Study Plan for Fiscal Years 2012 and 2013 Supplemental 106 Funding

Field Year 2014 Limited Warmwater Habitat Assessment Monitoring

Division of Surface Water
Ecological Assessment Section
April 25, 2014

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Grant # I01E00992
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EA^3 Project Name:
LWH/SRW Assessments (FFY12/13 106 Supplemental Gr.) 2013-15

Monitoring Objective

Sampling will be conducted to determine the appropriate tiered aquatic life use for several streams currently assigned the Limited Warmwater Habitat (LWH) use within the Wills Creek watershed (13 streams), four streams in the Duck Creek watershed, one stream in the Moxahala Creek watershed, and one stream in the Hocking River watershed. These are waters that were temporarily designated in the 1978 Water Quality Standards (WQS) as not meeting specific Warmwater Habitat (WWH) chemical water quality criteria. The LWH aquatic life use is no longer being assigned to Ohio streams and rivers and this effort will redesignate those few streams in these watersheds that are still assigned this use. As stated in the WQS at 3745-1-07(B)(1)(b), "Stream segments currently designated limited warmwater habitats will undergo use attainability analyses and will be redesignated other aquatic life habitats. No additional stream segments will be designated limited warmwater habitats." Table 1 lists all of the 2014 streams and sites to be sampled and provides relevant details for each. Figures 1 - 4 map the stream sampling sites in each of the four watersheds.

Sampling Activities

Biological Community Assessment

The fish communities will be assessed once or twice at each sampling site based on headwater (< 20 mi^2 drainage) or wading (>20 mi^2 drainage) assignment using standard electrofishing methods. Macroinvertebrate communities will be assessed once at each sampling site with a quantitative artificial substrate collection and a qualitative multihabitat composite sample (sites > 20 mi^2 drainage) or a qualitative multihabitat composite sample only (sites < 20 mi^2 drainage).

Physical Habitat Assessment

Physical habitat will be evaluated at each biological sampling site and pertinent attributes will be used in the overall assessment of the each streams' appropriate aquatic life use recommendation.

Water Quality Field Parameters

Periodic site visits (1-3) to measure site water temperature, dissolved oxygen, pH, and conductivity will be conducted at a minimum and results will be used in the overall assessment of each streams' appropriate aquatic life use recommendation. Some larger sites may have more intensive and frequent chemical water quality monitoring as they are being assessed as part of the comprehensive 2014 watershed survey being conducted in the Wills Creek watershed.

Results

- Results will be used to look at key biological community and physical habitat parameters used by Ohio EPA to determine the appropriate and/or existing aquatic life use including: 1) presence of federal or state endangered, threatened, or special concern fish and invertebrate species, 2) number and prevalence of declining fish species, 3) quality of the physical habitat as documented by Qualitative Habitat Evaluation Index (QHEI) scores, and 4) quality (*e.g.*, abundance, balance, and diversity) and status of fish and macroinvertebrate communities as reflected with biological index scores (Index of Biotic Integrity – IBI, Modified Index of well-being – MIwb, and Invertebrate Community Index - ICI) and as compared to current biocriteria assigned to the Western Allegheny Plateau ecoregion of Ohio.

- Results of the above assessments will be used to recommend the appropriate tiered aquatic life use based on those currently defined in the Ohio Water Quality Standards. It is anticipated that these recommendations will be incorporated into a future WQS rulemaking at an as yet to be determined time.

Quality Assurance/Sampling Methods

Ohio EPA Manuals

All biological, physical habitat, field water quality, data processing, and data analysis methods and procedures adhere to those specified in the Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013) for field parameter measurement, the Biological Criteria for the Protection of Aquatic Life, Volumes I - III (Ohio EPA 1987a, 1987b, 1989a, 1989b, 2014a, 2014b) for biological assemblage assessment, and The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Ohio EPA 1989c, 2006) for physical habitat assessment.

