

LEVEL 3 PROJECT STUDY PLAN
FOR THE
CLERMONT COUNTY, OHIO
HABITAT ASSESSMENT PROGRAM



Stonelick Creek

APRIL 21, 2010

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1. OBJECTIVES

Clermont County Office of Environmental Quality (OEQ) has been collecting water quality and habitat data for 14 years to support various initiatives. Habitat will be assessed in Stonelick Creek, Poplar Run, Grassy Fork, Ulrey Run, Patterson Run, Rocky Fork, Solomon Run and Pleasant Run by performing a Qualitative Habitat Evaluation Index (QHEI). Assessments will be used to monitor habitat improvements in future or ongoing projects in these streams and habitat in additional streams may be assessed in the future. Data will be used to ascertain quality of habitat at various locations and within various watersheds, and may provide support to federal or state supported projects. According to the latest U.S. EPA guidelines, projects generating newly-collected data require a set of performance criteria that are of sufficient quality and quantity to address the project's goals (EPA/240/B-06/001). Clermont County OEQ has developed such performance criteria in the form of Data Quality Objectives for field accuracy and field precision (See attached Quality Assurance Project Plan, Appendix A).

Table 1. List of sample identifications

Location	Sample ID
Grassy Fork RM 0.2 at Glancy Corner-Marathon Rd.	GRSSY0.2
Patterson Run RM 2.2 at Caudil West Rd.	PATSN2.2
Pleasant Run RM 0.2 at Hutchinson Property	PLEAS0.2
Poplar Creek RM 2.1 at Macedonia	POPLR2.1
Rocky Fork RM 1.9 at Bergen Rd	ROCKY1.9
Solomon Run RM 3.2 at St.Rt. 251	SOLMN3.2
Solomon Run RM 3.4 at St. Rt. 251	SOLMN3.4
Stonelick Creek RM 0.1 on Kipp Property at Stonelick-Olivebranch Rd	ST0.1
Stonelick Creek RM 17.3 at Stonelick Trace	ST17.3
Ulrey Run RM 1.3 at St.Rt. 125	ULREY1.3

2. POINT AND NONPOINT SOURCE ISSUES

Table 2 provides a summary of the point and nonpoint sources of pollution in the watersheds of each sampling location.

Based on the locally led TMDL report for the EFLMR, *An Innovative Approach to Identifying Key Priorities for Improving Water Quality in the East Fork Little Miami River Watershed* (www.oeq.net), habitat and flashiness are the primary stressors inhibiting biotic communities. Therefore, improvements to in-stream habitat must be made to meet biological criteria. Clermont OEQ will assess habitat in Patterson Run, Rocky Fork, Solomon Run, and Stonelick Creek RM 0.1 to monitor progress of current and possible future stream restoration projects in these streams. Specifically, Solomon Run is being assessed to determine the impact from the Chatfield College lowhead dam on instream habitat. Clermont OEQ will assess habitat in Grassy Fork, Poplar Creek, Pleasant Run, Stonelick Creek RM 17.3, and Ulrey Run to provide supporting data for the biological monitoring to occur at these locations in 2010. If the Clermont County OEQ assesses any other sites for habitat, the Level 3 Project Study Plan will be amended accordingly and resubmitted to the Ohio EPA.

Table 2 summarizes the possible point and nonpoint sources of pollution in the watersheds of each sampling location. The upper East Fork watershed is primarily rural and receives runoff from agriculture, livestock, and Home Sewage Treatment Systems (HSTs). There is some urban storm water runoff from the Village of Bethel at the Poplar Creek location. Sampling sites in Ulrey Run may also receive some urban storm water runoff due to residential and industrial developments in the watersheds. All sites receive runoff from agriculture and may drain failing HSTs. Solomon Run, Pleasant Run, Patterson Run, Rocky Fork, and Stonelick Creek are also susceptible to pollution from livestock facilities.

The sampling site in Ulrey Run receives effluent from the Forest Creek WWTP. The Solomon Run site at river mile 3.2 is downstream from the Saint Martin WWTP and the Stonelick Creek site at river mile 0.1 is downstream from the Stonelick State Park Campgrounds WWTP. The PLEAS0.2 site receives effluent from the storm water pond at the CECOs hazardous waste landfill and possibly other contaminants associated with this facility.

Table 2. Summary of point and nonpoint sources of pollution for each sampling location

Sample ID	Figure No.	Point Source Issues	Non-Point Source Issues
GRSSY0.2	1	N/A	agriculture, HSTs, wildlife
PATSN2.2	2	N/A	agriculture, HSTs, livestock, wildlife
POPLR2.1	3	N/A	HSTs, urban stormwater, agriculture, wildlife
PLEAS0.2	4	HW landfill	agriculture, HSTs, livestock, wildlife
ROCKY1.9	5	N/A	agriculture, HSTs, livestock, wildlife
SOLMN3.2	6	WWTP	agriculture, HSTs, livestock, wildlife
SOLMN3.4	6	N/A	agriculture, HSTs, livestock, wildlife
ST17.3	7	N/A	agriculture, HSTs, livestock, wildlife
ST0.1	8	WWTP	agriculture, HSTs, livestock, wildlife
ULREY1.3	9	WWTP	HSTs, agriculture, urban stormwater, wildlife

