PHYSICAL HABITAT ASSESSMENT OF 17 CUYAHOGA RIVER TRIBUTARIES WITHIN CUYAHOGA VALLEY NATIONAL PARK, OHIO

DATA COLLECTORS

Project Leader: Sonia Bingham (QDC Number 168),
QDC Level: 3 (Certified in accordance with rule 3745-4-03 of OAC, dated 05/14/08)
QDC Specialty: Stream Habitat Assessment (QHEI)
Cuyahoga Valley National Park
15610 Vaughn Road, Brecksville, OH 44141
330-342-0764 (ext 3)
sonia_bingam@nps.gov

Other Potential Collectors:
*Meg Plona, Biologist
Cuyahoga Valley National Park
15610 Vaughn Road, Brecksville, OH 44141
330-342-0764 (ext 2)
meg_plona@nps.gov

*All parameters that impact the QHEI score will be verified at each site in person by the lead QDC.

OBJECTIVE

The objective of this study is to add a physical habitat assessment component to Cuyahoga Valley National Park's (CVNP) existing water quality program so that physical changes at these sites may be documented and monitored over time with other changes occurring in the watershed. Physical habitat assessments at these sites will help park managers monitor the impacts of anthropogenic landuses on habitat integrity over time. This information will also be valuable when biological surveys (fish and macroinvertebrates) are completed.

SURVEY

The QHEI will be completed at existing water quality monitoring sites that have drainage areas over 1 mi^2 once every 2 years during summer low flow conditions, when fish sampling would typically be conducted (after June 15). The survey will include 17 tributaries, near their mouth with the Cuyahoga River (HUC: 4110002). Survey methods will follow those outlined by Rankin, E.T. (1989), *The qualitative habitat evaluation index (QHEI): rationale, methods and application.* Evaluations will begin in the summer of 2010, and data will be submitted to the Ohio EPA Credible Data Collector Program on or before August 13, 2010 each survey year.

BACKGROUND

History of Water Quality Monitoring

Since 1985 park staff has monitored the water quality of 19 tributaries to the Cuyahoga River and several sites along the mainstem of the Cuyahoga. The objective of the program was to ensure that the park streams were in compliance with water quality

standards established by the Ohio EPA, as well as identify and address the major problems affecting tributaries that have watersheds largely within the boundaries of the park. Several mainstem Cuyahoga River sites were added to the program in 1990. Parameters tested included: fecal coliform, *E.coli*, temperature, pH, dissolved oxygen, chloride, conductivity, turbidity, alkalinity, total phosphorus, and nitrogen-ammonia. In 1994, biologists from the Northeast Ohio Environmental Protection Agency were involved in the selection of parameters and revision of the sampling design in an effort to streamline the monitoring program. Sampling efforts were reduced from monthly during the recreation season to three times per year (spring, summer, fall). Two river sites and five streams with persistent pollution problems remained on a more intensive monthly sampling regime during the recreation season, from May through October (intensive monitoring (IM) sites). These streams, Brandywine Creek, Stone Road, Sagamore Creek, Tinkers Creek, and Spring Creek, had persistent problems with bacteria, nitrogen, phosphorous and chloride - all sewage related problems. The remaining 15 tributaries were placed on a long term monitoring schedule (LTM sites) and sampled only three times (spring, summer and fall) each year. In 1996, Sagamore and Stone Road Creeks were reduced from the IM to the LTM schedule and in 2004, Brandywine, Tinkers and Spring were also reduced to the LTM schedule as a result of improvement in water quality. Additionally, fecal coliform was removed as a parameter in 2003 and total phosphorous was removed in 2006. All data from 1984 to the present (2009) has been entered into the US EPA's STORET database.

Sites are located as close as possible to their confluence with the Cuyahoga River, however land ownership, ease of access, availability of long, straight stream reaches, and position away from external influences such as roads, agricultural lands, residences and park facilities, influenced the final site location (Map 1).