Aquatic Life 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 7-15. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and the 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 1988). 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. Biological sampling results will be compared to WWH or EWH biocriteria for applicable ecoregions in Ohio.

Biological Community Assessment

The macroinvertebrates from each waterbody sampling location with a drainage area >20 mi^2 will be sampled quantitatively using a composited set of five modified Hester-Dendy multiple-plate artificial substrate samplers; this sample will be supplemented with a qualitative multihabitat composite sample. At those sites with <20 mi^2 drainages, only the qualitative multihabitat composite sample will be 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 once (headwater method at site <20 mi^2 drainage) or twice (wading method at sites >20 mi^2 drainage) at each sampling location with pulsed DC electrofishing gear.

Detailed biological field and laboratory sampling protocols are documented in the Ohio EPA manual *Biological Criteria for the Protection of Aquatic Life, Volume III* (1989b, 2014b).

Stream Physical Habitat Evaluation

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Ohio EPA 1989c, 2006). 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.

Water Quality Field Parameters

Water quality field parameters (temperature, dissolved oxygen, pH, and conductivity) will be measured 1-3 times at each location using field meters calibrated and maintained according to procedures specified in the Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013). At larger sites in the Wills Creek basin which will be more intensively and frequently sampled as part of the comprehensive watershed survey, samples will be collected and preserved using appropriate methods, as outlined in Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013) and delivered to the Ohio EPA Division of Environmental Services lab for analyses. The study plan for the 2014 Wills Creek watershed survey is available at the following web location under the Study Plans tab:
http://epa.ohio.gov/dsw/bioassess/ohstrat.aspx .

Table 1. FY12/13 106 supplemental grant sampling: 2014 site list for designated Limited Warmwater Habitat (LWH) stream assessment.