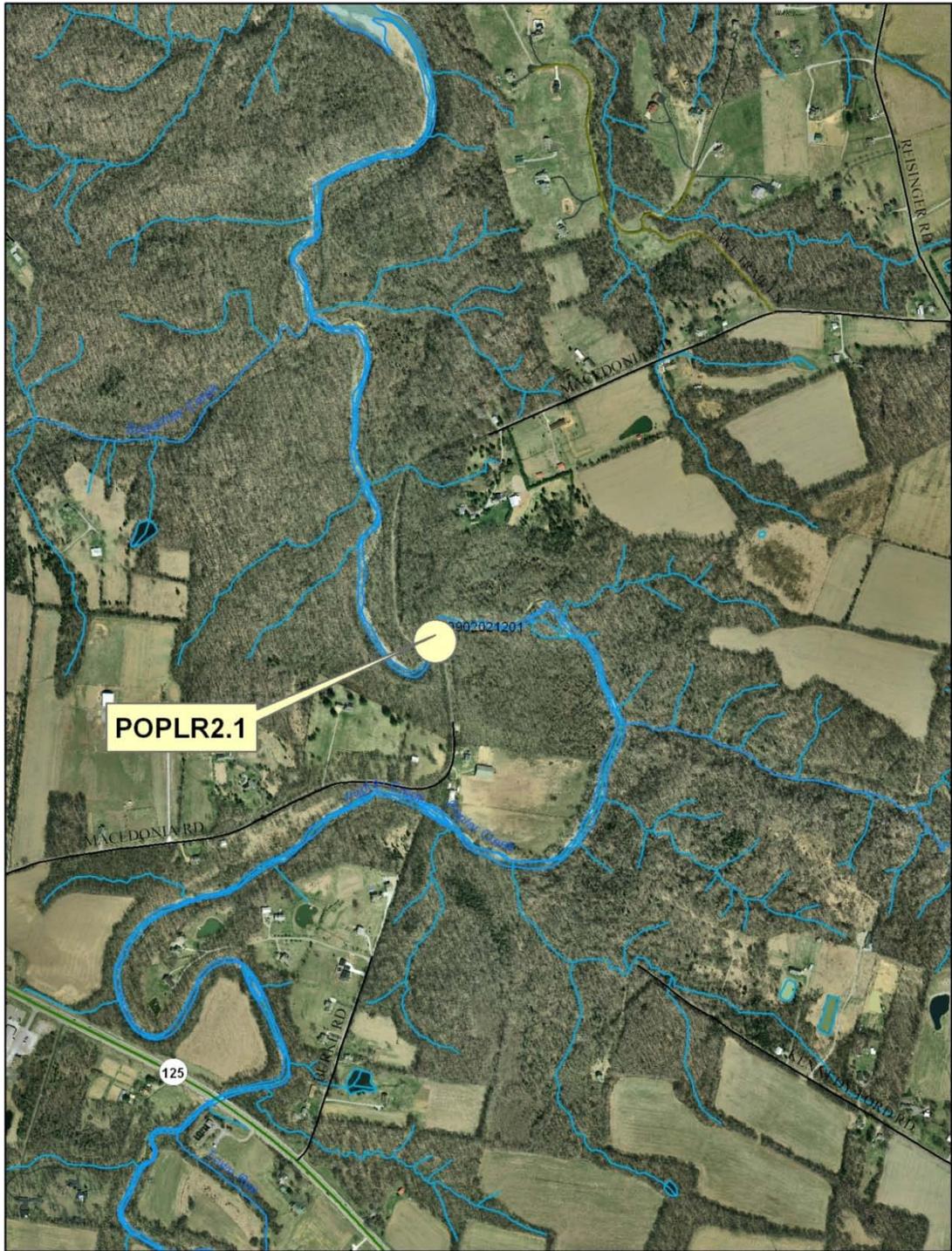


Figure 1.
Habitat Assessment Reach
Grassy Fork



Figure 2.

**Habitat Assessment Reach
Patterson Run**



0 550 1,100 2,200 Feet



Figure 3.