Watershed Descriptions

The CVNP Water Quality Monitoring reports and a study completed by URS Corporation in 1986 were reviewed to identify potential point source issues in each watershed. However, point sources have changed a bit since the 1986 survey. Physical habitat (QHEI) and macro-invertebrates (ICI) were surveyed at each of the sites by the USGS in 1998 (Table 2), and relevant information is also included in the watershed descriptions below. The two studies are listed:

URS Corporation. 1986. *Potential Sources of Water Pollution, Cuyahoga Valley National Recreation Area, Ohio.*

Stewart, P.M., Hudson, P., Butcher, J.T., and Hesselberg, R. 1998. *Benthic Macroinvertebrate and Polycyclic Aromatic Hydrocarbon Inventory in Tributaries to the Cuyahoga River at the Cuyahoga Valley National Recreation Area.* Biological Resources Division, U.S. Geological Survey.

Brookside Creek is a third order stream with a watershed size of 2.6 mi^2. Over half of the watershed is residential and 4 storm sewer outfalls were identified in the watershed in 1986. Elevated levels of chloride and fecal coliform have also been documented (CVNP). Possible non-point sources include a powerline, bridge, road runoff

(Riverview), and a cement causeway located beneath the overpass. This reach previously scored low for poor riffle quality and a modified riparian zone (USGS 1998).

Chippewa Creek is a fourth order stream with a drainage area of 17.7 mi^2. The watershed is largely residential with numerous new housing developments. In 1986, there was one NPDES holder in the watershed, 12 storm sewer outfalls, and several complaints of failing septic tanks. Potential non-point source impacts include roads, bridges, and channel modifications.

CMA Creek (Central Maintenance Area Creek) has a discharge of 2.7 mi^2. Nearly a third of the watershed is residential, with fields and forests comprising the remainder. Two storm sewer outfalls were identified in 1986, and there have been documented exceedances of fecal coliform and total phosphorus (CVNP) standards. Heavy sedimentation and artificial substrate were noted in the USGS study, however much of the creek was still in good condition.

Columbia Run is a small third order stream with a drainage area of 2.1 mi^2. The watershed has some residential, forest and agricultural land uses.

Boston Run is a second order stream with a drainage area of 3.0 mi^2. There is little development in the watershed, except in the headwaters near Route 8 and in Peninsula. Land use is primarily agricultural, pasture, and forest. There was one storm sewer outfall and 3 non-permitted dischargers depicted in 1986. Fecal coliform was previously a concern, however levels do not appear to be elevated currently (CVNP).

Haskell Run is a small second order stream that drains 1.0 mi^2. There is little development in the watershed and most of the land is forested.

Salt Run is a third order stream with a drainage area of 2.6 mi^2. Less than 10 percent of the watershed is developed, however new developments are currently underway in the headwaters. Septic tank complaints were noted in 1986 and elevated NH_3 levels are documented (CVNP). An impoundment exists in the watershed (Kendall Lake) and physical habitat scores were low in the USGS study.

Dickerson Run is a second order stream with a drainage area of 2.2 mi^2. It is lightly developed and over 90 percent of the watershed is forest or field. Some residents and agriculture are interspersed throughout the watershed and there are serveal small impoundments. There was one storm sewer outfall and three non-permitted dischargers in 1986. Some sedimentation and beaver activity was noted in previous physical habitat studies, and turbidity levels are generally higher at this site than the rest of the study streams.

Oak Hill Creek is a small second order stream with a watershed of 0.3 mi^2. It is considered an intermittent stream and is often dry. The watershed is largely undeveloped; only one small residential lot and a small impoundment is present. Due to the size of the watershed, a QHEI will not be performed.

Langes Run is a third order stream with a drainage area of 1.7 mi^2. Approximately 15 percent of the watershed is developed in its headwaters. Agriculture, pasture and forest are dominant in the watershed. Septic tank complaints were noted in the 1986, and elevated NH_3 levels are documented (CVNP). Erosion issues were also noted in the USGS study and continue today.

Robinson Run is a third order stream with a drainage area of 1.6 mi^2. Less than 6 percent of the watershed is developed and there were no discharges or outfalls noted in 1986. However, there are a couple small impoundments depicted by aerial photography and moderate sedimentation from erosion is a documented problem.

Furnace Run is a fourth order stream with a relatively large watershed, draining 20.2 mi^2 of primarily agriculture, pasture and forest land. Residential, commercial and industrial uses are also present. Furnace Run is considered a high quality stream. However, recent developments within the watershed have created numerous problems which include increased erosion and sediment loads. In 1986 there were 20 storm sewer outfalls, 10 identified non-permitted discharge holders, and septic tank complaints. Physical habitat evaluation scores were high for Furnace Run in the USGS study, but have decreased in recent years.

