June 11, 2007

Final Study Plan

for the

2007 Biological and Water Quality Survey

of the

Upper Grand River Basin

Ashtabula, Geauga, Portage and Trumbull Counties, Ohio

State of Ohio Environmental Protection Agency
Division of Surface Water
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Geo-Referenced Relational Information
The sites listed in the study plan table are coded with STORET station IDs. These STORET IDs link data across several tables. They must be included on all field, lab and sample sheets. Because the ECOS database is still the primary database for fish and macroinvertebrate data, and because various tables in ECOS lack a field for STORET IDs, the river mile, in concert with the rivercode, acts as the key relational field; ergo, **THE EXACT RIVER MILE LISTED IN THE STUDY PLAN TABLE MUST BE THE ONE YOU PUT ON YOUR FIELD SHEETS AND ENTERED INTO ECOS!!!** If for some reason you sample at a location other than the one listed in the study plan, and that location is a trivial distance away from that listed in the table and is fully representative of the STORET station, simply record the location information separately, and that can be used to create an Absolute Location Point (ALP) if warranted.

Broad Issues
The upper Grand River watershed is relatively undisturbed, having roughly 50 percent forest cover, 8 percent of which is wooded wetland. The Grand River mainstem and the lower reaches of its tributaries flow through a clay-rich glacial lake bed, and consequently are low-gradient swamp streams. These forested tributaries are likely to be important spawning and nursery habitats for Great Lakes muskellunge, as muskellunge favor quiet backwaters with woody debris for spawning.

The upper reaches of tributaries draining the west side of the valley drain moraine deposits and flow over sandstone bedrock along the steeper valley sides. These headwater reaches are likely to be composed of a high percentage of Class III primary headwaters. The headwaters of Phelps Creek, being in proximity to US 322, may come into pressure from housing development.

The watershed also has, for Ohio, a relatively large number of emergent wetlands. Streams draining these wetlands may potentially harbor remnant populations of blacknose shiners.

Planned sampling locations, samples to be collected, and geographic descriptions of respective locations are given in Table 1.

Samples to Support Nutrient Study
Periphyton and water column samples for determination of chlorophyll a concentrations are planned for three sites (Table 1). These sites require at least one water column and one periphyton sample collected between late July and early September following a minimum of two weeks of stable, low-flow. For a given sampling event (either periphyton or water column), one composite sample per site will be split among three filters for later analysis. Attention district staff: on the day you collect the water column chlorophyll sample, please also collect a dissolved P sample. Datasondes are requested from the Modeling section for each nutrient site.

Sentinel Sites
To aid in the development of a TMDL model(s), sentinel sites have been established at ten locations (Table 1). At each sentinel site, samples are collected monthly beginning prior to the routine field season that starts 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

hundredth 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.

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 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 redesignating 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
Previously unassessed streams (named and unnamed) within the study area have aquatic life use designations made prior to standardized approaches to the collection of physical habitat and biological samples. Consequently their aquatic life use designations are unverified. Furthermore, many water bodies within the study area are entirely unclassified and have no existing beneficial use designations. The Ohio EPA is obligated to review, evaluate, or recommend (where appropriate) beneficial uses prior to initiating any permitting actions to a water body.

Specific Issues
Public Water Supply
The Village of West Farmington draws surface water from the Grand River for its drinking water supply. A full suite of samples (biological, habitat, sediment, datasondes and water quality+organics) are requested upstream from the source intake at two locations on the Grand River mainstem. Biological and routine water chemistry samples are planned for one location on each of two tributaries that enter upstream from the intake to assess the potential for agricultural sources of pollution to affect the water supply.

Waste Water Treatment Plants
The following publicly owned wastewater treatment plants are being evaluated:

Facility	**Receiving Stream**
The Village of Orwell	Unnamed tributary to the Grand River at RM 62.6
The Village of Rock Creek	Rock Creek
The Village of Parkman	Grand River