**Habitat Assessment Reach
Poplar Creek**

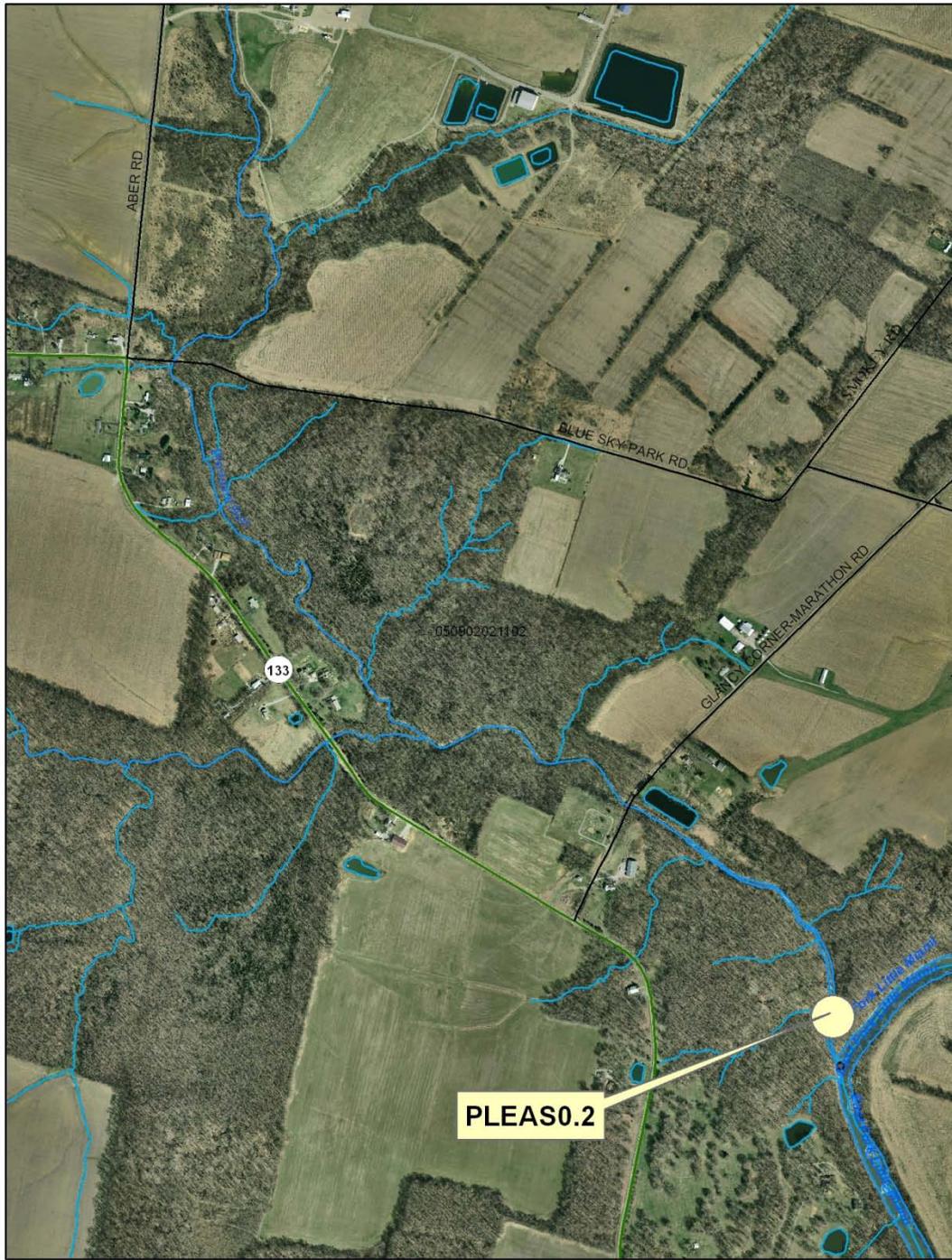


Figure 4.
Habitat Assessment Reach
Pleasant Run



Figure 5.

**Habitat Assessment Reach
Rocky Fork**



0 500 1,000 2,000 Feet



Figure 6.

**Habitat Assessment Reach
Solomon Run**



Figure 7.

**Habitat Assessment Reach
Stonelick Creek RM 17.3**

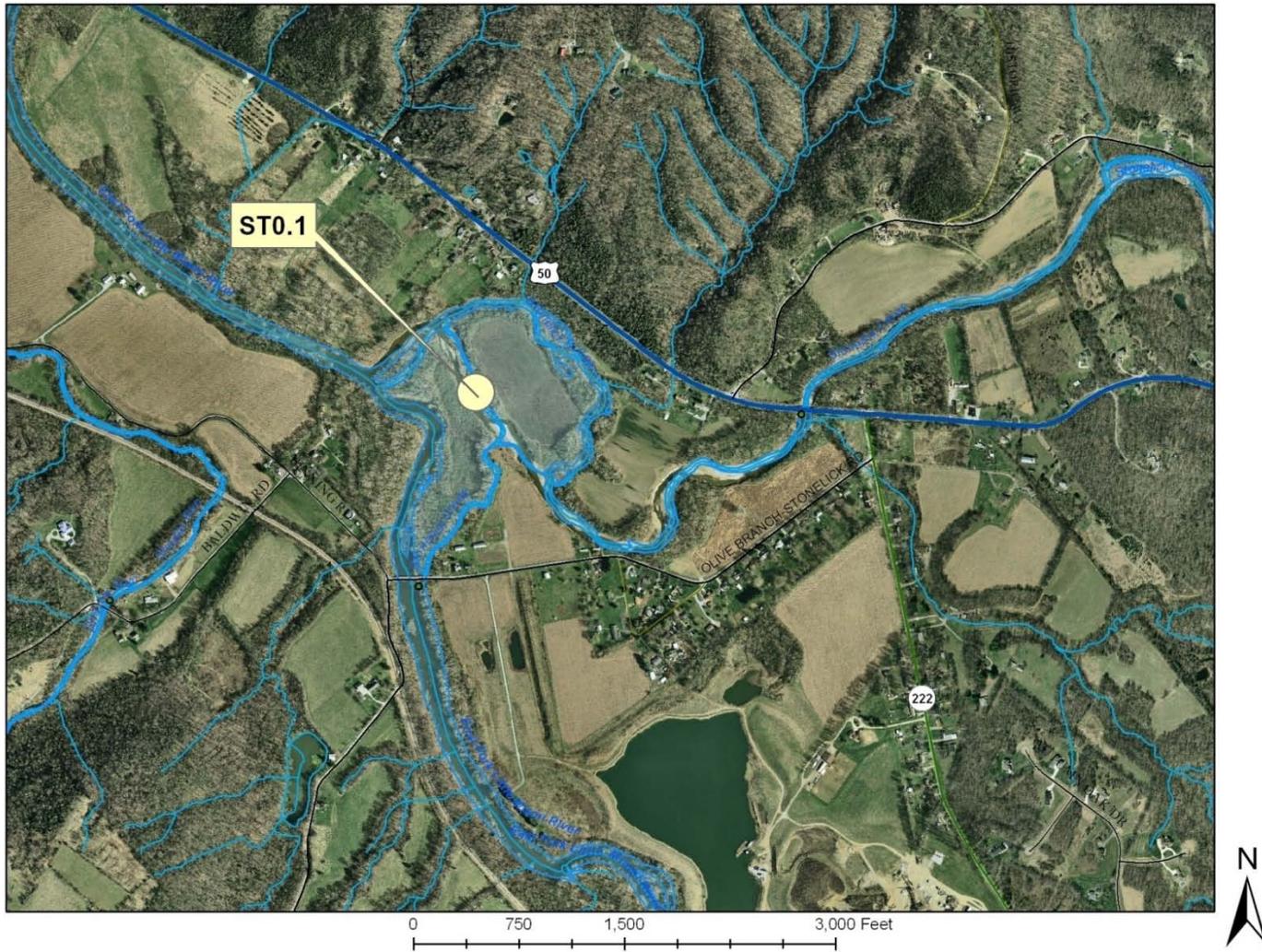


Figure 8.