Ira Creek is a small second order stream with a discharge of 0.6 mi^2. About half of the watershed is residential and the other half is forested. No pollutions sources were identified in 1986, however elevated NH_3 has been documented. Channelization and artificial substrates were noted in the USGS study. Due to the size of the watershed, a QHEI will not be performed at this site.

Yellow Creek is a fourth order stream with a large watershed, draining 40.5 mi^2. It is largely residential with many recent developments and some commercial uses. One sewage treatment facility discharges to a tributary of Yellow Creek, however on-site septic is common in the watershed. Despite landuse concerns, physical habitat scores were very high in the USGS study. In 1986 there were five NPDES holders, 21 non-permitted dischargers, 19 storm sewer outfalls, and numerous septic complaints.

Stone Creek is a third order stream draining 2.7 mi^2. The watershed is primarily residential and commercial. Five storm sewer outfalls were identified in 1986, with exceedances of chloride and fecal coliform standards documented (CVNP). Channel modifications, artificial substrates, and poor instream cover were noted by the USGS (1998).

Tinkers Creek is the only fifth order stream in Cuyahoga Valley National Park and has the largest watershed, draining 56.6 mi^2. It is highly urbanized with a number of point-source polluters. In 1986, point sources included 18 NPDES permit holders (seven sewer treatment plants), 105 storm sewer outfalls and two non-permitted facilities. Eroded banks, artificial substrates, poor channel morphology and poor instream cover were noted

in the USGS study. Elevated turbidity, chloride, total phosphorus, NH_3, and fecal coliform are concerns at this location (CVNP).

Sagamore Creek is a large third order stream, draining 7.4 mi^2. It is largely residential and has a hospital facility in the eastern portion of its watershed. The rest of the watershed is largely agricultural, pasture and forest. There were 13 storm sewer outfalls and two non-permitted dischargers identified in 1986. Erosion concerns were noted in 1998 (USGS). Sagamore Creek has recently been designated as a cold water stream.

Brandywine Creek is a large third order stream with a drainage area of 34.1 mi^2. It is largely residential with some industrial development. Within the CVNP, the watershed is mostly forested. In 1986, Brandywine Creek received effluent from three large sewage treatment facilities. However, all residents are now connected into the Cleveland Interceptor sewer line, and all treatment plants are gone. In addition, two other NPDES permit holders, 26 storm sewer outfalls, nine non-permitted dischargers, and numerous septic tank complaints were noted in 1986. Exceedances of chloride, fecal coliform and total phosphorus standards have been documented (CVNP). Despite poor water quality issues, poor riparian quality was the only physical habitat issue noted by USGS (1998).

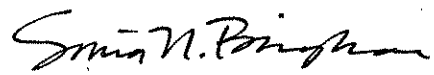
Spring Creek is a second order stream, draining 1.2 mi^2. The watershed is mostly undeveloped with few residences, oil wells, a large ski complex, and three miles of interstate highways. One storm sewer outfall was noted in 1986, as well as one non-permitted discharger. Salt contamination in the groundwater inflates the conductivity and chloride readings in this stream, although the source was corrected in 1999 (CVNP). Also, NH_3 levels are a potential concern. The USGS study noted that it was highly channelized, with heavy sedimentation and poor riparian quality.

FINAL PRODUCTS

The QHEI scoresheets for each site will be submitted to the Ohio EPA Credible Data Program through the Credible Data Online Application: (http://www.epa.ohio.gov/dsw/volunteermonitoring/submission_of_data.aspx) The QHEI scores (metric and final) will also be digitized and available for viewing through the US EPA STORET database. A digital photolog of the specific sample location, riparian zone, and general land use in the immediate vicinity of the site, will be maintained for each site for a minimum of ten years.

The named data collectors have never been convicted of or pleaded guilty to a violation of section 2911.21 of the Ohio Revised Code, or a substantially similar municipal ordinance.

QDC Signature:



Sonia N. Bingham

Map 1. Location of monitoring sites throughout Cuyahoga Valley National Park.