Name	HUC12	Stream Code	Station	Latitude	Longitude	River Mile	Drainage Area	Location	County
Wills Creek Basin									
1) White Eyes Creek	05040005 06 03	17-803-000	R18P07	40.073053	-81.773964	11.90	4.2	Highland-Grange Rd.	Muskingum
2) White Eyes Creek	05040005 06 03	17-803-000	301752	40.094020	-81.771450	10.14	16.2	Dent Rd.	Muskingum
3) White Eyes Creek	05040005 06 03	17-803-000	302572	40.134658	-81.735982	4.78	35.4	Houts Rd.	Muskingum
4) White Eyes Creek	05040005 06 03	17-803-000	R18P06	40.169552	-81.739868	0.67	43.6	Twp. Rd. 145	Coshocton
5) Brush Run	05040005 06 03	17-804-000	302602	40.097305	-81.778230	0.40	7.3	Dent Rd. (access?)	Muskingum
6) Jackson Run	05040005 05 03	17-831-000	302603	40.016300	-81.646770	0.60	1.6	Jackson Run Rd.	Guernsey
7) Peters Creek	05040005 05 03	17-832-000	302604	40.026010	-81.698278	2.96	3.4	Peters Creek Rd. (Twp. Rd. 416)	Guernsey
8) Peters Creek	05040005 05 03	17-832-000	R18P04	40.010300	-81.657500	0.28	10.4	U.S. Rt. 40	Guernsey
9) Bobs Run	05040005 05 03	17-833-000	302605	40.018670	-81.669940	0.15	2.6	Peters Creek Rd. (Twp. Rd. 416)	Guernsey
10) North Crooked Cr.	05040005 05 01	17-834-000	302606	39.987940	-81.701070	1.41	16.3	Morgan Rd.	Guernsey
11) Fox Creek	05040005 05 01	17-835-000	302607	39.993054	-81.746378	0.96	3.8	S. Bridge II parking area off U.S. Rts. 22/40	Muskingum
12) Fox Creek	05040005 05 01	17-835-000	302571	39.992033	-81.743103	0.70	7.8	New Concord WTP dst. dam	Muskingum
13) Dare Run	05040005 05 02	17-836-000	302608	39.977700	-81.684120	0.70	1.6	Holmes Rd.	Guernsey
14) Shannon Run	05040005 03 01	17-844-000	R17P01	39.963600	-81.267200	0.05	4.4	St. Rt. 265	Guernsey
15) Buffalo Creek	05040005 02 03	17-890-000	302611	39.805011	-81.471615	11.00	5.7	Mill Rd.	Noble
16) Buffalo Creek	05040005 02 04	17-890-000	302610	39.823781	-81.487171	9.20	21.2	Pleasant Hill Rd. (Twp. Rd. 134)	Noble
17) Buffalo Creek	05040005 02 04	17-890-000	302609	39.858815	-81.522950	5.40	35.9	Charelston Rd. (Twp. Rd. 109)	Noble
18) Buffalo Creek	05040005 02 04	17-890-000	R17S11	39.902800	-81.550600	0.08	49.9	St. Rt. 146	Guernsey
19) N. Fk. Buffalo Cr.	05040005 02 04	17-891-000	302612	39.841262	-81.504906	0.73	6.7	Halley Ridge Rd. (Co. Rd. 37)	Noble
20) S. Fk. Buffalo Cr.	05040005 02 03	17-892-000	302615	39.803370	-81.426570	2.85	5.0	Fredericksdale Rd. (Twp. Rd. 141)	Noble
21) S. Fk. Buffalo Cr.	05040005 02 03	17-892-000	302614	39.812340	-81.469040	0.45	12.40	St. Rt. 284	Noble
22) Little Buffalo Cr.	05040005 02 03	17-893-000	302616	39.807180	-81.447030	0.06	3.8	Zep Rd. (St. Rt. 146) at Shenandoah School	Noble
Duck Creek Basin									
23) Camp Run	05030201 08 02	06-325-000	203993	39.723100	-81.463300	0.40	1.6	adj. Hohman Rd. (Twp. Rd. 265)	Noble
24) Rocky Run	05030201 08 03	06-326-000	203995	39.632506	-81.335157	0.20	3.1	adj. Coyle Rd. (Twp. Rd. 242B)	Noble
25) McBride Run	05030201 08 01	06-333-000	302618	39.740980	-81.326390	0.05	1.8	adj. Zerger Quarry Rd. (Twp. Rd. 234)	Noble
26) Wolfpen Run	05030201 08 01	06-336-000	302619	39.782329	-81.395893	0.05	1.1	Doshie Rd. (Co. Rd. 6)	Noble
Hocking River Basin									
27) Herrold Run	05030204 09 05	01-120-000	J03G04	39.343600	-81.889400	0.10	1.8	near mouth (adj. McGraw Rd.?)	Athens
Moxahala Creek Basin									
28) Dry Run	05040004 05 01	17-309-000	302620	39.744403	-82.078401	0.14	3.0	Rosefarm Rd. (Co. Rd. 75)	Morgan

Figure 1. LWH stream sampling locations in the White Eyes Creek and North Crooked Creek watersheds (Wills Creek basin), 2014. Site numbers correspond to those in Table 1.