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*10*			
03-001-000		**Grand River**				
200631	98.95	Bq, F, C	US 422 (upper crossing)	Garrettsville	Ust Parkman, Dst impoundment	6.6
G01S07	95.38	Bq, F, C	US 422 (lower crossing)	Garrettsville	Ust Nelson Ledges trib	14.8
G01K09	94.27	Bq, F, C	Grand R. @ Hobart Rd.	Garrettsville	Sentinel, Dst Nelson Ledges trib, Ust PWS	17.4
300168	90.08	bacteria	Girdle Rd.	West Farmington	Upstream drinking water intake	
300206	89.14	Co	West Farmington PDW Intake	West Farmington	Drinking Water Intake	
G01K20	88.50	B, F, Co, S	Grand R. @ Wood Curtis Rd. in West Farmington	West Farmington	Sentinel, Ust West Farmington PWS	32.2
03-021-000		**Coffee Creek**				
G01K17	0.30	Bq, F, C	Combs Road	West Farmington		7.1
03-022-000		**Baughman Creek**				
G02S06	3.29	B, F, Co, S	Fenton Rd.	West Farmington	Reference	14.3
03-022-001		**Deacon Creek**				
300176	5.31	Bq, F, C	Shaffer Rd.	Champion		5.2
300175	1.38	Bq, F, C	Hyde Oakfield Rd	Bristolville		9.3
03-023-000		**Center Creek**				
300174	6.25	Bq, F, C	SR 45	Champion		6.4
G01K13	3.00	Bq, F, C	Corey Hunt Road	West Farmington		11.6
03-024-000		**Mud Run**				
300172	4.05	Bq, F, C	Housel Craft Rd.	Southington		8.5
03-025-000		**Dead Branch**				
300170	7.86	Bq, F, C	Old State Rd.	Southington		4.8
300169	5.05	Bq, F, C	Geauga Portage Easterly Rd.	Southington		12.7

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*10*			
03-025-001		**Trib. to Dead Branch (RM 6.20)**				
300171	0.14	Bq, F, C	St. Rt. 534	Southington		6.3
03-160-000		**Swine Creek**				
300178	10.36	Bq, F, C	Swine Creek Park Picnic Area	Middlefield		6.5
G01K16	8.17	Bq, F, C	Curtis Middlefield Rd. (Twp Rd 227)	West Farmington	Sentinel	11.8
200628	1.72	Bq, F, C	SR 87	West Farmington		18.0
03-160-00x		**Grapevine Creek**				
300177	2.10	Fx, T, Bq	Donley County Line Rd	West Farmington	District Fish, CWH?	0.5
03-162-000		**Andrews Creek**				
300179	3.62	Bq, F, C	Girdle Rd.	West Farmington		6.0
03-163-000		**Plum Creek**				
300180	1.48	Fx, T, Bq	Girdle Rd.	West Farmington	District Fish, AQL	1.3

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*20*			
03-001-000		**Grand River**				
G01K18	75.58	B, F, C	Ust. Swine Creek, Ust. County Line-Donley Rd.	West Farmington		126.2
G01W06	65.88	B, F, Co, S	U.S. Rt. 322	Windsor	Sentinel, Reference, Ust WWTP Trib	210.0
G01K07	60.56	B, F, C	Montgomery Rd	Windsor	Dst Orwell WWTP Trib	232.0
G01K08	55.62	B, F, C	Grand R. @ US 6	Windsor	Sentinel	257.2
03-017-000		**Crooked Creek**				
300182	6.70	Fx, T, Bq	Callahan Rd. (east stream)	East Trumbull	District Fish, CWH?	3.2
300181	3.51	Bq, F, C, Chla, D	Higley Rd.	East Trumbull	Nutrients, CWH?	8.2
G01K01	1.63	Bq, F, C	Callender Rd.	East Trumbull		9.3
03-017-00x		**U.T. Crooked Creek RM 6.50**				
300194	0.29	Fx, T, Bq	Callahan Rd. (west stream)	East Trumbull	District Fish, CWH?	1.9
03-018-000		**Mud Creek**				
300188	3.78	Bq, F, C	Higley Rd.	Windsor	CWH?	1.7
300187	0.20	B, F, C	Wilderness Road	East Trumbull		20.8
03-019-000		**Mill Creek**				
300186	4.94	Fx, T, Bq	Wiswell Rd.	Windsor	District Fish, CWH?	2.8
300185	2.30	Bq, F, C	Sweet West off SR 534	West Farmington	CWH?	9.0
03-019-00x		**RM 3.79 Trib. Mill Creek**				
300191	0.13	Fx, T, Bq	Girdle Rd.	Windsor	District Fish, CWH?	3.5
03-020-000		**Garden Creek**				
300183	2.31	Fx, T, Bq	Girdle Rd.	West Farmington	District Fish, CWH?	1.2
03-140-000		**Hoskins Creek**				

