HD T C O D *Ec* S	Ust. Miakonda impoundment
Sylvania A	16.84	301441	2x HD T *Ec* S	Access via Camp Miakonda
Central A	15.05	P11P35	*Ec* S	Park at Epworth Church
Edgehill R	14.42	301442	2x HD T C D S	
Talmadge R	13.16	-	S	
Bancroft R	12.21	P11S51	2x HD	Ust. historic dam (11/07)
Ust. UT Dam	11.80	204346	2x HD T S	In former pool
Secor A	11.67	P11K59	2x HD	Dst. historic dam, Ust. UT 319
Stadium D	**11.15**	**P11S74**	**2x HD C O D Cl_A *Ec***	**USGS Gage #04177000**
Douglas A	10.86	301443	2x HD S	Dst. UT 319 project
Monroe S	9.25	301444	2x HD T C D S	Jermain Park from South Cove
			Prairie Ditch	
Tupelo Way	1.41	301447	1x Q C_N *Ec*	Secor Metropark
			North Tenmile	
Monroe S	0.12	P11S77	1x Q C D *Ec*	Ohio / Michigan Border
			Lake Olander	
Sylvania A		204646	T C	Heath Ditch RM 0.3
			Heldman Ditch	
Hill A	2.72	P11S93	1x Q C	Mixed land use
Edgevale R	0.15	P11S85	1x Q C D S	Mixed land use
			Zink Ditch	
Dorr S	0.70		1x Q	Dst. Subdivision growth
			Hill Ditch	
Carriage D	2.57	301450	1x Q	Ust. Botanical impoundment
Reynolds R	2.11	P11K61	1x Q C	Dst. Botanical impoundment
			Shantee Creek	
Lewis A	3.10	P11S96	1x Q C	Unknown discharge
Stickney A	0.70	P11S60	1x Q C O S	Dst. Omni Source / E.I. Dupont

Table 2. cont'd.

Location	RM	Site #	Sample Types	Rationale / Notes
			Silver Creek	
Lewis A	4.64	P11S79	1x Q C	Dst. General Motors
Futura D	1.74	301449	1x Q C *Ec* S	Dst. Shantee Creek
			Halfway Creek	
(E) State Line R	4.88	301448	1x Q C *Ec* S	Ohio / Michigan Border
			Mud Creek	
Suder A	0.42	301451	C	Dst. Hoffman R Landfill
			Detwiler Ditch	
Detwiler Park	0.50	P11S84	1x Q C O *Ec* S	Dst. Mud Ck, Dst. Libbey

capital O. A second sample will be obtained from any location which returns elevated parameter values.

The Modeling and Assessment Section will place Datasonde© continuous recorders at 11 locations (D in Table 2) to obtain diurnal measurements of dissolved oxygen, pH, temperature, conductivity and samples for laboratory analysis. The Modeling Unit will calibrate discharge correlated to stream height at sentinel sites (indicated by **bold text** in Table 2). These stations will be chemically sampled more than five times during which stream height will be recorded. Subsequently, loading calculations will be possible for these locations. Chlorophyll A concentrations will be determined at two sites to provide understanding of nutrient availability (Cl_A in Table 2). Multi-probe field measurements in conjunction with all water samples will be obtained and recorded on the laboratory sample submission form. Surface water grab samples will be collected from the upper 12 inches of river water using clean appropriate containers. Collected water will be preserved using appropriate methods and delivered to the Ohio EPA contracted lab for analysis.

Sediment Sampling

Sediment metal and organic samples will be collected once at 15 sites (S in Table 2). These locations are generally on principal streams or located in the vicinity of plausible sources. Sediment sampling in the Ottawa River will be conducted by the Ecological Assessment Section. The NW District Office will obtain sediment from other locations.

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 glass jars with teflon lined lids, placed on ice (to maintain 4°C) and delivered to the Ohio EPA lab.

Bacteria Sampling

Bacteria sampling will be conducted at 14 locations to facilitate calculation of a geometric mean *E. coli* concentration needed to determine compliance with Ohio recreational use criteria. Bacteriological sampling effort will be shared between the Modeling and Assessment Section (May, July and September) and the NW District Office (June and August).

Table 3. Ohio EPA sampling effort for the 2011 Tenmile Ottawa watershed study area.