**Habitat Assessment Reach
Stonelick Creek RM 0.1**

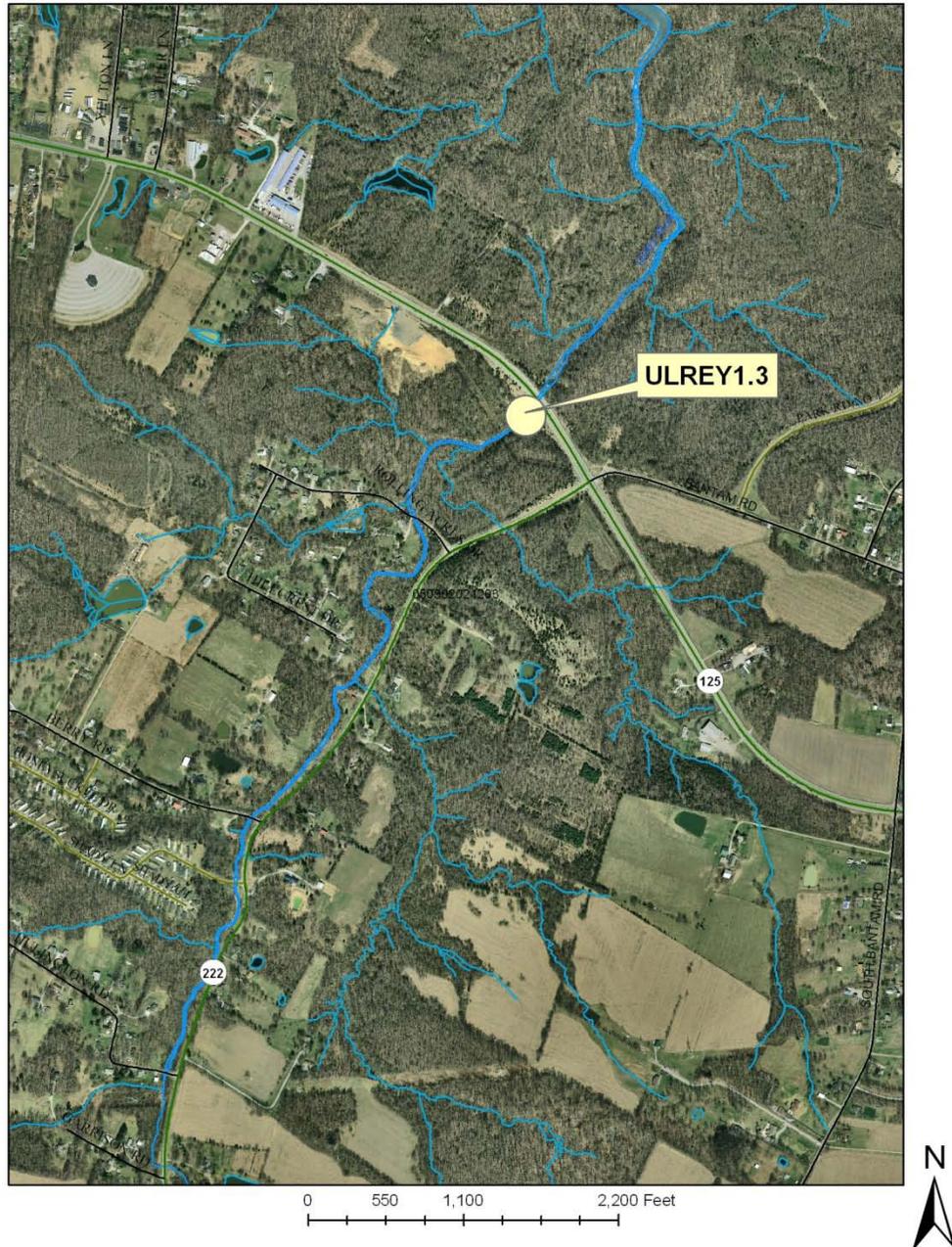


Figure 9.
Habitat Assessment Reach
Ulrey Run

3. PARAMETERS FOR EACH SAMPLING LOCATION

The QHEI requires the calculation of six different metrics using various qualitative measurements of habitat shown in the field sheet (Attachment 1). The six metrics are listed below:

1. SUBSTRATE—types, origin, and quality
2. INSTREAM COVER—present types and amount
3. CHANNEL MORPHOLOGY—sinuosity, development, channelization, and stability
4. BANK EROSION AND RIPARIAN ZONE—erosion, riparian width, and flood plain quality
5. POOL/GLIDE AND RIFFLE/RUN QUALITY—maximum depth, channel width, current velocity, riffle depth, run depth, riffle/run substrate, and riffle/run embeddedness
6. GRADIENT/DRAINAGE AREA

4. IDENTIFICATION OF FIELD AND LABORATORY METHODS

Standard Operating Procedure (SOP) documents have been developed for all of the field sampling and data collection activities associated with this study. These SOPs are included in Appendix B of this Study Plan. Habitat Assessment methodologies for wadeable and headwater streams were developed from “The qualitative habitat evaluation index (QHEI): rationale, methods, and application” (Rankin E.T. 1989).

5. EXPLANATION OF PLANNED SAMPLING LOCATIONS

A detailed explanation of planned sampling locations for 2010 is provided in Section 2 and Table 3. Detailed maps of the sampling locations are provided in Figures 1-9. Georeferencing data, i.e. boundaries for each map (north and south latitudes and east and west longitudes) are provided in Table 4. Figure 10 is a map of the scale in Figures 1-9.