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*20*			
03-140-000		**Hoskins Creek**				
300184	4.88	Bq, F, C	St. Rt. 534	Windsor		5.7
G01K19	2.00	Bq, F, C	Hurlburt Rd.	Windsor		13.5
03-140-00x		**Trib to Hoskins Creek @ RM 0.4**				
300196	1.40	Bq, F, C	Windsor-Mechanicsville Road	Windsor		7.2
03-140-00y		**Trib to Hoskins Creek @ RM 2.45**				
300197	1.15	Fx, T, Bq	SR 534	Windsor	District Fish, CWH?	2.0
03-141-000		**Indian Creek**				
200624	1.38	Bq, F, C	Montgomery Rd	Windsor		3.9
03-150-000		**Phelps Creek**				
300190	5.14	B, F, C, D, Chla	U.S. Rt. 322	Windsor	Nutrients	23.5
G01K06	1.23	B, F, C	Windsor Rd Ext (T-525)	Windsor		25.8
03-151-000		**N. Br. Phelps Creek**				
300189	0.94	Bq, F, C	Huntley Rd.	East Claridon		6.3
03-152-000		**S. Br. Phelps Creek**				
300193	5.16	Bq, F, C	Peters Rd.	Middlefield		4.7
300192	0.58	Bq, F, C	U.S. Rt. 322	East Claridon		11.8

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*30*			
03-130-000		**Rock Creek**				
G01W02	9.64	B, F, C	Dodgeville Road	Orwell	Sentinel, Assessment	42.5
G01K03	1.23	B, F, C	SR 45, Main St	Jefferson	Sentinel, Ust WWTP	70.0
G01W05	0.95	B, F, Co, S	bridge to cemetery	Jefferson	Dst WWTP, Reference	70.0
03-130-003		**Rock Creek (Snyder Ditch)**				
300199	0.60	B, F, C	Moore Rd.	Orwell	Assessment	29.0
03-133-000		**Whetstone Creek**				
	2.00	Bq, F, C	SR 46	Orwell		4.0
03-134-000		**Lebanon Creek**				
300198	1.93	Bq, F, C	Institute Rd	Orwell		4.2

Table 1. Sampling locations by assessment unit for the 2007 upper Grand River biological and water quality study.

STORET	RM	SAMPLES	LOCATION	TOPO	ISSUES	Drain Area
Assessment Unit			*40*			
03-001-000		**Grand River**				
G02K54	48.60	B, F, C, Chla, D	Footville Richmond Road	East Trumbull	Dst Rock Creek, Nutrients	323.0
G02K52	45.10	B, F, C	Camp Beaumont	East Trumbull	Sentinel, Dst Rock Creek	387.8
03-012-000		**Bronson Creek**				
300201	1.52	Bq, F, C, Chla, D	Windsor-Mechanicsville Rd.	East Trumbull	Nutrients, Ust Livestock	5.2
G02K50	0.82	Bq, F, C, Chla, D	Schweitzer Road	East Trumbull	Nutrients, Dst Livestock	7.5
03-013-000		**Trumbull Creek**				
300205	9.03	Fx, T, Bq	Dawsey Rd.	East Trumbull	District Fish, Mitigation Bank	2.7
300204	6.23	Bq, F, C	St. Rt. 534	East Trumbull		13.1
G02K51	2.01	B, F, C	Riverdale Rd.	East Trumbull	Sentinel	19.6
03-014-000		**Spring Creek**				
300202	5.02	Fx, T, Bq	Leggett Rd.	Thompson	District Fish, CWH?	5.9
300207	2.76	Bq, F, C	Callahan Rd.	East Trumbull		6.5
03-015-000		**Three Brothers Creek**				
300203	6.68	Bq, F, C	Stumpville Rd.	Jefferson		5.8
300208	1.99	Bq, F, C	biology upstream Badger Creek, Behind Lake?	Jefferson		17.4

Sample Tallies for 2007 Upper Grand Survey

Chemistry

355 conventional (53 sites x 5 runs; 9 sentinels x 10 runs)
12 organics (5 sites x 2-3 runs)
251 metals*

Sediment	Chlorophyll		
4 Metals	water column	5 sites x 2 runs =	30 samples + 4 field blanks
4 Organics	periphyton	5 sites x 1 runs =	15 samples + 2 field blanks
4 TOC			45 samples
4 Particle Size			

Sondes	Fish	Macroinvertebrates
5	69 samples	45 quals
	[10 district fish samples]†	16 quants

†District fish samples are not included in the 69 fish samples, the district samples will be collected to assess coldwater potential of very small headwaters previously identified by the The Nature Conservancy. A qual macroinvertebrate sample will be collected by EAS staff and preserved for later identification if needed.

Bacteria

319 E. coli (53 sites x 5 runs; 9 sites x 6 runs)
54 fecal coliform (9 sites x 6 runs)

Contact Information

Study Plan and Field Sampling Team	
Bob Miltner - Fish & Habitat	(614) 836-8796
Mike Bolton - Macroinvertebrates	(614) 836-8781
Paul Anderson - Water Chemistry	(330) 963-1228
Ohio EPA (emergency contacts)	
Dave Stroud (Northeast District)	(330) 963-1177
Jeff Deshon (Central Office)	(614) 836-8780

Wildlife Officers by County

Ashtabula	Rod Tennant	(330) 644-3802 x3219
Geauga	Scott Denamen	(330) 644-3802 x3218
Trumbull	Jerrod Allison	(330) 644-3802 x3214

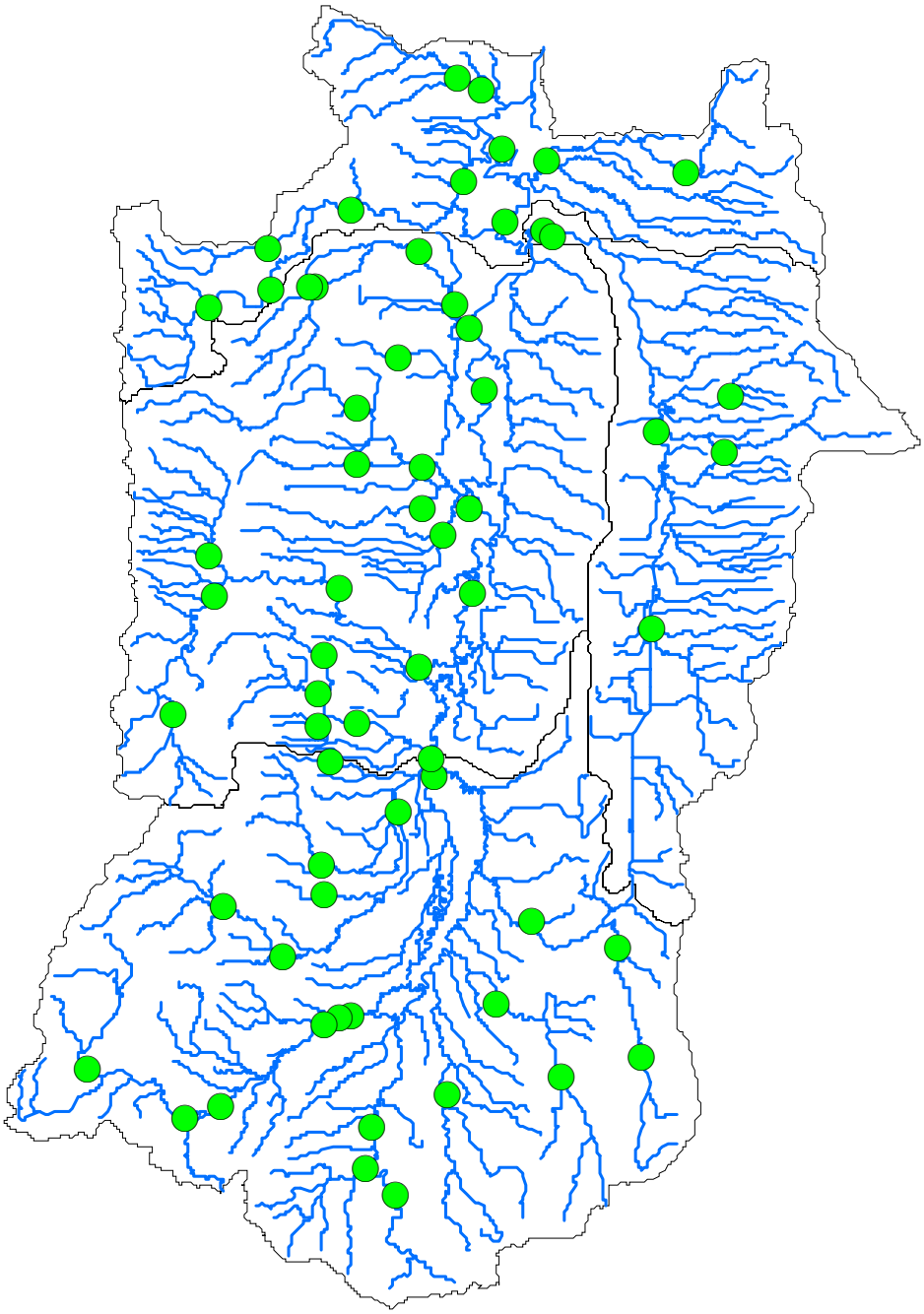
Hospitals/Clinics

University Hospitals Health System
Memorial Hospital of Geneva
870 W Main St
Geneva, OH
(440) 466-1141