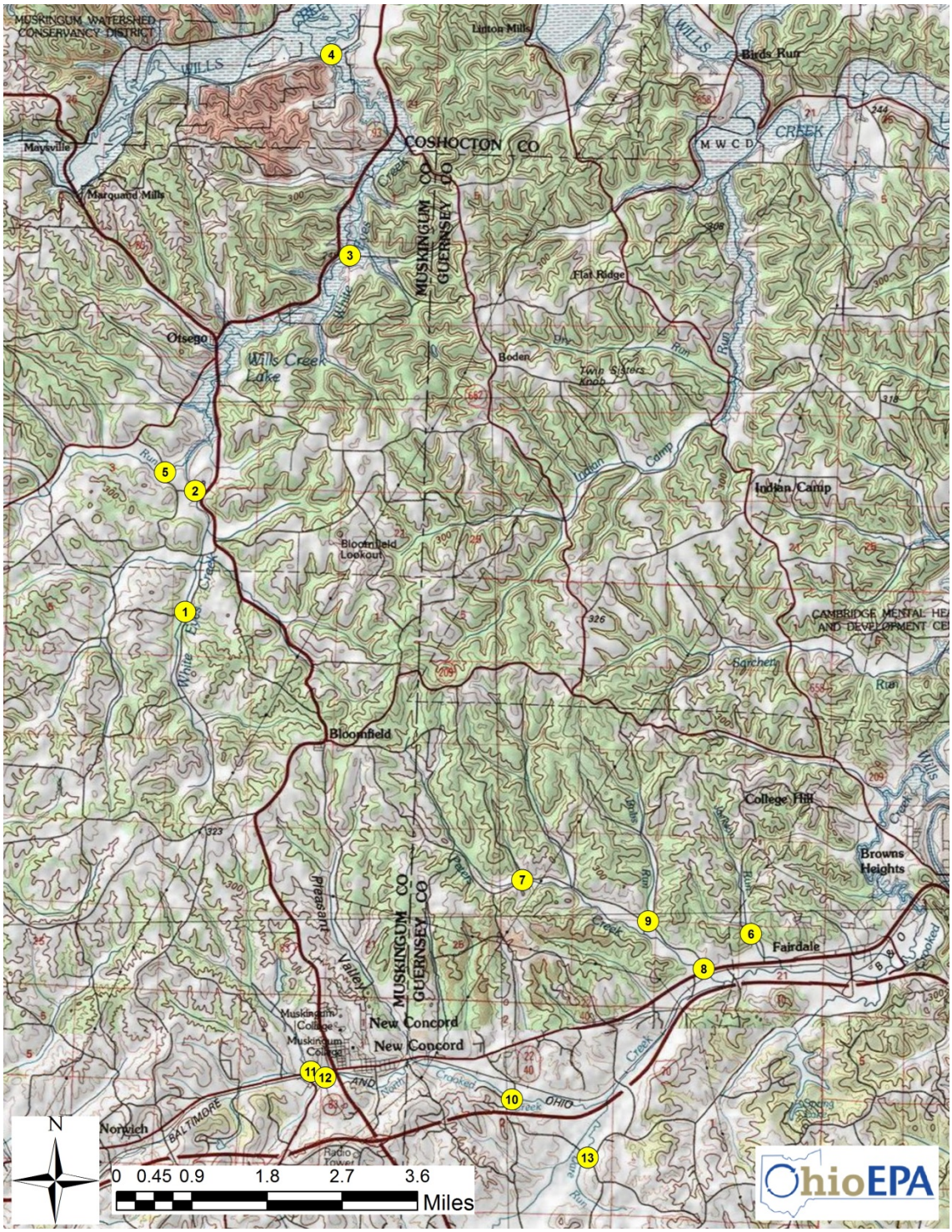


Figure 2. LWH stream sampling locations in the Buffalo Creek watershed and Shannon Run (Wills Creek basin) and those in the Duck Creek basin, 2014. Site numbers correspond to those in Table 1.