Habitat is being assessed in Stonelick Creek river mile 17.3, Ulrey Run, Poplar Creek, Grassy Fork and Pleasant Run to aid in determining the source of any biological impairment documented during the scheduled 2010 biological assessments. A 500 meter reach of Stonelick Creek near the mouth will be assessed to determine the need for natural stream design habitat restoration in this stretch of stream and to serve as a pre-restoration assessment in the event that this stream is restored. Solomon Run habitat assessments are being conducted upstream and downstream of the Chatfield College lowhead dam to determine what impact a dam removal project would have on instream habitat. Habitat assessments in Rocky Fork and Patterson Run are being conducted to determine the need for an instream restoration. All assessment reaches will be 200 meters in length with the exception of Stonelick Creek river mile 0.1, which will be 500 meters in length.

Table 3. Georeferencing Data for Assessment Reaches

SampleID	Waterbody	River Mile	Latitude (decimal degrees)	Longitude (decimal degrees)	USGS	Township
GRSS0.2	Grassy Fork	0.2	-84.0153	39.1329	Williamsburg	Williamsburg
PATSN2.2	Patterson Creek	2.2	-84.0923	39.1222	Williamsburg	Stonelick
POPLR2.1	Poplar Creek	2.1	-84.1010	38.9820	Bethel	Tate
PLEAS0.2	Pleasant Run	0.2	-84.0374	39.1084	Williamsburg	Jackson
ROCKY1.9	Rocky Fork	1.9	-84.1113	39.1530	Newtonsville	Stonelick
SOLMN3.2	Solomon Run	3.2	-83.8914	39.2089	Fayetteville	Perry
SOLMN3.4	Solomon Run	3.4	-83.8886	39.2128	Fayetteville	Perry
ST0.1	Stonelick Creek	0.1	-84.2073	39.1225	Batavia	Stonelick
ST17.3	Stonelick Creek	17.3	-84.0440	39.2320	Newtonsville	Wayne
ULREY1.3	Ulrey Run	1.3	-84.1515	39.0017	Batavia	Tate

Table 4. Georeferencing data for figures

site	North	South	East	West
	Decimal Degrees	Decimal Degrees	Decimal Degrees	Decimal Degrees
Figure 1	39.152	39.129	-84.007	-84.030
Figure2	39.126	39.109	-84.068	-84.099
Figure 3	38.994	38.971	-84.089	-84.111
Figure 4	39.127	39.104	-84.035	-84.057
Figure 5	39.167	39.149	-84.087	-84.118
Figure 6	39.221	39.201	-83.879	-83.900
Figure 7	39.246	39.228	-84.019	-84.049
Figure 8	39.130	39.112	-84.189	-84.219
Figure 9	39.010	38.987	-84.142	-84.164
Figure 10	39.272	38.95	-83.761	-84.371

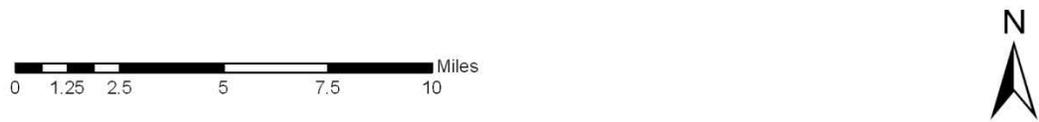
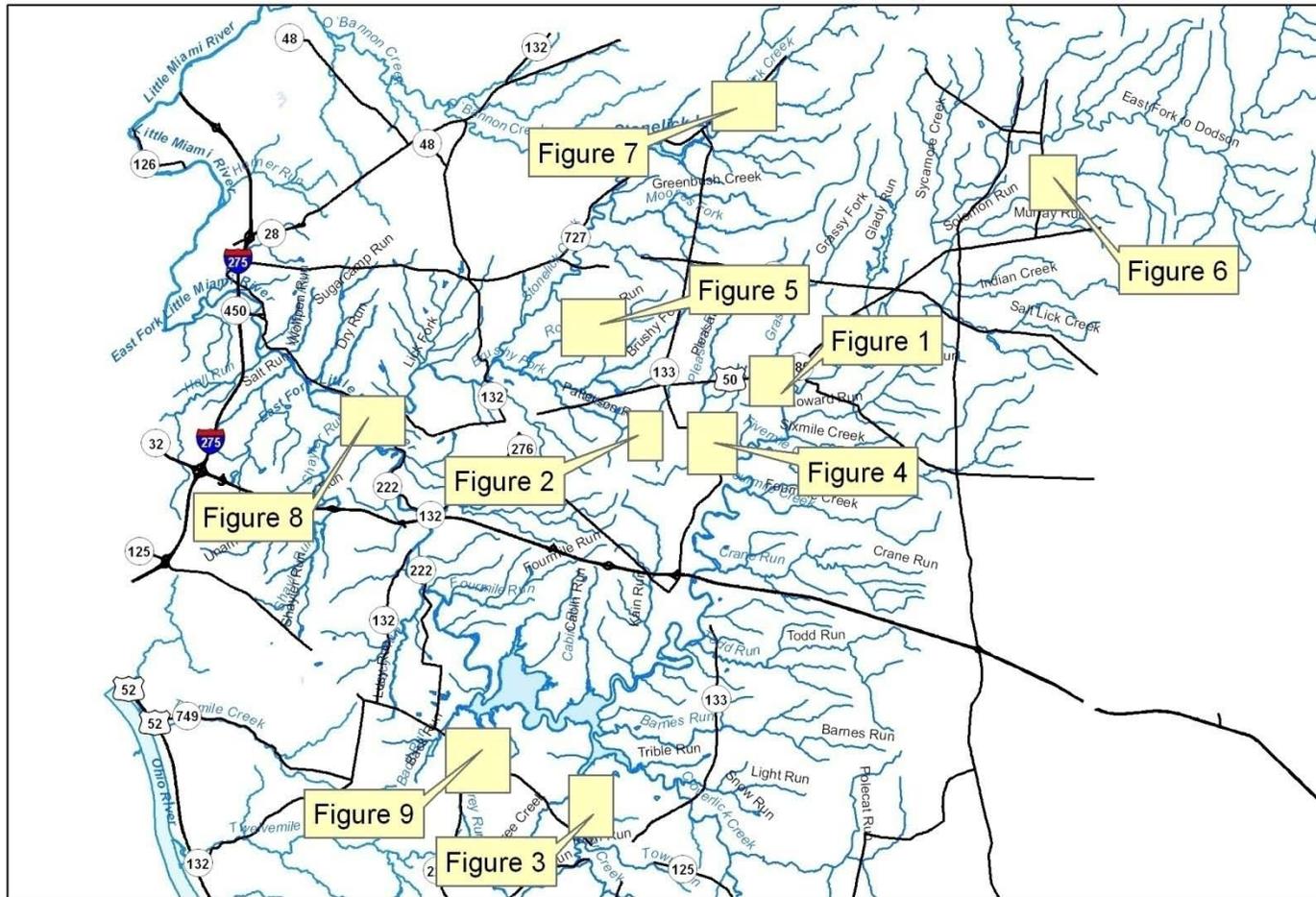