Type of sample	# Sites	# Passes	Total #
Biological Communities			
Fish (Wading)	16	2	32
Fish (Headwater)	16	1	16
Fish Tissue	6	Multiple samples/ site	> 12
Macroinvertebrate (HD)	16	1	16
Macroinvertebrate (Qualitative)	16	1	16
Water Chemistry			
Conventional (Inorganic Samples)	19	5	95
Conventional with no metals analysis	8	5	40
Sentinel Sites	2	More frequently (~3)	~6
Chlorophyll A	2	1	2
Volatiles (VOC) and Semivolatiles (BNA)	5	1 (2 if needed)	5 (-10)
Datasonde deployment	11	1	11
Sediment			
Metals (Selected)	15	1	15
PCB's and Semivolatiles (BNA)	15	1	15
Bacteria			
E. coli cultures	14	5	70

Water samples will be collected directly from the river using clean appropriate containers, cooled to 4°C, and transported to an Ohio EPA certified lab for analysis within 6 hours of sample collection. All samples will be analyzed for E. coli bacteria using U.S.EPA approved methods (STORET Parameter Code 31633). Samples may be processed in the field using standard incubation methods before delivery to the Ohio EPA contracted lab.

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.

Contacts:

Metroparks of the Toledo Area
Secor Metropark
Wildwood Preserve Metropark
(419) 407-9700

City of Toledo
Division of Parks and Forestry
Ottawa Park
Detwiler Park
(419) 245-3357

DeVilbiss Boy Scout Reservation
Camp Miakonda
(419) 882-1651

Ohio Division of Natural Areas and Preserves
Irwin Prairie State Nature Preserve
Ryan Schroeder
NW District Manager
(419) 445-1775

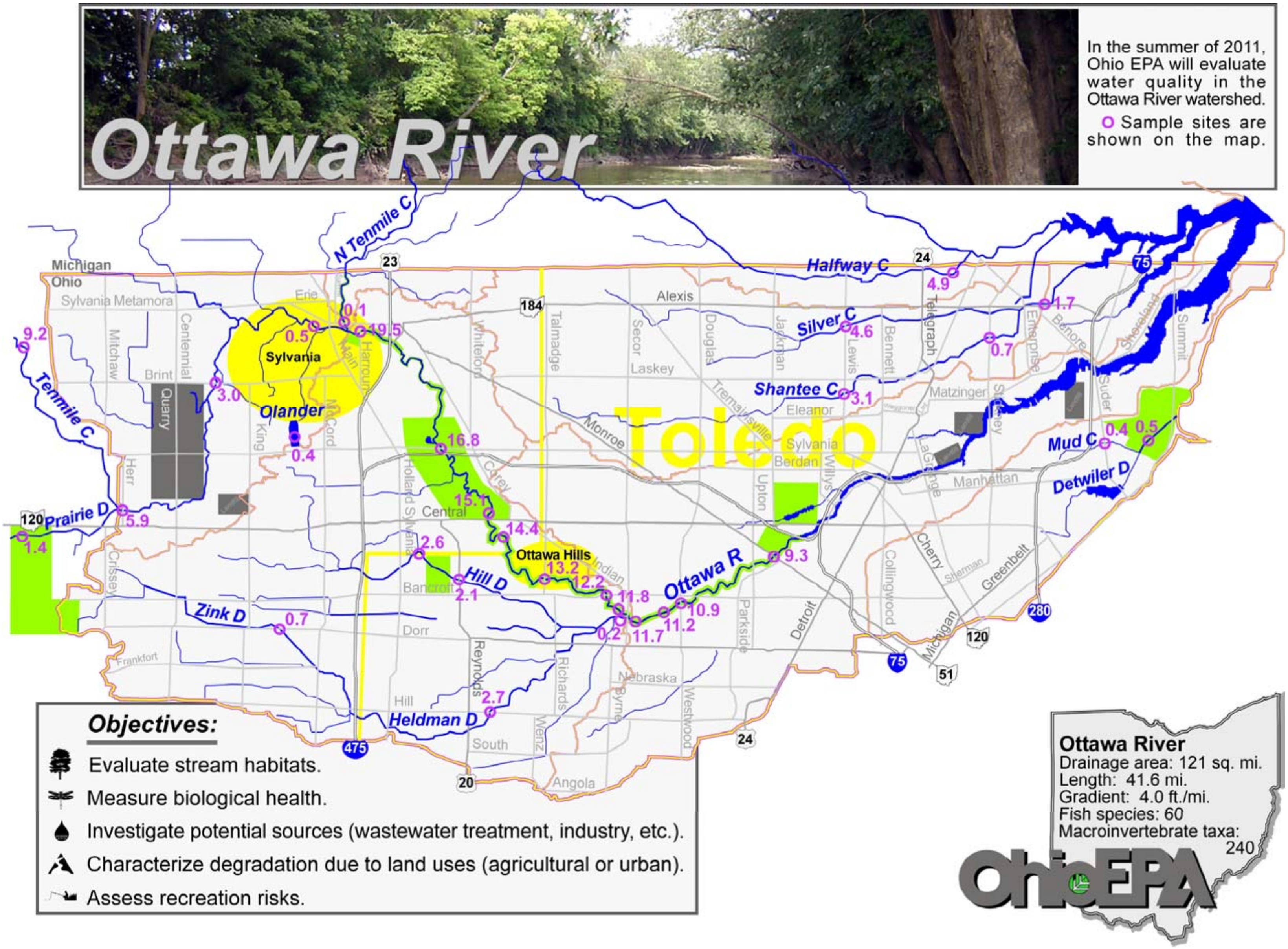
Ohio Division of Wildlife
District 2, Findlay
(419) 424-5000
Cody Klima
Lucas Co. Wildlife Officer
(419) 429-8388
Robert Wolfrum
Fulton Co. Wildlife Officer
(419) 429-8383