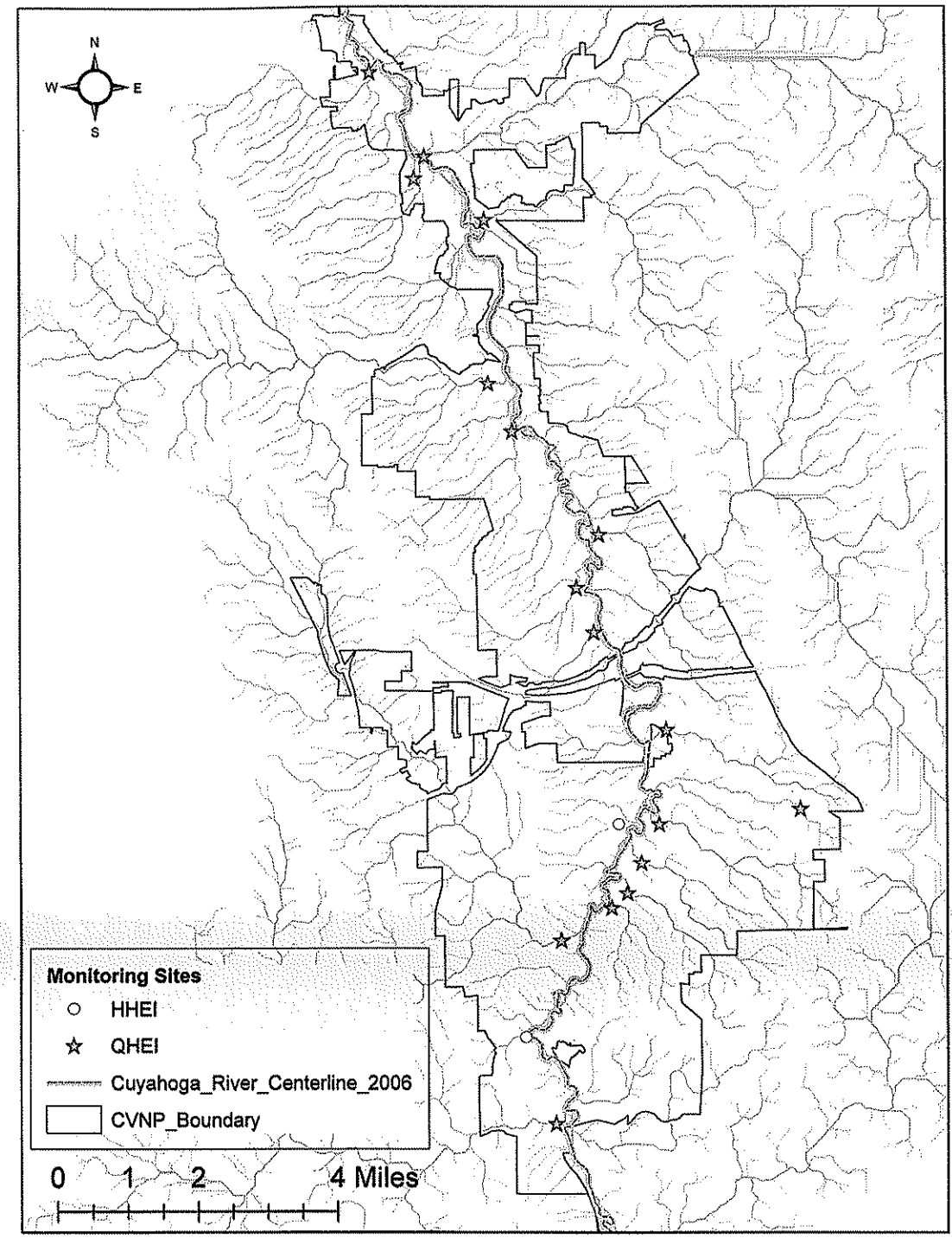


Table 1. Historical Water Quality Sites

Station ID (Storet)	Station Name	River Mile	Latitude	Longitude	Datum	County	USGS Quad
LTM Sites		(Cuyahoga)					
CUVA_NPS_BRRO	Brookside Creek	17	41.3600547	-81.61168	NAD83	CUYAHOGA	Northfield
CUVA_NPS_CHCR	Chippewa Creek	21.6	41.3170425	-81.592128	NAD83	CUYAHOGA	Northfield
CUVA_NPS_CMAC	CMA Creek	22.4	41.3070894	-81.585758	NAD83	CUYAHOGA	Northfield
CUVA_NPS_CORU	Columbia Run	26	41.2747725	-81.568711	NAD83	CUYAHOGA	Northfield
CUVA_NPS_BORU	Boston Run	29.5	41.2449196	-81.544468	NAD83	SUMMIT	Peninsula
CUVA_NPS_HARU	Haskell Run	30.3	41.2287263	-81.508268	NAD83	SUMMIT	Peninsula
CUVA_NPS_SARU	Salt Run	30.8	41.2259805	-81.546987	NAD83	SUMMIT	Peninsula
CUVA_NPS_DIRU	Dickerson Run	31	41.2178783	-81.551971	NAD83	SUMMIT	Peninsula
CUVA_NPS_OACR	Oak Hill Creek	31.1	41.225983	-81.558089	NAD83	SUMMIT	Peninsula
CUVA_NPS_LARU	Langes Run	32	41.211503	-81.555958	NAD83	SUMMIT	Peninsula
CUVA_NPS_RORU	Robinson Run	32.8	41.2083333	-81.560333	NAD83	SUMMIT	Peninsula
CUVA_NPS_FURU	Furnace Run	33.6	41.201325	-81.574158	NAD83	SUMMIT	Peninsula
CUVA_NPS_IRCR	Ira Creek	35.5	41.1811347	-81.584205	NAD83	SUMMIT	Peninsula
CUVA_NPS_YECR	Yellow Creek	37.4	41.1634511	-81.576268	NAD83	SUMMIT	Peninsula
CUVA_NPS_STRO	Stone Creek	15	41.3819619	-81.623484	NAD83	CUYAHOGA	Shaker Heights
CUVA_NPS_TICR	Tinkers Creek	17.2	41.3645319	-81.608717	NAD83	CUYAHOGA	Northfield
CUVA_NPS_SACR	Sagamore Creek	19	41.3514283	-81.592465	NAD83	CUYAHOGA	Northfield
CUVA_NPS_BRCR	Brandywine Creek	24.7	41.2856847	-81.562388	NAD83	CUYAHOGA	Northfield
CUVA_NPS_SPCR	Spring Creek	26.6	41.2656291	-81.564139	NAD83	SUMMIT	Northfield

Table 2. QHEI and ICI results (USGS 1998)

Station ID (Storet)	Station Name	QHEI Scores		ICI Scores		Narrative Rating
LTM Sites		*1994*	*1995*	*1994*	*1995*	
CUVA_NPS_BRRO	Brookside Creek	48.6	50	36	34	good
CUVA_NPS_CHCR	Chippewa Creek	73	53	28	42	fair to good
CUVA_NPS_CMAC	CMA Creek	67.3	71.3	36	36	good
CUVA_NPS_CORU	Columbia Run	67	65.8	48	52	excellent
CUVA_NPS_BORU	Boston Run	70.5	65	40	44	good
CUVA_NPS_HARU	Haskell Run	64.3	69.5	24	38	fair to good
CUVA_NPS_SARU	Salt Run	57.5	53	28	36	fair to good
CUVA_NPS_DIRU	Dickerson Run	57	56.5	42	32	good to fair
CUVA_NPS_OACR	Oak Hill Creek	62	51	12	24	poor to fair
CUVA_NPS_LARU	Langes Run	49	57	28	28	fair
CUVA_NPS_RORU	Robinson Run	58.5	67.5	36	34	good
CUVA_NPS_FURU	Furnace Run	75	72.8	34	28	good to fair
CUVA_NPS_IRCR	Ira Creek	56	56	44	36	good
CUVA_NPS_YECR	Yellow Creek	84.7	85.5	40	32	good to fair
CUVA_NPS_STRO	Stone Creek	60.3	57	36	34	good
CUVA_NPS_TICR	Tinkers Creek	60.5	58.5	28	32	fair
CUVA_NPS_SACR	Sagamore Creek	66	55	40	42	good
CUVA_NPS_BRCR	Brandywine Creek	?	73	36	34	good
CUVA_NPS_SPCR	Spring Creek	53.7	60	30	40	fair to good