Orwell Medical Center
315 E Main St
Orwell, OH 44076
(440) 437-6222

Geauga Medical Group Inc
16030 E High St
Middlefield, OH 44062
(440) 632-0770

Ashtabula Clinic
234 N Chestnut St, Jefferson, OH
(440) 576-8933



Map of the upper Grand River catchment showing sampling locations for the 2007 biological and water quality monitoring survey.

Table 2. Study area sites for the 2007 upper Grand study arranged alphabetically.

Andrews Creek						
3.62	300179	Girdle Rd.	41.4403	-80.9728	West Farmington	Bq, F, C
Baughman Creek						
3.29	G02S06	Fenton Rd.	41.4194	-80.8769	West Farmington	B, F, Co, S
Bronson Creek						
1.52	300201	Windsor-Mechanicsville Rd.	41.7145	-80.9036	East Trumbull	Bq, F, C, Chla, D
0.82	G02K50	Schweitzer Road	41.7100	-80.8926	East Trumbull	Bq, F, C, Chla, D
Center Creek						
6.25	300174	SR 45	41.3645	-80.8649	Champion	Bq, F, C
3.00	300173	Corey Hunt Road	41.3910	-80.8933	West Farmington	Bq, F, C
Coffee Creek						
0.30	G01K17	Combs Road	41.4706	-80.9206	West Farmington	Bq, F, C
Crooked Creek						
6.70	300182	Callahan Rd. (east stream)	41.6420	-80.9720	East Trumbull	Fx, T, Bq
3.51	300181	Higley Rd.	41.6543	-80.9238	East Trumbull	Bq, F, C, Chla, D
1.63	G01K01	Callender Rd.	41.6353	-80.9075	East Trumbull	Bq, F, C
Deacon Creek						
5.31	300176	Shaffer Rd.	41.3714	-80.8269	Champion	Bq, F, C
1.38	300175	Hyde Oakfield Rd	41.4093	-80.8376	Bristolville	Bq, F, C
Dead Branch						
7.86	300170	Old State Rd.	41.3244	-80.9419	Southington	Bq, F, C
5.05	300169	Geauga Portage Easterly Rd.	41.3481	-80.9517	Southington	Bq, F, C
Garden Creek						
2.31	300183	Girdle Rd.	41.4891	-80.9738	West Farmington	Fx, T, Bq
Grand River						
98.95	200631	US 422 (upper crossing)	41.3705	-81.0828	Garrettsville	Bq, F, C
95.38	G01S07	US 422 (lower crossing)	41.3528	-81.0386	Garrettsville	Bq, F, C
94.27	G01K09	Grand R. @ Hobart Rd.	41.3570	-81.0219	Garrettsville	Bq, F, C
90.08	300168	Girdle Rd.	41.3845	-80.9736	West Farmington	bacteria
89.14	300206	West Farmington PDW Intake	41.3864	-80.9658	West Farmington	Co

Table 2. Study area sites for the 2007 upper Grand study arranged alphabetically.

RM	STORET	LOCATION	Y	X	TOPO	SAMPLES
Grand River						
88.50	G01K20	Grand R. @ Wood Curtis Rd. in West Farmington	41.3875	-80.9605	West Farmington	B, F, Co, S
75.58	300209	Ust. Swine Creek, Ust. County Line-Donley Rd.	41.4772	-80.9219	West Farmington	B, F, C
65.88	G01W06	U.S. Rt. 322	41.5347	-80.9011	Windsor	B, F, Co, S
60.56	G01K07	Montgomery Rd	41.5643	-80.9018	Windsor	B, F, C
55.62	G01K08	Grand R. @ US 6	41.6054	-80.8944	Windsor	B, F, C
48.20	G02K54	Footville Richmond Road	41.6637	-80.8834	East Trumbull	B, F, C, Chla, D
45.10	G02K52	Camp Beaumont	41.6896	-80.8844	East Trumbull	B, F, C
Grapevine Creek						
2.10	300177	Donley County Line Rd	41.4760	-80.9689	West Farmington	Fx, T, Bq
Hoskins Creek						
4.88	300184	St. Rt. 534	41.6003	-80.9531	Windsor	Bq, F, C
2.00	G01K19	Hurlburt Rd.	41.5792	-80.9236	Windsor	Bq, F, C
Indian Creek						
1.38	200624	Montgomery Rd	41.5644	-80.9238	Windsor	Bq, F, C
Lebanon Creek						
1.93	300198	Institute Rd	41.5819	-80.7845	Orwell	Bq, F, C
Mill Creek						
4.94	300186	Wiswell Rd.	41.5132	-80.9711	Windsor	Fx, T, Bq
2.30	300185	Sweet West off SR 534	41.4894	-80.9565	West Farmington	Bq, F, C
Mud Creek						
3.78	300188	Higley Rd.	41.6170	-80.9334	Windsor	Bq, F, C
0.20	300187	Wilderness Road	41.6270	-80.9004	East Trumbull	B, F, C
Mud Run						
4.05	300172	Housel Craft Rd.	41.3597	-80.9185	Southington	Bq, F, C
N. Br. Phelps Creek						
0.94	300189	Huntley Rd.	41.5489	-81.0233	East Claridon	Bq, F, C
Phelps Creek						
5.14	300190	U.S. Rt. 322	41.5375	-80.9636	Windsor	B, F, C, D, Chla
1.23	G01K06	Windsor Rd Ext (T-525)	41.5084	-80.9274	Windsor	B, F, C
Plum Creek						
1.48	300180	Girdle Rd.	41.4302	-80.9730	West Farmington	Fx, T, Bq

Table 2. Study area sites for the 2007 upper Grand study arranged alphabetically.

RM	STORET	LOCATION	Y	X	TOPO	SAMPLES
RM 3.79 Trib. Mill Creek						
0.13	300191	Girdle Rd.	41.5005	-80.9736	Windsor	Fx, T, Bq
Rock Creek						
9.64	G01W02	Dodgeville Road	41.5893	-80.8147	Orwell	B, F, C
1.23	G01K03	SR 45, Main St	41.6583	-80.8612	Jefferson	B, F, C
0.95	G01W05	bridge to cemetery	41.6606	-80.8656	Jefferson	B, F, Co, S
Rock Creek (Snyder Ditch)						
0.60	300199	Moore Rd.	41.5211	-80.8203	Orwell	B, F, C
S. Br. Phelps Creek						
5.16	300193	Peters Rd.	41.4939	-81.0400	Middlefield	Bq, F, C
0.58	300192	U.S. Rt. 322	41.5350	-81.0206	East Claridon	Bq, F, C
Spring Creek						
5.02	300202	Leggett Rd.	41.6361	-81.0213	Thompson	Fx, T, Bq
2.76	300207	Callahan Rd.	41.6419	-80.9925	East Trumbull	Bq, F, C
Swine Creek						
10.36	300178	Swine Creek Park Picnic Area	41.4268	-81.0193	Middlefield	Bq, F, C
8.17	G01K16	Curtis Middlefield Rd. (Twp Rd 227)	41.4089	-80.9914	West Farmington	Bq, F, C
1.72	200628	SR 87	41.4582	-80.9379	West Farmington	Bq, F, C
Three Brothers Creek						
6.68	300203	Stumpville Rd.	41.6797	-80.7994	Jefferson	Bq, F, C
1.99	300208	biology upstream Badger Creek, Behind Lake?	41.6855	-80.8637	Jefferson	Bq, F, C
Trib to Hoskins Creek @ RM						
1.40	300196	Windsor-Mechanicsville Road	41.5553	-80.9143	Windsor	Bq, F, C
Trib to Hoskins Creek @ RM						
1.15	300197	SR 534	41.5799	-80.9532	Windsor	Fx, T, Bq
Trib. to Dead Branch (RM 6.20)						
0.14	300171	St. Rt. 534	41.3338	-80.9552	Southington	Bq, F, C
Trumbull Creek						
9.03	300205	Dawsey Rd.	41.6560	-80.9933	East Trumbull	Fx, T, Bq
6.23	300204	St. Rt. 534	41.6686	-80.9539	East Trumbull	Bq, F, C
2.01	G02K51	Riverdale Rd.	41.6781	-80.9019	East Trumbull	B, F, C
U.T. Crooked Creek RM 6.50						
0.29	300194	Callahan Rd. (west stream)	41.6420	-80.9740	East Trumbull	Fx, T, Bq
Whetstone Creek						
2.00		SR 46	41.6018	-80.7804	Orwell	Bq, F, C