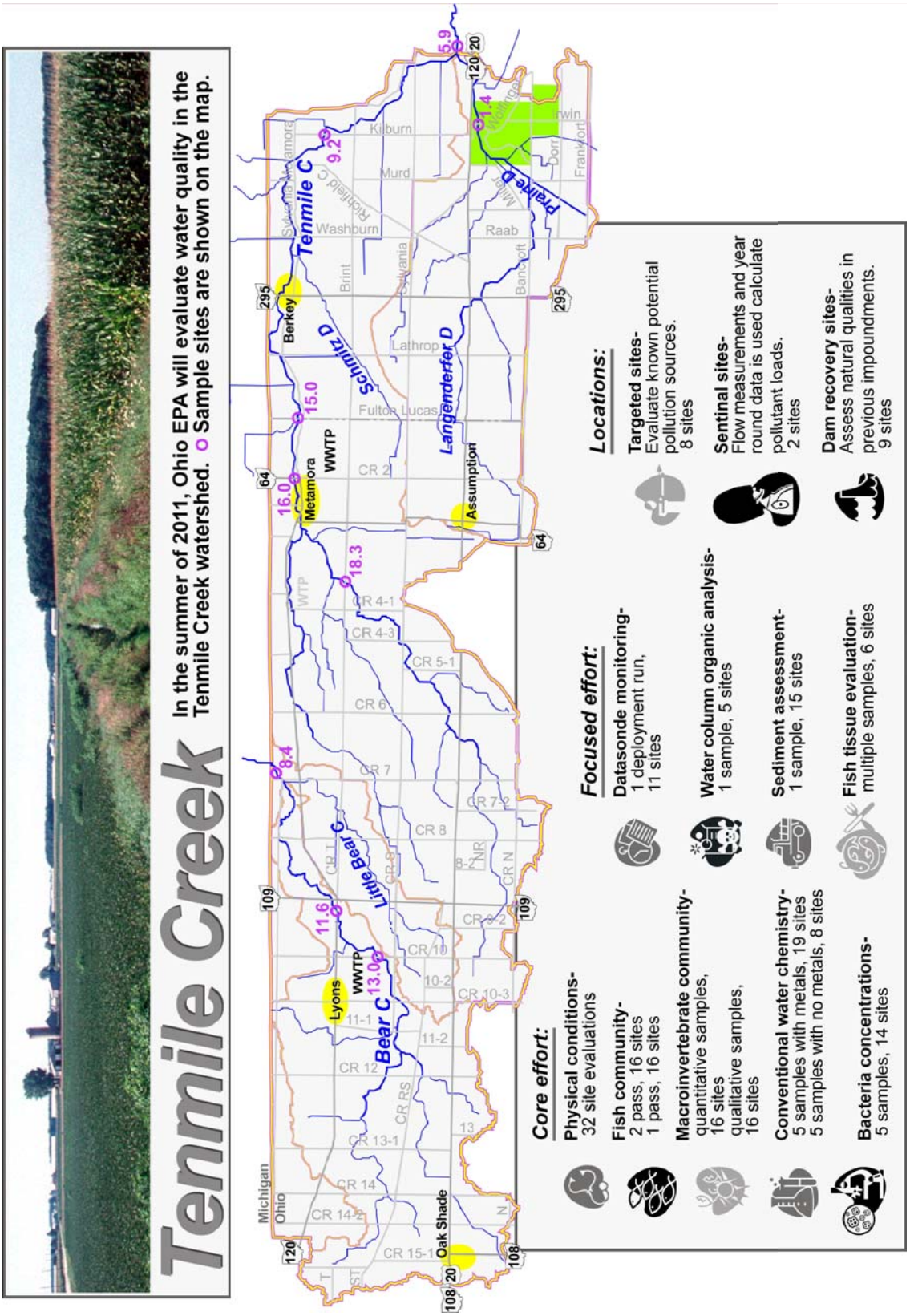
University of Toledo / Gage conditions and Maumee RAP
Dr. Patrick Lawrence, Chair: Geography and Planning Department,
Chair: UT Commission on the River,
President: Partners for Clean Streams.
(419) 530-4128