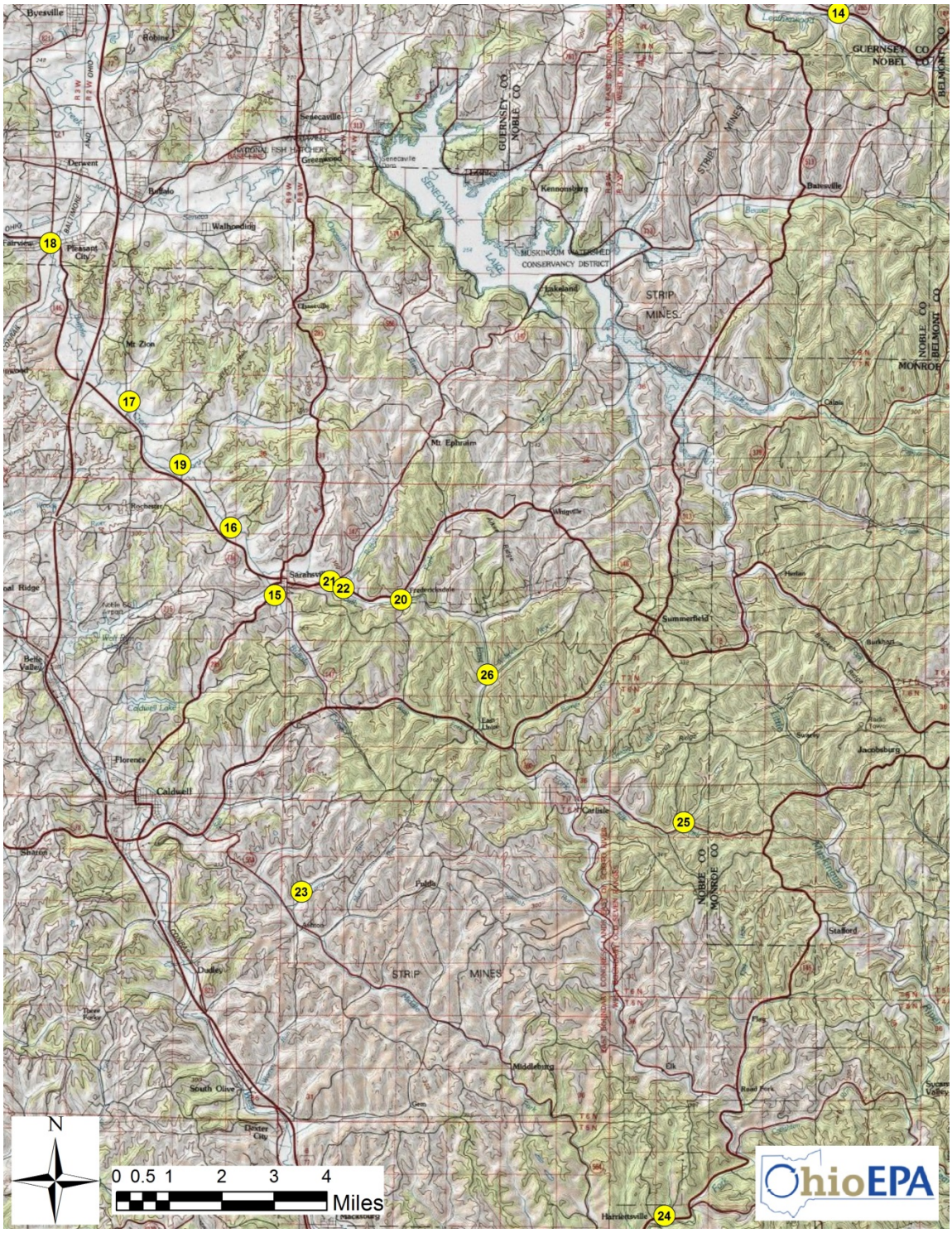


Figure 3. LWH stream sampling location in Herrold Run (Hocking River basin), 2014. Site number corresponds to the one in Table 1.

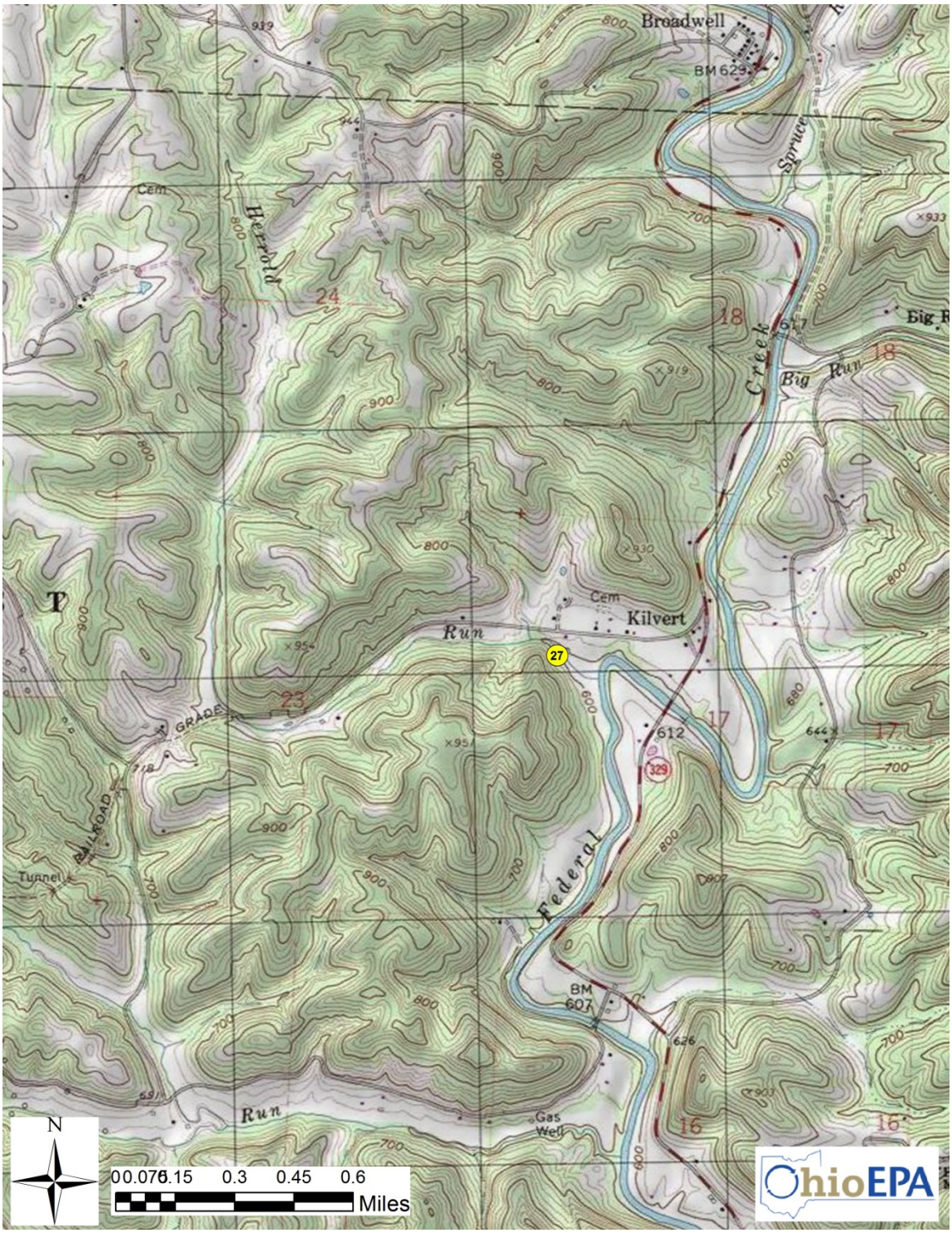
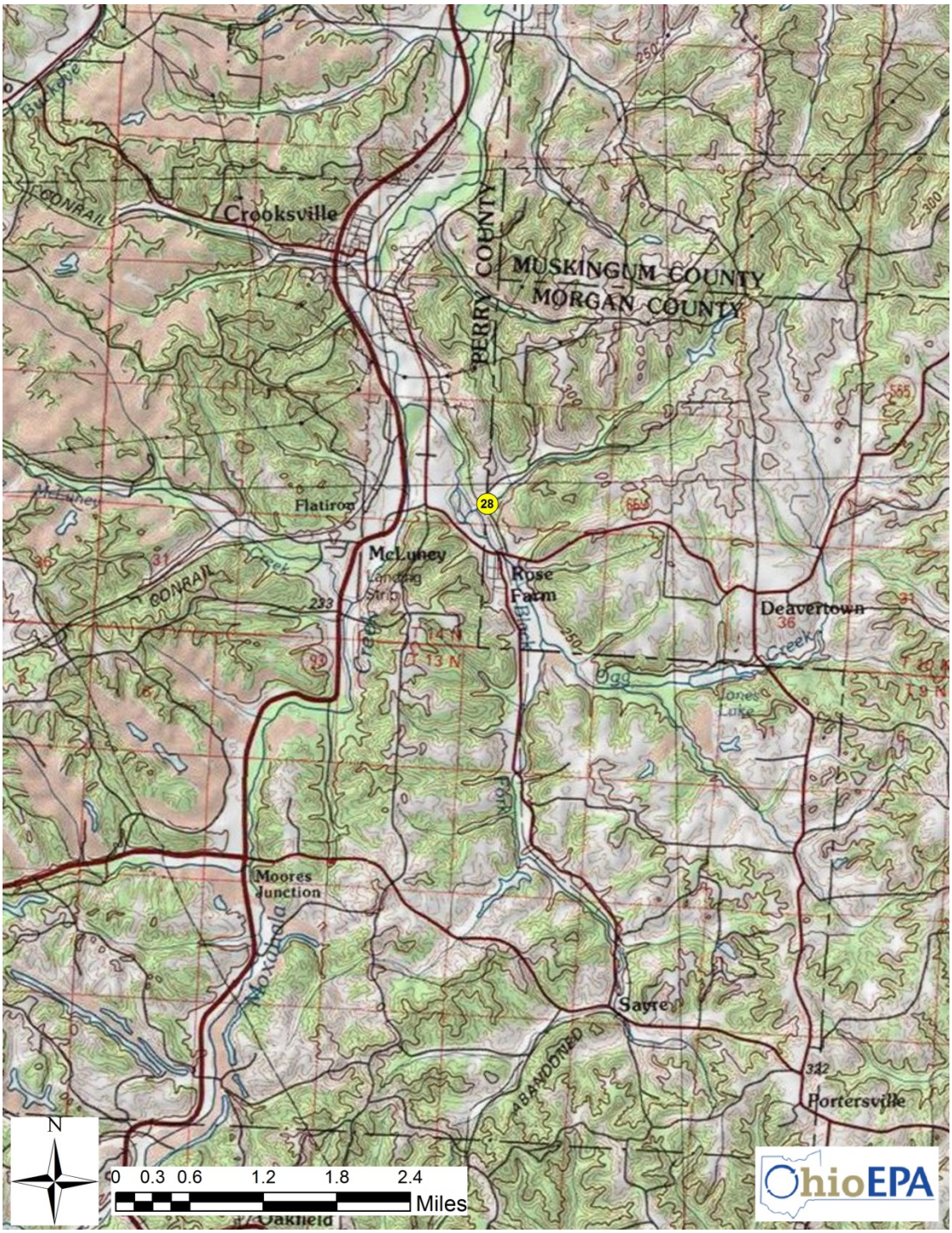


Figure 4. LWH stream sampling location in Dry Run (Moxahala Creek basin), 2014. Site number corresponds to the one in Table 1.



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. 2014a. 2014 Updates to Biological criteria for the protection of aquatic life: Volume II and Volume II Addendum. Users manual for biological field assessment of Ohio surface waters. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

___. 2014b. 2014 Updates to Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

___. 2013. Surface water field sampling manual for water column chemistry, bacteria and flows. Version 4.0, January 31, 2013. Div. of Surface Water, Columbus, Ohio.

___. 2006. Methods for assessing habitat in flowing waters: Using the Qualitative Habitat Evaluation Index (QHEI). Ohio EPA Tech. Bull. EAS/2006-06-1. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

___. 1989a. Addendum to Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Planning and Assessment, Surface Water Section, Columbus, Ohio.

___. 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.

___. 1989c. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Division of Water Quality Planning and Assessment, Columbus, Ohio.

___. 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.

___. 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.

Omernik, J.M. 1988. Ecoregions of the coterminous United States. Ann. Assoc. Amer. Geogr. 77(1): 118-125.