

Biological and Water Quality Study of streams in the Grand River Watershed



Division of Surface Water
Ecological Assessment Section
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Recommendations

Streams in the Grand River watershed currently listed in the [Ohio Water Quality Standards](#) (WQS) are assigned one or more of the following aquatic life use designations: Warmwater Habitat (WWH), Exceptional Warmwater Habitat (EWH), Modified Warmwater Habitat - Channelization (MWH-C), Coldwater Habitat (CWH) and Seasonal Salmonid Habitat (SSH). The aquatic life use designations for the majority of larger streams in the Grand River drainage basin have been previously verified using biological data. Many streams in Ohio were originally designated for aquatic life use in the 1978 Ohio WQS, but the techniques used then did not include standardized approaches to the collection of instream biological data or numerical biological criteria. These surveys used biological data to assess current condition to verify current designations or recommend designations for several unlisted water bodies within the Grand River drainage basin. A summary of the findings include the following:

- Two streams with an existing WWH use designation should be retained. These include Marsh Creek and Red Creek.
 - Marsh Creek is a direct tributary to Lake Erie in Mentor, Ohio and drains about 16.5 square miles. Although some channel modifications have occurred historically, it has a wooded riparian corridor along most of its length along with occasional riparian wetlands.
 - Red Creek enters the Grand River at river mile 4.80 and drains a suburbanized former lake plain of 9.5 square miles in area. Consequently, its parent, fine-grained lacustrine substrates are moderately embedded with silt. The lower reach, where sampled, had not been channelized, and so has sufficient habitat attributes to support a warmwater stream fish assemblage. Red Creek has sustained flow throughout the summer owing to ground water from beach ridges and a thick soil horizon.
- Deacon Creek is a tributary to Baughman Creek entering at river mile 5.79 and draining 11.1 square miles that is currently undesignated in the WQS. The stream is recommended to be designated warmwater habitat. Results of biological sampling were consistent with expectations for a stream characterized by the wetland conditions through which it flows.
- Two currently undesignated tributaries are recommended to be designated coldwater habitat based upon the presence of multiple coldwater macroinvertebrate taxa and the presence of coldwater fish populations. The first, an unnamed tributary to Crooked Creek entering at river mile 6.50 had four coldwater macroinvertebrate taxa and mottled sculpin, which comprised nearly 20% of the total fish captured. The second, an unnamed tributary to Hoskins Creek entering at river mile 2.45 had four coldwater macroinvertebrate taxa and mottled sculpins comprising 17% of the total fish captured.
- All streams with existing Agricultural Water Supply (AWS), Industrial Water Supply (IWS), Primary Contact Recreation (PCR) use designations should retain their respective designations. The water supply use designations (AWS, IWS) and recreational use designations (PCR) are recommended for the three currently undesignated streams (Deacon Creek, and the unnamed tributaries to Crooked Creek and Hoskins Creek).

Table 1 - Use designations for water bodies in the Grand River drainage basin.

Water Body Segment	Use Designations												Comments
	Aquatic Life Habitat						Water Supply			Recreation			
	S R W	W W H	E W H	M W H	S S H	C W H	L R W	P W S	A W S	I W S	B W	P C R	
Marsh creek		*/+						*/+	*/+		*/+		
Mentor creek and Mentor marsh	*	*						*	*		*		
Black brook		*						*	*		*		
Heisley creek		*						*	*		*		
Grand river - headwaters to downstream of the U.S. rte. 422 upstream crossing (RM 98.5)						+		*	*		*		
- downstream upper crossing of U.S. rte. 422 (RM 98.5) to lower crossing of U.S. rte. 422 (RM 95.5)			+					*	*		*		
- U.S. rte. 422 to st. rte. 608 (RM 91.8)			+					+	+		+		
- st. rte. 608 to Fobes rd. (RM 44.7)		+						+	+		+		
- at RM 89.12		+					o	+	+		+		
- Fobes rd. to Harpersfield dam (RM 30.9)			+					+	+		+		
- Harpersfield dam to State Route 2 (RM 5.5)			+		o			+	+		+		
- State Route 2 to the mouth		*			o			*	*		*		
Pebble branch		*						*	*		*		
Red creek		*/+			o			*/+	*/+		*/+		
Big creek - headwaters to Girdled rd. (RM 7.1)		+						+	+		+		
- Girdled road to the mouth		+			o			+	+		+		
Kellogg creek		+			o			+	+		+		
Ellison creek		+			o			+	+		+		
Jordan (Gordon) creek						+		+	+		+		

Water Body Segment	Use Designations												Comments	
	S R W	Aquatic Life Habitat						Water Supply			Recreation			
		W H	E W H	M W H	S S H	C W H	L R W	P W S	A W S	I W S	B W	P C R		S C R
East creek							+			+	+		+	
Aylworth creek							+			+	+		+	
Jenks creek							+			+	+		+	
Cutts creek							+			+	+		+	
Paine creek - headwaters to Paine falls (RM 2.9)		+								+	+		+	
- Paine falls to the mouth			+		o					+	+		+	
Bates creek		*								+	+		+	
Phelps creek			+			+				+	+		+	
Unnamed tributary (Paine creek RM 7.2)			+			+				+	+		+	
Talcott creek						+				+	+		+	
Griswold creek		*								*	*		*	
Mill creek - headwaters to Doty rd. (RM 1.5)					o	+				+	+		+	
- Doty rd. to the mouth		+			o					+	+		+	
Unnamed tributary (Mill creek RM 4.3)						+				+	+		+	
Coffee creek		+								+	+		+	
Center creek		*								*	*		*	
Mill creek		+								+	+		+	
Cemetery creek		+								+	+		+	
Griggs creek		*								*	*		*	
Askue run		+								+	+		+	
Peters creek		+								+	+		+	
Bronson creek		+								+	+		+	

Water Body Segment	Use Designations												Comments
	Aquatic Life Habitat						Water Supply			Recreation			
	S R W	W W H	E W H	M W H	S S H	C W H	L R W	P W S	A W S	I W S	B W	P C R	
Trumbull creek - headwaters to Windsor-Mechanicsville rd. (RM 3.4) - Windsor-Mechanicsville rd. to the mouth		+				+		+	+		+		
Spring creek		+						+	+		+		
Three Brothers creek		+						+	+		+		
Badger run		*						*	*		*		
Rock creek		+						+	+		+		
Plum creek		*						*	*		*		
Sugar creek		*						*	*		*		
Whetstone creek		+						+	+		+		
Lebanon creek		+						+	+		+		
Shanty creek		*						*	*		*		
Snyder ditch (Rock creek RM 15.17)				+				+	+		+		EOLP ecoregion - channel modification
Crooked creek - headwaters to Windsor-Mechanicsville rd. (RM 2.5) - Windsor-Mechanicsville rd. to the mouth		+				+		+	+		+		
Mud creek		*						*	*		*		
Unnamed tributary at Crooked Creek RM 6.5						Δ		Δ	Δ		Δ		
Hoskins creek - headwaters to Hurlburt rd. (RM 2.0) - Hurlburt rd. to the mouth			+			+		+	+		+		
Indian creek						+		+	+		+		
Unnamed tributary at Hoskins Creek RM 2.45						Δ		Δ	Δ		Δ		
Montville ditch		*						*	*		*		
Phelps creek - North branch / South branch confluence (RM 8.62) to State Route 534 (RM 2.1)						+		+	+		+		

Water Body Segment	Use Designations												Comments
	Aquatic Life Habitat						Water Supply			Recreation			
	SRW	WWH	EWH	MWH	SSH	CWH	LRW	PWS	AWS	IWS	BW	PCR	
- State Route 534 to the mouth		+							+	+		+	
North branch		+							+	+		+	
South branch		+							+	+		+	
Mill creek - South Windsor rd. (RM 4.56) to State Route 534 (RM 1.78)						+			+	+		+	
- State Route 534 to the mouth		+							+	+		+	
Garden creek		+							+	+		+	
Swine creek - headwaters to Girdle rd. (RM 7.07)						+			+	+		+	
- Girdle rd. to the mouth		+							+	+		+	
Grapevine creek		*							*	*		*	
Andrews creek		+							+	+		+	
Plum creek						+			+	+		+	
Coffee creek		*							*	*		*	
Baughman creek		+							+	+		+	
Deacon creek		Δ							Δ	Δ		Δ	
Center creek		+							+	+		+	
Mud run		+							+	+		+	
Dead branch		*							*	*		*	
McKinley creek		*							*	*		*	
Big creek		*							*	*		*	

SRW = state resource water; WWH = warmwater habitat; EWH = exceptional warmwater habitat; MWH = modified warmwater habitat; SSH = seasonal salmonid habitat; CWH = coldwater habitat; LRW = limited resource water; PWS = public water supply; AWS = agricultural water supply; IWS = industrial water supply; BW = bathing water; PCR = primary contact recreation; SCR = secondary contact recreation.

Table 2. Aquatic life use attainment status for stations sampled in the Grand River watershed. The Index of Biotic Integrity (IBI), Modified Index of well being (MIwb), and Invertebrate Community Index (ICI) are scores based on the performance of the biological communities. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat of the stream to support a biotic community. The Grand River watershed is located within the Eastern Ontario Lake Plains (EOLP) ecoregion. If biological impairment has occurred, the cause(s) and source(s) of the impairment are noted.

Location	STORET (RM) ^a	DRAIN. (MI ²)	IBI	MIwb ^b	ICI ^c	QHEI	Status ^d	Causes	Sources
Marsh Creek (03-026-000) (2015) WWH (Existing)									
Hendricks Road	303281 (1.50)	5.6 ^H	26*	N/A	LF*	61.5	NON	Sedimentation/Siltation	Urban runoff/ Storm sewers
SR 283	303282 (0.2)	14.2	-	-	P*	-	-		
Red Creek (03-004-000) (2004) WWH (Existing)									
Mantle Road	G02W09 (0.50)	9.5 ^H	30*	N/A	F*	67.0	NON	Flow alteration, toxicity	Urban runoff
Crooked Cr trib @ RM 6.5 (2007) (03-017-000) Undesignated/CWH Recommended									
Callahan Road	300194 (0.29)	1.9 ^H	44	N/A	F	59.0	FULL		
Hoskins Cr trib at RM 2.45 (2007) (03-140-002) Undesignated/CWH Recommended									
Private road off Mead Hollow Road	300197 (1.15)	2.0 ^H	36 ^{NS}	N/A	MG ^{NS}	78.0	FULL		
Deacon Creek (03-022-001) (2007) Undesignated/WWH Recommended									
Hyde Shaffer Road	300176 (5.31)	5.2	-	-	P*	-	-		
Hyde Oakfield Road	300175 (1.38)	9.3 ^H	26*	N/A	P*	53.0	NON		Natural – wetland conditions

a - River Mile (RM) represents the Point of Record (POR) for the station, not the actual sampling RM.

B - MIwb is not applicable to headwater streams with drainage areas ≤ 20 mi².

c - A narrative evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional

d - Attainment is given for the recommended status when a change is recommended.

ns - Nonsignificant departure from biocriteria (≤ 4 IBI or ICI units, or ≤ 0.5 MIwb units).

* - Indicates significant departure from applicable biocriteria (> 4 IBI or ICI units, or > 0.5 MIwb units). Underlined scores are in the Poor or Very Poor range and would automatically place a site into non-attainment.

H - Headwater site.

NA -not applicable.

Biological Criteria Eastern Ontario Lake Plains			
Index – Site Type	EWH	WWH	MWH-CM
IBI – Headwaters	50	40	24
IBI – Wading	50	38	24
IBI – Boat	50	40	24
MIwb – Wading	9.4	7.9	6.2
MIwb – Boat	9.6	8.7	5.8
ICI	46	34	22

Table 3. Matrix of macrohabitat features.

QHEI Attributes:			Grand River Basin																										
			WWH Attributes						MWH Attributes																				
									High Influence			Moderate Influence																	
Key QHEI Components									High-Influence Modified Attributes			Moderate Influence Modified Attributes																	
River Mile	QHEI	Gradient (ft/mi)	WWH Attributes						High-Influence Modified Attributes			Moderate Influence Modified Attributes																	
			Boulder/Cobble/Cravel Substrates Not Channelized or Recovered	Good/Excellent Development	Moderate/High Sinuosity	Extensive/Moderate Cover	Fast Current/Eddies	Low/Normal Embeddness	Max Depth > 40cm	Low/Normal Embeddness	Channelized/No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse/No Cover	Max Depth < 40cm	High/Moderate Embeddness	No Fast Current	Intermittent/Poor Pools	Only 1 or 2 Cover Types	Low Sinuosity	Fair/Poor Development	Hardpan Substrate Origin	Sand Substrates (Boat)	Heavy/Moderate Silt Cover	Recovering Channel	M. I. Modified Attributes	M. I. Modified Attributes		
03-017-001 Crooked Trib																													
Year: 2007																													
0.3	59.0	43.48	X	X			X	X	X	X	6	X					1	X		X	X	X	X	X	X	X			
03-022-001 Deacon Cr.																													
Year: 2007																													
1.4	53.0	7.81	X				X		X	X	4						0	X	X	X	X	X	X	X	X	X			
03-140-002 Hoskins Trib																													
Year: 2007																													
0.6	78.0	71.43	X	X	X	X	X	X	X	X	8						0			X		X	X		X				
03-004-000 Red Creek																													
Year: 2004																													
0.5	67.0	37.03	X	X	X	X	X	X	X	7						0	X		X				X	X					
03-026-000 Marsh Creek																													
Year: 2015																													
1.5	61.5	10.00	X	X	X	X	X	X	6						0	X	X					X	X	X					