Tenmile Ottawa Study Team
Remedial Action Plan Coordination: Cherie Blair (419) 373-3010
Chemical Sampling / Nonpoint: Katie McKibben (419) 373-3013
Storm Water: Lynette Hablitzel (419) 373-3009
Modeling: Eric Saas (614) 644-2890
Benthic: Mike Bolton (614) 836-8781, Mike Gray (614) 836-8773
Fish: Brian Alsdorf (614) 836-8770, Dave Altfater (614) 836-8786
Fish Tissue: Mylynda Shaskus (614) 466-6308, Dave Altfater (614) 836-8786
TMDL Coordination: Beth Risley (614) 728-2384
Water Quality Standards: Chris Skalski (614) 644-2144
Public Involvement Coordinator: Darla Peelle (614) 728-0035

Table 4. Water and sediment chemical test methods for the 2011 Tenmile Ottawa watershed study area.

Parameters	Water column field test method	Water column lab test method	Sediment lab test method
Percent Solids			SM 2540G
Conductivity	YSI meter	USEPA 120.1	
pH	YSI meter	USEPA 150.1	
Solids, Dissolved (TDS)		USEPA 160.1	
Solids, Suspended (TSS)		USEPA 160.2	
Total Organic Carbon (TOC)			OEPA 335.2
Alkalinity, Total CaCO3		USEPA 310.1	
Chloride, Cl		USEPA 325.1	
COD		USEPA 410.4	
Nitrite		USEPA 354.1	
Ammonia		USEPA 350.1	
Nitrate+Nitrite		USEPA 353.1	
Sulfate		USEPA 375.4	
TKN (Total Kjeldahl Nitrogen)		USEPA 351.2	
Total Phosphorus		USEPA 365.4	
E. coli		USEPA 1103.1/ 640.1	
ICP-MS 1 (As,Cd,Cr,Cu,Ni,Pb,Se)		USEPA 200.8	
Zinc, Total			USEPA 200.7/ 6010B
Cadmium, Total			USEPA 200.8/ 6020A
Copper, Total			USEPA 200.8/ 6020A
Lead, Total			USEPA 200.8/ 6020A
Nickel, Total			USEPA 200.8/ 6020A
CR+6, Hexavalent Chromium			SM 3500-CR D
Mercury, Total			USEPA 7471A
Chlorophyll A		USEPA 445.1	
Dissolved Oxygen	YSI meter		
Temperature	YSI meter		
VOCs		USEPA 624	
BNA Organics (SVOCs)		USEPA 625	USEPA 8270C
PCBs			USEPA 8082 OEPA 590.2


Ottawa River
In the summer of 2011, Ohio EPA will evaluate water quality in the Ottawa River watershed.
Sample sites are shown on the map.
Toledo
Sylvania
Ottawa Hills
Ottawa R
N Tenmile C
Tenmile C
Prairie D
Zink D
Olander
Hill D
Heldman D
Halfway C
Silver C
Shantee C
Mud C
Detwiler D
Michigan
Ohio
Quarry
Objectives:
Evaluate stream habitats.
Measure biological health.
Investigate potential sources (wastewater treatment, industry, etc.).
Characterize degradation due to land uses (agricultural or urban).
Assess recreation risks.
Ottawa River
Drainage area: 121 sq. mi.
Length: 41.6 mi.
Gradient: 4.0 ft./mi.
Fish species: 60
Macroinvertebrate taxa: 240
OhioEPA


Tenmile Creek
In the summer of 2011, Ohio EPA will evaluate water quality in the Tenmile Creek watershed. o Sample sites are shown on the map.
Core effort:
Physical conditions-
32 site evaluations
Fish community-
2 pass, 16 sites
1 pass, 16 sites
Macroinvertebrate community-
quantitative samples, 16 sites
qualitative samples, 16 sites
Conventional water chemistry-
5 samples with metals, 19 sites
5 samples with no metals, 8 sites
Bacteria concentrations-
5 samples, 14 sites
Focused effort:
Datasonde monitoring-
1 deployment run, 11 sites
Water column organic analysis-
1 sample, 5 sites
Sediment assessment-
1 sample, 15 sites
Fish tissue evaluation-
multiple samples, 6 sites
Locations:
Targeted sites-
Evaluate known potential pollution sources.
8 sites
Sentinal sites-
Flow measurements and year round data is used calculate pollutant loads.
2 sites
Dam recovery sites-
Assess natural qualities in previous impoundments.
9 sites
Tenmile C
Schmultz D
Langenderfer D
Prairie D
Little Bear C
Bear C
Berkey
Metamora
Lyons
Oak Shade
Assumption
Fulton
Lucas
Lathrop
Washburn
Brint
Sylvania
Kilburn
Murd
Raab
Irwin
Michigan
Ohio
WWTP
WTP
16.0
15.0
18.3
11.6
13.0
8.4
9.2
5.9
1.4