Figure 10
Scale Map of all Habitat Assessment Maps

6. SCHEDULE OF PLANNED SAMPLING ACTIVITIES

Habitat assessments will be made once in 2010, between the months of April and August. QHEIs will not be performed within 72 hours of a rain event or during exceptionally cloudy days to ensure accurate visual assessments of habitat. Additional sites may be assessed after the timeframe identified in this plan and such additions will be identified in an addendum to be e-mailed to the Credible Data Program Director prior to habitat assessment.

7. QUALITY ASSURANCE/QUALITY CONTROL PLAN

Clermont County has developed a detailed Quality Assurance Plan in conjunction with annual water quality monitoring activities (Attachment A). However, due to the qualitative nature of habitat assessments, only certain components of the QAP will be applicable to this project.

7.1 Accuracy of the QHEI assessments is determined by the required QHEI field test for Level 3 Credible Data Certification. Both quality data collectors received passing marks on the field test, ensuring that habitat assessments are performed with sufficient accuracy for level 3 data.

7.2 Field precision tests are conducted for at least 10% of the habitat assessments. The precision of assessments is determined by the comparison of results from two different Level 3 Quality Data Collectors. The field precision objective is for index scores to be within 10% similarity. The relative percent difference (RPD) between the analyte levels measured in the field duplicates will be calculated as follows:

$$RPD = \frac{|C_A - C_B|}{0.5(C_A + C_B)} \times 100$$

where $C_A = \text{QDC 1 QHEI score}$
 $C_B = \text{QDC 2 QHEI score}$

7.3 Field completeness is determined by the number of measurements collected versus the number of measurements planned for collection. The details concerning the actual number of field measurements and samples to be collected are discussed in the annual Study Plan. The number of measurements collected is validated by the Monitoring Leader. The completeness criterion habitat assessment is 100% percent.

7.4 Representativeness is the degree to which data accurately and precisely represents a characteristic of an environmental condition. Representative habitat assessments are assured since habitat assessments are only conducted by level 3 QDC's. These QDC's have received extensive training on habitat assessment methodology to ensure data is representative of environmental conditions.

7.5 The objective for data comparability is to generate habitat quality data that are comparable between sampling locations and comparable over time. Data comparability will be promoted by:

1. Using standard EPA approved methods
2. Consistently following the sampling methods detailed in the Study Plan and SOPs

8. WORK PRODUCTS

Results of Clermont County's habitat assessment data will be entered into the online Credible Data database within one year from PSP approval (Ohio EPA eBusiness Center).

9. LIST OF QUALITY DATA COLLECTORS AND OTHER PERSONNEL

Only Level 3 Quality Data Collectors certified in habitat methodologies will conduct QHEI assessments.

John McManus, a Program Manager for the Clermont County Stormwater Department, has been certified by the Ohio EPA as a Level 3 Quality Data Collector for Stream Habitat Assessment (QDC No. 236), effective September 10, 2008. Contact information for Mr. McManus is provided below:

John McManus, Program Manager
Clermont County Stormwater Department
4400 Haskell Lane
Batavia, Ohio 45103
Phone: (513) 732-7880
Email: jmcmanus@co.clermont.oh.us

Hannah Lubbers, Project Manager for Clermont County OEQ, has been certified by the Ohio EPA as a Level 3 Quality Data Collector for Stream Habitat Assessment (QDC No. 274), effective December 2, 2008. Contact information for Ms. Lubbers is provided below:

Hannah Lubbers, Project Manager
Clermont County Office of Environmental Quality
4400 Haskell Lane
Batavia, Ohio 45103
Phone: (513) 732-7894
Email: hlubbers@co.clermont.oh.us

10. DOCUMENTATION OF LEVEL 3 QDC STATUS

Figure 11 is a copy of the certified letters from OEPA Director Chris Korleski to John McManus approving Mr. McManus as a Level 3 Quality Data Collector for Stream Habitat Assessment.

Figure 12 is a copy of the certified letter from OEPA Director Chris Korleski to Hannah Lubbers approving Ms. Lubbers as a Level 3 Quality Data Collector for Stream Habitat Assessment.

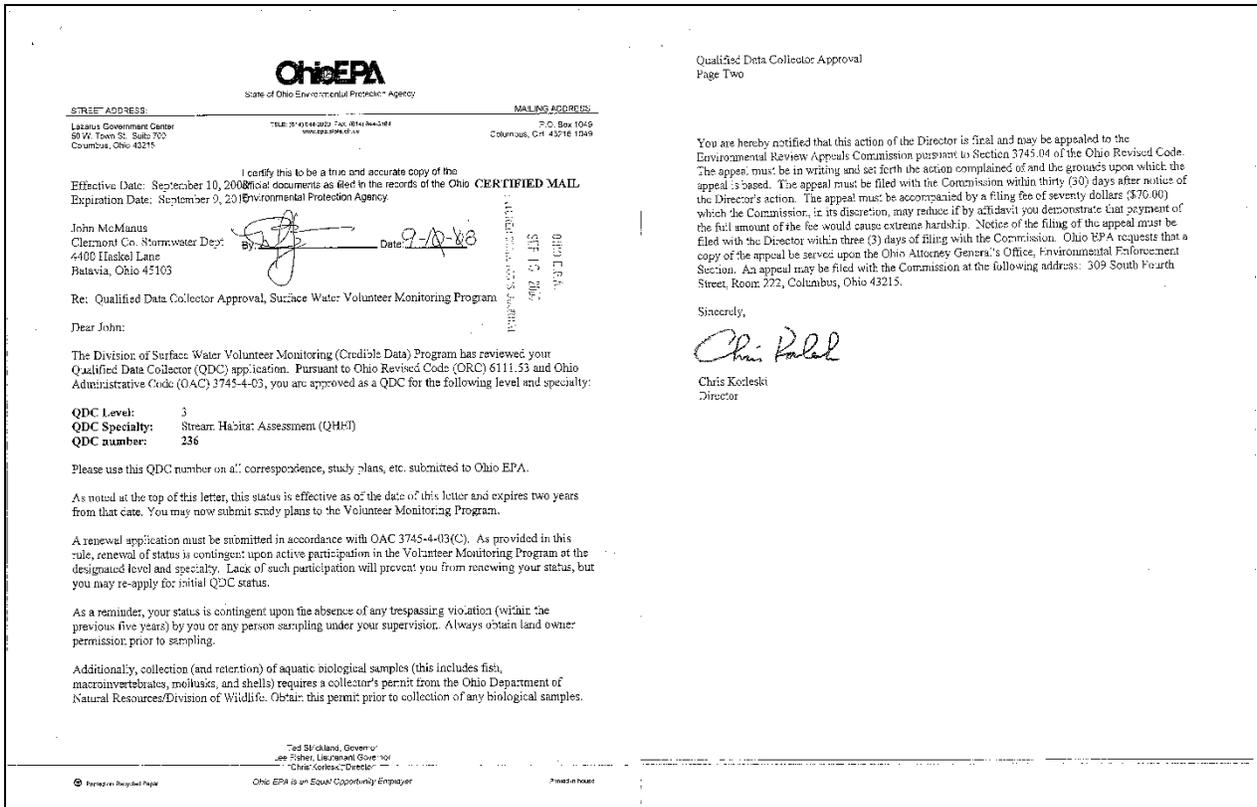


Figure 11.

Documentation for Level 3 Qualified Data Collector

McManus: Stream Habitat Assessment

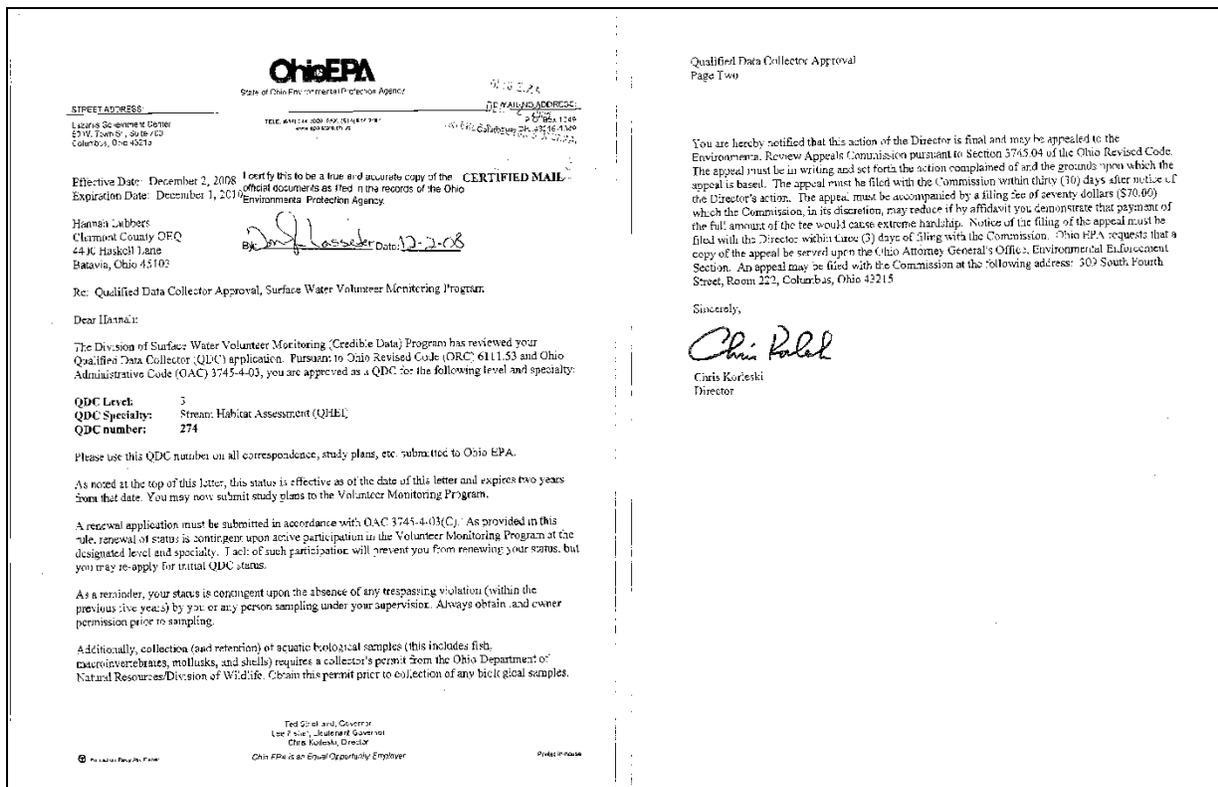


Figure 12.

Documentation for Level 3 Qualified Data Collector

Lubbers: Stream Habitat Assessment

11. IDENTIFICATION OF CONTRACT LABORATORY

All habitat assessments will be conducted in the field and will not require any laboratory work.

12. SCIENTIFIC COLLECTOR'S PERMIT

Not applicable.

13. DIGITAL PHOTO CALALOG

A digital photo catalog of all sampling locations will be maintained for ten years including photos of the specific sampling location, riparian zone adjacent to the sampling location, and general land use in the immediate vicinity of the sampling location. See Figure 13 for certification letter.

14. VOUCHER SPECIMENS

Not applicable.

15. STATEMENT REGARDING CRIMINAL TRESPASSING

Neither Mr. McManus nor Ms. Lubbers has been convicted of or pleaded guilty to a violation of section 2911.21 of the Revised Code (criminal trespass) or a substantially similar municipal ordinance within the previous five years. See Figure 13 for the criminal trespassing statement.



BOARD OF COUNTY COMMISSIONERS

CLERMONT COUNTY, OHIO

ROBERT L. PROUD R. SCOTT CROSWELL III EDWIN H. HUMPHREY

April 21, 2010

Jeff Reynolds
Ohio EPA, Division of Surface Water
Standards and Technical Support Section
P.O. Box 1049
122 S. Front Street
Columbus, Ohio 43216-1049

Dear Mr. Reynolds,

Pursuant to the requirements outlined in Appendix A of Section 3745-4-06 of the Ohio Administrative Code describing the requirements of a Level 3 Study Plan, the purpose of this letter is to certify that the Clermont County Office of Environmental Quality will create a digital photo catalog of all sampling locations in its Habitat Assessment Program, and maintain that catalog for ten years. The catalog will include photos of the specific sampling location, riparian zone adjacent to the sampling location, and general land use in the vicinity of the sampling location.

This letter further certifies that Ms. Lubbers nor Mr. McManus have never been convicted of or pleaded guilty to a violation of Section 2911.21 of the Ohio Revised Code (criminal trespass) or a substantially similar municipal ordinance.

Sincerely,

Hannah Lubbers, Project Manager
Clermont County Office of Environmental Quality

John McManus, Program Manager
Clermont County Stormwater Department

OFFICE OF ENVIRONMENTAL QUALITY
4400 HASKELL LANE BATAVIA, OHIO 45103
TELEPHONE: (513) 732-7745 FAX: (513) 732-7310

Figure 13.

Certification Letter

QHEI field sheet



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score:

Stream & Location: _____ RM: _____ Date: ____/____/06

Scorers Full Name & Affiliation: _____

River Code: _____ STORET #: _____ Lat./ Long.: _____ 18 _____ Office verified location

1] **SUBSTRATE** Check ONLY Two substrate-TYPE BOXES; estimate % or note every type present

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE	ORIGIN	QUALITY
<input type="checkbox"/> BLDR /SLABS [10]	_____	<input type="checkbox"/> HARDPAN [4]	_____	<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/> HEAVY [-2]
<input type="checkbox"/> BOULDER [9]	_____	<input type="checkbox"/> DETRITUS [3]	_____	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> COBBLE [8]	_____	<input type="checkbox"/> MUCK [2]	_____	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> GRAVEL [7]	_____	<input type="checkbox"/> SILT [2]	_____	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> FREE [1]
<input type="checkbox"/> SAND [6]	_____	<input type="checkbox"/> ARTIFICIAL [0]	_____	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> BEDROCK [5]	_____			<input type="checkbox"/> LACUSTURINE [0]	<input type="checkbox"/> MODERATE [-1]

NUMBER OF BEST TYPES: 4 or more [2] 3 or less [0]

Comments _____

2] **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	AMOUNT
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	Check ONE (Or 2 & average)
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> EXTENSIVE >75% [1]
			<input type="checkbox"/> MODERATE 25-75% [7]
			<input type="checkbox"/> SPARSE 5-<25% [3]
			<input type="checkbox"/> NEARLY ABSENT <5% [1]

Comments _____

3] **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments _____

4] **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
	<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input type="checkbox"/> NONE [0]	<input type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Comments _____

5] **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	Primary Contact
<input type="checkbox"/> > 1m [6]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]	Secondary Contact
<input type="checkbox"/> 0.7-<1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> SLOW [1]	(circle one and comment on back)
<input type="checkbox"/> 0.4-<0.7m [2]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0]	<input type="checkbox"/> VERY FAST [1]	
<input type="checkbox"/> 0.2-<0.4m [1]		<input type="checkbox"/> FAST [1]	
<input type="checkbox"/> < 0.2m [0]		<input type="checkbox"/> MODERATE [1]	

Comments _____

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average)

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments _____

6] **GRADIENT** (ft/mi) VERY LOW - LOW [2-4] MODERATE [6-10] HIGH - VERY HIGH [10-6]

DRAINAGE AREA (mi²)

%POOL: %GLIDE: %RUN: %RIFFLE:

Comments _____

Attachment 1–page 2

QHEI field sheet

AJ SAMPLED REACH

Check ALL that apply

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

METHOD

- BOAT
- WADE
- L. LINE
- OTHER

STAGE

- 1st -sample pass- 2nd
- HIGH
 - UP
 - NORMAL
 - LOW
 - DRY

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- 1st -sample pass- 2nd
- < 20 cm
 - 20-40 cm
 - 40-70 cm
 - > 70 cm/ CTB
 - SECCHI DEPTH

meters

CANOPY

- > 85% - OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10% - CLOSED

CJ RECREATION

AREA DEPTH
POOL: >100ft² >3ft

BJAESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPounded / DESICCATED
- FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone x² width
- entrench. ratio
- Legacy Tree:

Stream Drawing: