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## **STATUS OF WATER QUALITY GRAND RIVER (UPPER) WATERSHED**

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Three aquatic life uses are applicable in the Grand River (upper) watershed (see Appendix C for definitions of uses). Several of these became final when a revision to OAC 3745-1-10 was made final in June 2011. Exceptional warmwater habitat (EWH) applies to two segments of the Grand River main stem. Coldwater habitat (CWH) applies to several of the smaller streams on the western side of the Grand River and to the headwaters of the Grand River main stem. Warmwater habitat (WWH) applies to all other designated streams in the watershed. The results of the study, *Biological and Water Quality Study of the Upper Grand River Watershed, 2007, Ashtabula, Geauga, Portage and Trumbull Counties, Ohio* (Ohio EPA 2009), herein the technical support document (TSD), is available at: <http://epa.ohio.gov/portals/35/documents/UpperGrandTSD2007.pdf>.

## **B1 Aquatic Life Use Attainment**

The condition of biological communities in the upper Grand River basin is governed principally by post-glacial physiography. Briefly, the upper Grand River valley was carved by a glacier, and became a lake in the immediate wake of glacial retreat. The dominant feature of the catchment now is the glacial lake-plain and lacustrine deposits that fill the valley. This has essentially resulted in three classes of streams: lowland streams, upland headwaters, and the non-wadeable Grand River main stem. The lowland streams flank the eastern and southern edges of the valley. The upland headwaters drain from the west, but become lowland streams in character as they flow through the lacustrine deposits of the valley floor. Because the lowland streams are sluggish and have fine-grained substrates, they cannot, in all cases, be reasonably expected to support biological communities typical of the ecoregion. This is especially the case where substrates are composed primarily of muck, silt and clay. At the other extreme, some of the headwaters drain areas where bedrock is very close to the surface, and consequently, flow is not sustained through the summer because the shallow soil horizon does not store water.

Several areas of high quality should be protected:

- The presence of rare species and a native population of walleye suggest that the reach of the Grand River through and downstream from West Farmington should be considered for the Superior High Quality Water (SHQW) antidegradation tier.
- Baughman Creek is listed as a Superior High Quality Water for antidegradation. Therefore, channelization activities in the stream should be avoided.
- The coldwater character of Swine Creek could be enhanced with riparian restoration in the reach along Swine Creek Road, especially between river miles (RMs) 10.3 and 11.2, and with proactive storm water management for the developed area centered near State Route 528.
- The Grand River is one of the few streams in Ohio that supports self-sustaining, native populations of walleye and muskellunge, both highly valued sport fish. As such, the reach from Swine Creek to Rock Creek should be considered for the SHQW antidegradation tier.
- As high-quality coldwater streams are rare in Ohio, periodic monitoring and careful stewardship of the Indian Creek catchment is warranted.
- The Grand River from Rock Creek to Mill Creek is unique in having populations of walleye, northern pike and muskellunge inhabiting the same reach. The reason these species co-occur is because the habitat is largely intact, and the water unpolluted.
- Because Bronson Creek is a bedrock stream and experiences critically low flows during the summer, it is especially sensitive to disturbance and pollution. Watershed

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protection, agricultural best management practices, and riparian restoration should be advanced.

- Considerable potential exists to augment the coldwater character of Trumbull Creek, predicated on habitat protection and restoration, and riparian restoration in the primary headwaters.

Apart from natural limitations, some of the sites evaluated in the upper watershed were convincingly impacted by pollution or loss of habitat. Of the nine sites with defined impairments, three were caused by habitat alterations, three were starved of flow by impoundments, two were impaired by organic enrichment from on-site sewerage, and one from a combination of high total dissolved solids (TDS) and organic enrichment. Organic enrichment and nutrients tended to cause impairment in the eastern half of the watershed. Habitat alterations caused impairment in the northwestern quadrant of the watershed, with a third site in the headwaters of the Grand River main stem. Impoundments caused impairment at the mouth of Rock Creek (northern portion of the watershed), on Mill Creek (west-central portion of the watershed) and in the headwaters of the Grand River main stem (southern portion of the watershed). Natural limitations caused impairment at scattered locations throughout the watershed, but these sites were more concentrated in the northern and southern portions of the watershed.

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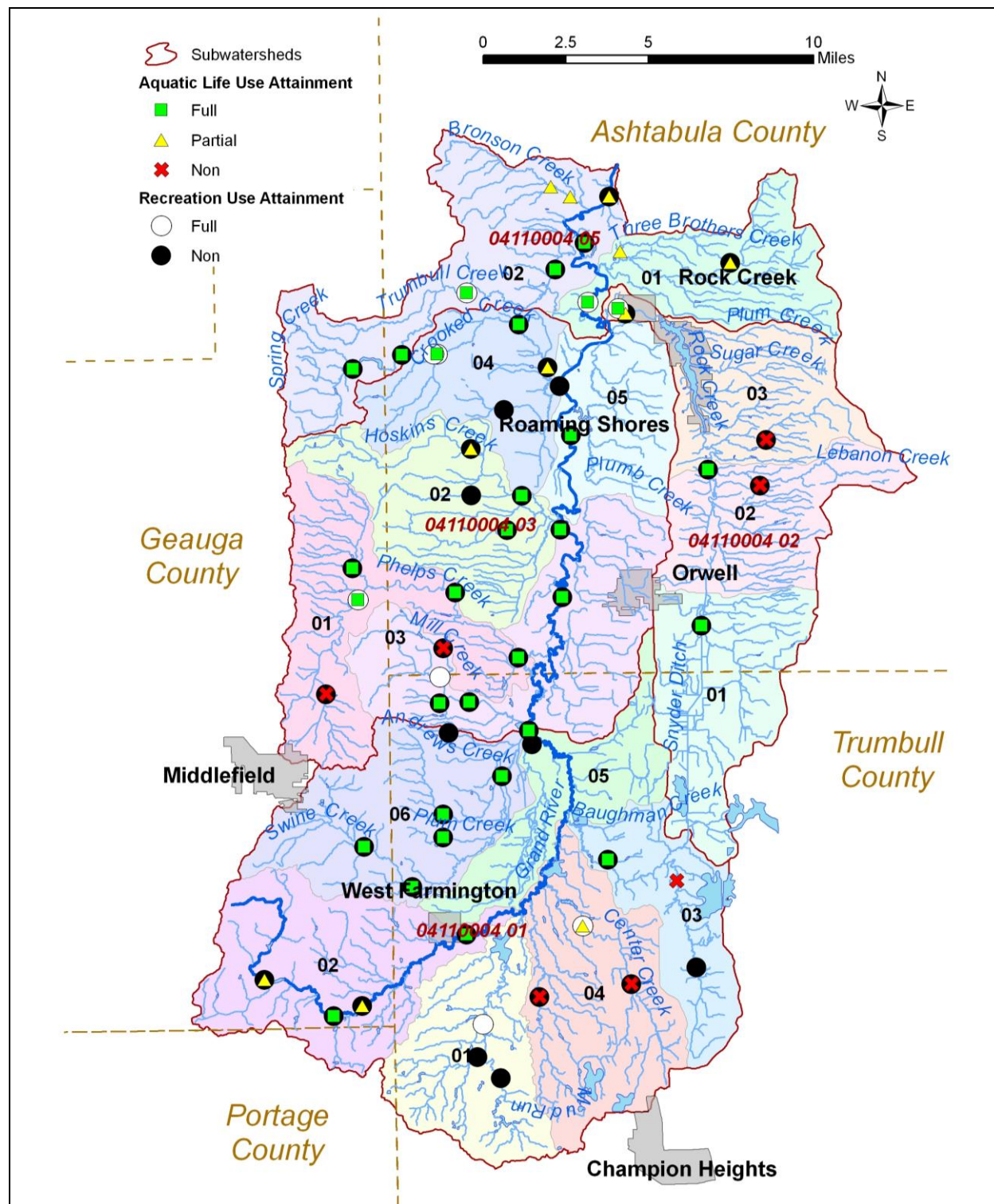


Figure B-1. Aquatic life use and recreation use attainment in the Grand River (upper) watershed.

**Grand River (upper) Watershed TMDLs**

**Table B-1. Aquatic life use attainment in the Grand River (upper) watershed.**

HUC 12	Station Code	Station	RM	DA	Aquatic Life Use <sup>1</sup>	IBI	MIwb <sup>a</sup>	ICI <sup>b</sup>	Macro Narrative	QHEI	Attainment Status	Cause <sup>c</sup>	Sources <sup>c</sup>
01 01	300170	Dead Branch Grand R. at Old State Rd.	7.86	4.8	WWH				Poor				
01 01	300169	Dead Branch @ Geauga Easterly Rd.	5.05	13	WWH				Low Fair				
01 01	300171	Trib. to Dead Branch (6.20) @ St. Rt. 534	0.14	6.3	Undesignated				Fair				
01 02	200631	Grand R. Upst. Parkman, 0.2 mi. dst. U.S. Rt. 422	98.7	7	CWH	28 <sup>†</sup>			Exceptional	75	Partial	Direct habitat alterations	Impacts from hydrostructure flow regulation/ modification
01 02	G01S07	Grand R. E of Parkman @ U.S. Rt. 422	95.4	14	EWH	56			Exceptional	80.5	Full	-	-
01 02	G01K09	Grand R. @ Hobart Rd.	94.3	17	EWH	40*			Exceptional	58	Partial	Direct habitat alterations	Highways, roads, bridges, infrastructure (new construction)
01 02	G01K20	Grand R. upst W. Farmington PWS @ Woods Curtis Rd.	88.5	32	WWH	51	8.0	54		71	Full	-	-
01 03	300176	Deacon Creek @ Hyde Shaffer Rd.	5.31	5.2	Undesignated				Poor				
01 03	300175	Deacon Creek @ Hyde Oakfield Rd.	1.38	9.3	Undesignated	26*			Poor	53	Non	Natural conditions (flow or habitat)	Natural sources
01 03	G02S06	Baughman Creek @ Fenton Rd.	3.3	16	WWH	46		58		67.5	Full	-	-
01 04	300174	Center Creek @ St. Rt. 45	6.25	6.4	WWH	30*			Fair	43.5	Non	Ammonia (total), total dissolved solids, total Kjeldahl nitrogen	Sewage discharges in unsewered areas

**Grand River (upper) Watershed TMDLs**

HUC 12	Station Code	Station	RM	DA	Aquatic Life Use <sup>1</sup>	IBI	MIwb <sup>a</sup>	ICI <sup>b</sup>	Macro Narrative	QHEI	Attainment Status	Cause <sup>c</sup>	Sources <sup>c</sup>
01 04	G01K13	Center Creek @ Corey Hunt Rd.	3.03	12	WWH	28*			Good	56	Partial	Organic enrichment (sewage) biological indicators, natural conditions (flow or habitat)	Sewage discharges in unsewered areas, natural sources
01 04	300172	Mud Run @ Housel-Craft Rd.	4.05	8.5	WWH	22*			Fair	53	Non	Natural conditions (flow or habitat)	Natural sources
01 05	G01K18	Grand R. @ County Line Donley Rd.	75.6	126	WWH	46	8.4		Marginally Good	58	Full	-	-
01 06	300178	Swine Creek @ Valley Picnic Area at Swine Creek Park	10.4	6.5	CWH	54			Exceptional	71	Full	-	-
01 06	G01K16	Swine Creek @ Curtis Middlefield Rd.	8.18	12	CWH	52			Exceptional	72.5	Full	-	-
01 06	200628	Swine Creek E of Mesopotamia @ St. Rt. 87	1.8	18	WWH	44			Good	54.5	Full	-	-
01 06	300179	Andrews Creek @ Girdle Rd.	3.62	4.8	WWH	38			Good	68	Full	-	-
01 06	300177	Grapevine Creek @ Donley County Line Rd.	2.1	0.5	WWH				Poor				
01 06	300180	Plum Creek @ Girdle Rd.	1.48	1.3	CWH	40			Fair <sup>†</sup>	53	Full	-	-
02 01	300199	Snyder Ditch @ Moore Rd.	0.6	29	MWH-C	34	6.3	46		50	Full	-	-
02 02	G01W02	Rock Creek Upst Reservoir @ Dodgeville Rd.	9.64	52	WWH	45	7.6		Exceptional	61.5	Full	-	-
02 02	300198	Lebanon Creek @ Institute Rd.	1.93	4.2	WWH	28			Fair	50.5	Non	Nutrient/eutrophication biological indicators, total dissolved solids	Source unknown

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HUC 12	Station Code	Station	RM	DA	Aquatic Life Use <sup>1</sup>	IBI	MIwb <sup>a</sup>	ICI <sup>b</sup>	Macro Narrative	QHEI	Attainment Status	Cause <sup>c</sup>	Sources <sup>c</sup>
02 03	G01K03	Rock Creek At Rock Creek @ St. Rt. 45	1.23	70	WWH	41	7.2*	44		50.5	Partial	Low flow alterations, nutrient/eutrophication biological indicators	Dam or impoundment
02 03	G01W05	Rock Creek @ Cemetery Bridge Adj St. Rt. 166	0.95	70	WWH	40	8.2	44		68.5	Full	-	-
02 03	300200	Whetstone Creek @ St. Rt. 46	2	4	WWH	30			Fair	51.5	Non	Total dissolved solids, ammonia (total)	Source unknown
03 01	300193	S. Br. Phelps Cr @ Peters Rd.	5.16	4.7	WWH	34*				69.5	Non	Natural conditions (flow or habitat)	Natural sources
03 01	300192	S. Br. Phelps Creek @ U.S. Rt. 322	0.58	12	WWH	44			Good	73.5	Full	-	-
03 01	300189	N. Br. Phelps Creek @ Huntley Rd.	0.94	6.3	WWH	38			Exceptional	66.5	Full	-	-
03 01	300190	Phelps Creek @ U.S. Rt. 322	5.14	24	CWH	36 <sup>†</sup>	7.4 <sup>†</sup>		Exceptional	73.5	Full	-	-
03 01	G01K06	Phelps Creek @ Windsor Rd. Extension	1.23	26	WWH	45	7.7	60		65	Full	-	-
03 02	300184	Hoskins Creek @ St. Rt. 534	4.88	5.7	CWH	32 <sup>†</sup>			Good	63.5	Partial	Direct habitat alterations	Channelization
03 02	G01K19	Hoskins Creek @ Hurlburt Rd.	2.01	14	CWH	46			Exceptional	62	Full	-	-
03 02	300196	Trib. to Hoskins Creek (0.40) @ Windsor-Mechanicsville Rd.	1.4	7.2	Undesignated				Fair				
03 02	200624	Indian Creek N of Windsor @ Montgomery Rd	1.3	3.9	CWH	56			Exceptional	83.5	Full	-	-
03 02	300197	Trib. to Hoskins Creek (2.45) @ St. Rt. 534	1.15	2	Undesignated	36			Marginally Good	78			



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HUC 12	Station Code	Station	RM	DA	Aquatic Life Use <sup>1</sup>	IBI	MIwb <sup>a</sup>	ICI <sup>b</sup>	Macro Narrative	QHEI	Attainment Status	Cause <sup>c</sup>	Sources <sup>c</sup>
03 03	G01W06	Grand R @ U.S. Rt. 322	65.9	210	WWH	45	8.8	40		60	Full	-	-
03 03	G01K07	Grand R @ Montgomery Rd	61	222	WWH			40			Full	-	-
03 03	300186	Mill Creek @ Wiswell Rd.	4.94	2.8	CWH	26*			Poor	69	Non	Low flow alterations, natural conditions (flow or habitat)	Dam or impoundment, natural sources
03 03	300185	Mill Creek @ Sweet West Rd.	2.3	9	CWH	44			Very Good	68.5	Full	-	-
03 03	300183	Garden Creek @ Girdle Rd.	2.31	1	WWH	38			Good	62	Full	-	-
03 03	300191	RM 3.79 Trib Mill Creek at Girdle Rd	0.13	3.5	Undesignated/WWH				Good				
03 04	300182	Crooked Creek @ Callahan Rd.	6.7	3.2	EW/CWH	38			Good	80	Full	-	-
03 04	300181	Crooked Creek @ Higley Rd.	3.51	8.2	EW/CWH	58			Exceptional	82.5	Full	-	-
03 04	G01K01	Crooked Cr @ Callender Rd.	1.62	9.3	EW/WWH	32			Good	55	Partial	Direct habitat alterations	Channelization
03 04	300188	Mud Creek @ Higley Rd.	3.78	1.7	WWH				Good				
03 04	300194	Trib to Crooked Creek (6.50) @ Callahan Rd.	0.29	1.9	Undesignated	44			Fair	59			
03 05	G01K08	Grand R. @ U.S. Rt. 6	55.6	251	WWH	50	8.4	36		59	Full	-	-
05 01	G02K54	Grand R @ Footville Richmond Rd	48.6	361	WWH	54	9.4	52		64.5	Full	-	-
05 01	300203	Three Brothers Creek @ Stumpville Rd.	6.68	5.8	WWH	44			Fair	66.5	Partial	Natural conditions (flow or habitat)	Natural sources
05 01	300208	Three Brothers Creek @ Camp Beaumont	1.99	17	WWH	38			Fair	72.5	Partial	Natural conditions (flow or habitat)	Natural sources

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HUC 12	Station Code	Station	RM	DA	Aquatic Life Use <sup>1</sup>	IBI	MIwb <sup>a</sup>	ICI <sup>b</sup>	Macro Narrative	QHEI	Attainment Status	Cause <sup>c</sup>	Sources <sup>c</sup>
05 02	G02K52	Grand R @ Camp Beaumont	45.1	383	WWH			48			Full	-	-
05 02	G02W16	Grand R. @ Sweitzer Rd.	42.3	417	EWH	46	8.6*			59	Partial	Natural conditions (flow or habitat)	Natural sources
05 02	300205	Trumbull Creek @ Dawsey Rd.	9.03	2.7	WWH				Poor				
05 02	300204	Trumbull Creek @ St. Rt. 534	6.23	13	WWH/CWH	40 <sup>†</sup>			Exceptional	69	Full	-	-
05 02	G02K51	Trumbull Creek @ Riverdale Rd.	2.05	20	EWH/WWH	46		48		70.5	Full	-	-
05 02	300202	Spring Creek @ Leggett Rd.	5.02	1.8	WWH	48			Very Good	76	Full	-	-
05 02	300207	Spring Creek @ Callahan Rd.	2.76	6.5	WWH	36			Good	61.5	Full	-	-
05 02	300201	Bronson Cr @ Windsor-Mechanicsville Rd	1.52	5.2	WWH	38			Fair	60	Partial	Natural conditions (flow or habitat)	Natural sources
05 02	G02K50	Bronson Creek @ Sweitzer Rd.	0.82	7.6	WWH	52			Fair	77.5	Partial	Natural conditions (flow or habitat)	Natural sources

1 Existing/recommended designated uses.

a MIwb is not applicable to headwater streams with drainage areas < 20 mi<sup>2</sup>.

b A qualitative narrative evaluation based on community composition, EPT taxa richness, and QCTV scores if an ICI could not be calculated.

c Causes and sources listed are considered to be a primary influence on water quality, but may not be the only issue leading to impairment.

\* Indicates significant departure from applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).

† Coldwater Aquatic Life Use (existing or proposed) - biological criteria do not apply. Attainment status is qualitatively based on narrative assessment of the number of coldwater macroinvertebrate and/or fish taxa, their relative abundance, and the presence of salamanders.

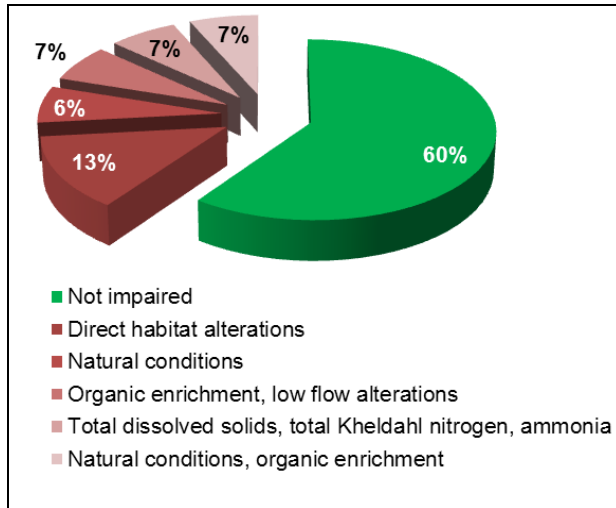
Shading indicates the following:

No attainment determination made	Full attainment	Partial attainment	Non-attainment
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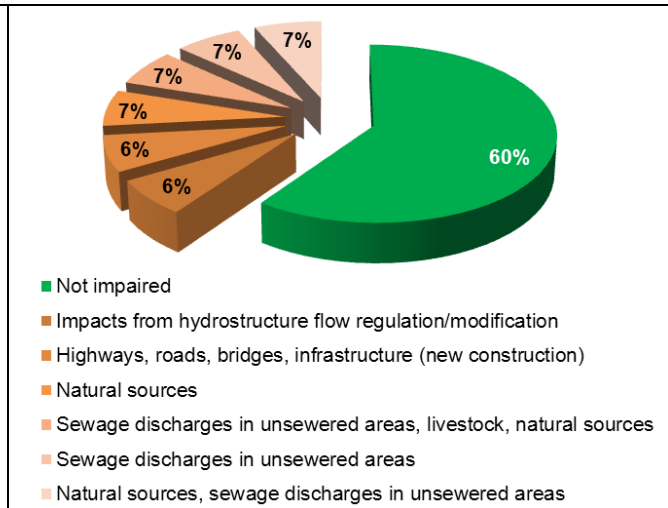
Biological Criteria	IBI		MIwb		ICI	
	WWH	EWH	WWH	EWH	WWH	EWH
Headwaters	40	50	NA	NA	34	46
Wadeable	38	50	7.9	9.4	34	46
Boat	40	50	8.7	9.6	34	46

**B1.1 Causes and Sources of Impairment**

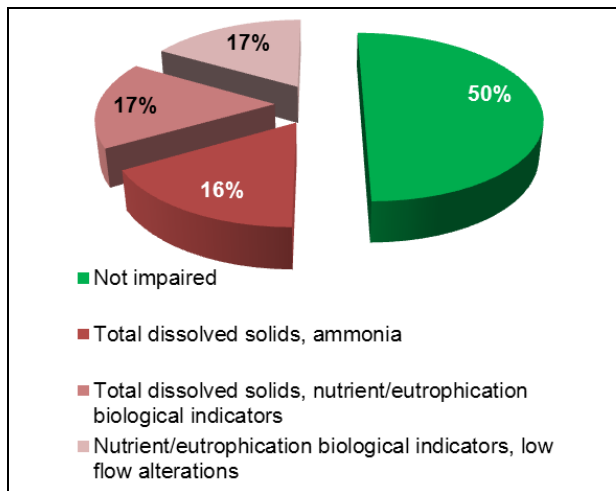
Natural causes (flow or habitat) stemming from natural sources were the most common in the Grand River (upper) watershed. Other causes included total dissolved solids, nutrients and dams or impoundments. Causes and sources for individual subwatersheds can be seen in Figures B-2 through B-9.



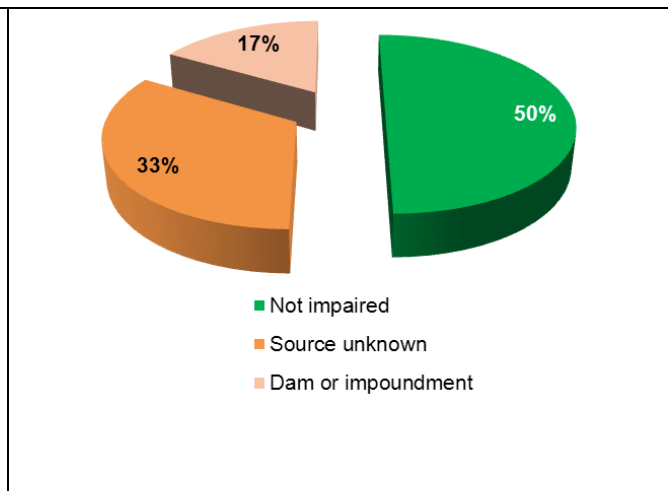
**Figure B-2. Causes of aquatic life use impairment in the Headwaters Grand River subwatershed.**



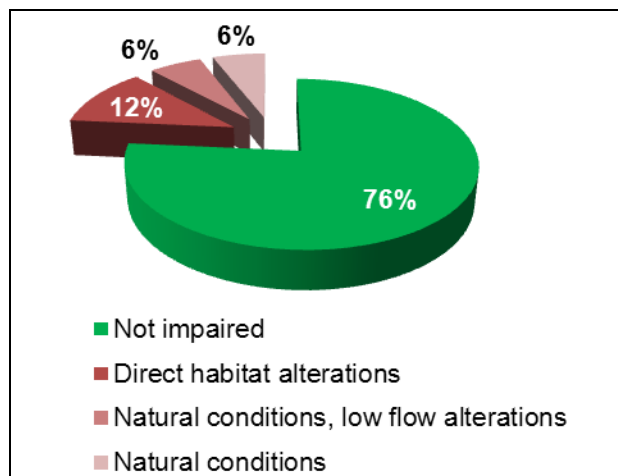
**Figure B-3. Sources of aquatic life use impairment in the Headwaters Grand River subwatershed.**



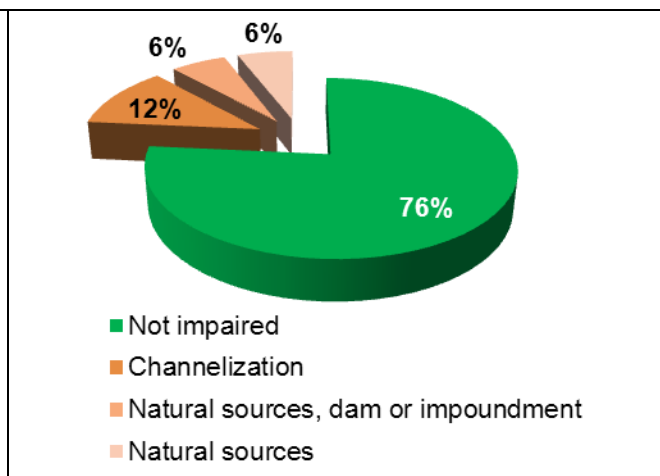
**Figure B-4. Causes of aquatic life use impairment in the Rock Creek subwatershed.**



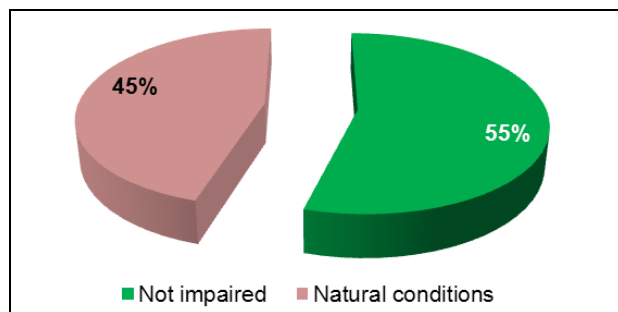
**Figure B-5. Sources of aquatic life use impairment in the Rock Creek subwatershed.**



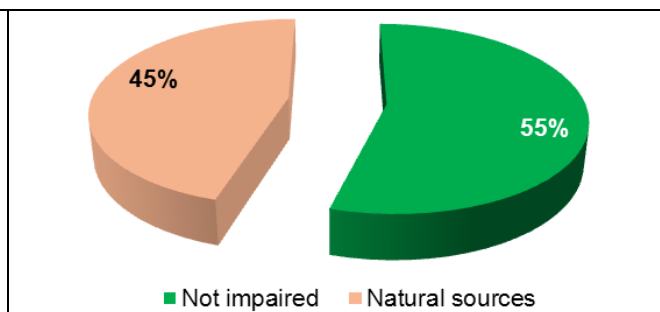
**Figure B-6. Causes of aquatic life use impairment in the Phelps Creek-Grand River subwatershed.**



**Figure B-7. Sources of aquatic life use impairment in the Phelps Creek-Grand River subwatershed.**



**Figure B-8. Causes of aquatic life use impairment in the Three Brothers Creek-Grand River subwatershed.**



**Figure B-9. Sources of aquatic life use impairment in the Three Brothers Creek-Grand River subwatershed.**

## **B1.2 Water Chemistry**

Water quality in the Grand River main stem is largely a function of land use and surficial geology. Wetlands and livestock agriculture are the most influential land uses, and lacustrine clays are the geological component. The combined influence of these factors is clearly evident in longitudinal plots of chemical oxygen demand, suspended sediment, dissolved oxygen and nitrogen to phosphorus ratios. The increasing trend in chemical oxygen demand and suspended sediment along the main stem respectively track organic compounds emanating from the wetlands, and the transition from coarse till deposits to fine-grained lacustrine deposits. There is a clear correlation between lacustrine deposits and wetlands. The trend of decreasing nitrogen to phosphorus ratios toward nitrogen limitation in the lower main stem likely reflects phosphorus being carried by the suspended sediment, but may also reflect utilization of nitrogen by the microbial community acting on the organic compounds.

Undue influence on main stem water quality by direct anthropogenic sources, either as point sources or localized nonpoint sources (e.g., home sewage treatment systems, livestock) was not apparent.

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Localized impacts to water quality from anthropogenic sources, principally from organic enrichment, were noted in tributaries to the Grand River. The sources of enrichment were primarily failing HSTS, livestock, and, in the case of Whetstone Creek, an unknown source. The organic enrichment was most apparent in Deacon Creek, Whetstone Creek, Three Brothers Creek, North Branch Phelps Creek, and Garden Creek, as noted by consistently high concentrations of total Kjeldahl nitrogen (TKN) co-occurring with elevated concentrations of ammonia-nitrogen. Livestock were the source to Garden Creek, failing HSTS to the others. Other streams where concentrations of both TKN and ammonia-nitrogen (NH<sub>3</sub>-N) were elevated included Dead Branch, Center Creek, South Branch Phelps Creek, and Crooked Creek. Failing HSTS were clearly the source to Center Creek, and livestock were the source to Crooked Creek. The sources to Dead Branch and South Branch Phelps Creek were unknown; however, both streams were intermittent and influenced by wetlands, suggesting a natural source.

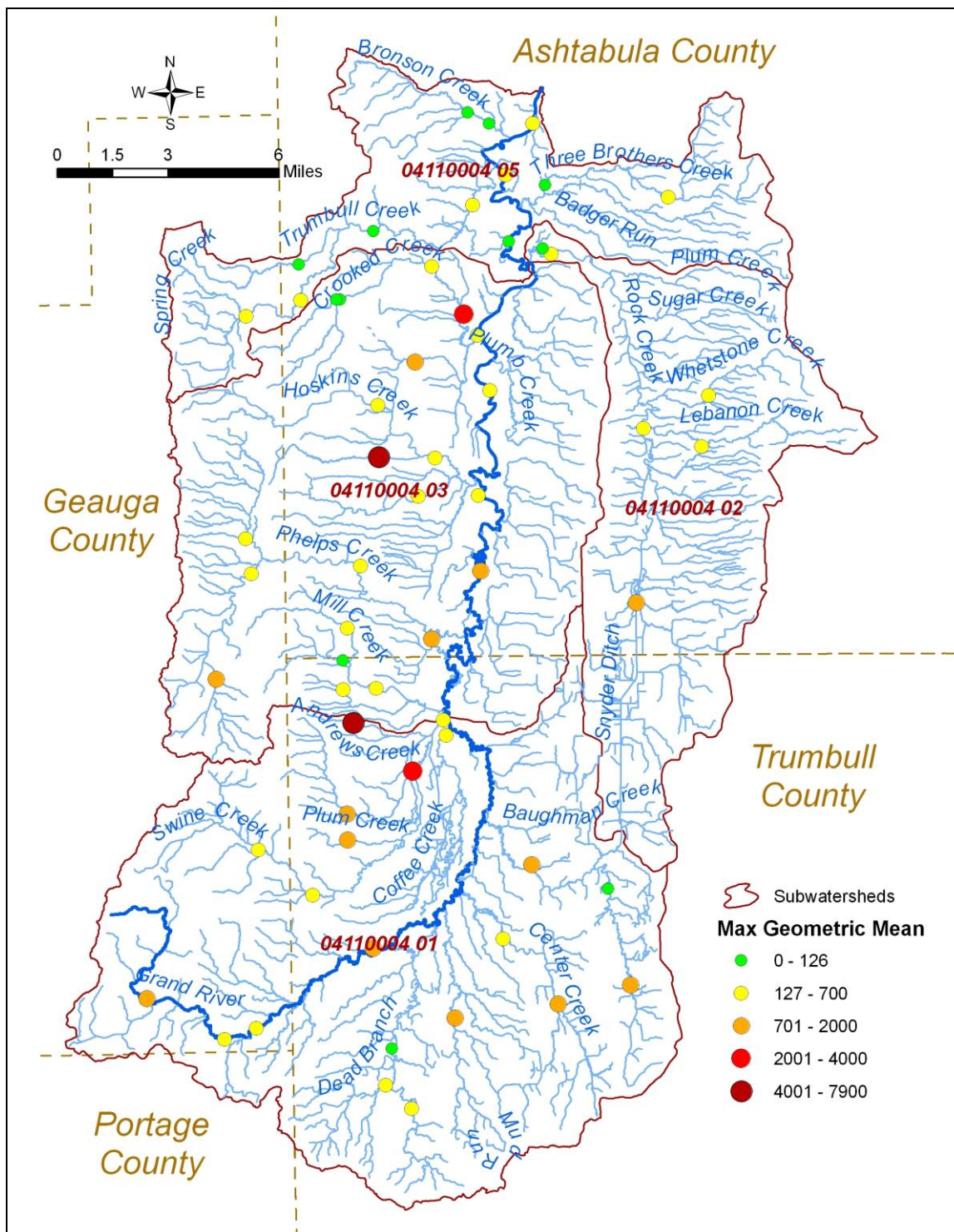
### **B1.3 Sediment Chemistry**

Sediments were sampled once at four locations in the upper Grand River basin during 2007. Results for organic compounds, including legacy priority organics and pesticides, were all less than the laboratory detection limits. Similarly, concentrations of trace and heavy metals were at background levels typical of unpolluted streams. Exceptions were for slightly elevated concentrations of arsenic and zinc. Based on effects levels suggested by MacDonald et al. (2000), NOAA (1999), and OMOE (1993), sediment quality is not likely to be limiting to aquatic life in the Grand River (upper) basin.

## **B2 Recreation Use Attainment**

Bacteria concentrations tended to be higher on the west side of the Grand River. The most concentrated area of attainment was in the northern (downstream) portion of the watershed. Figure B-1 shows recreation use attainment. Figure B-10 shows maximum geometric means in ranges for each site.

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**Figure B-10. E. coli geometric mean ranges in the Grand River (upper) watershed.**

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**Table B-2. Recreation use attainment table.**

<b>Nested Subwatershed</b>	<b>Nested Subwatershed Name</b>	<b>Sampling Location</b>	<b>River Mile</b>	<b>Drainage Area (mi<sup>2</sup>)</b>	<b>Attainment Status</b>	<b>Maximum GeoMean</b>
01 01	Dead Branch	Dead Branch Grand R. at Old State Rd.	7.86	4.8	Non	674
01 01	Dead Branch	Dead Branch @ Geauga Easterly Rd.	5.05	12.7	Full	76
01 01	Dead Branch	Trib. to Dead Branch (6.20) @ St. Rt. 534	0.14	6.3	Non	192
01 02	Headwaters Grand River	Grand R. upst. Parkman, 0.2 mi. dst. U.S. Rt. 422	98.70	7.0	Non	1271
01 02	Headwaters Grand River	Grand R. E of Parkman @ U.S. Rt. 422	95.38	14.2	Non	454
01 02	Headwaters Grand River	Grand R. @ Hobart Rd.	94.27	17.2	Non	471
01 02	Headwaters Grand River	Grand R. upst West Farmington PWS @ Woods Curtis Rd.	88.50	32.1	Non	982
01 03	Baughman Creek	Baughman Creek @ Fenton Rd.	3.30	15.5	Non	928
01 03	Baughman Creek	Deacon Creek @ Hyde Shaffer Rd.	5.31	5.2	Non	815
01 04	Center Creek-Grand River	Center Creek @ St. Rt. 45	6.25	6.4	Non	1130
01 04	Center Creek-Grand River	Center Creek @ Corey Hunt Rd.	3.03	11.6	Full	150
01 04	Center Creek-Grand River	Mud Run @ Housel-Craft Rd.	4.05	8.5	Non	1073
01 05	Coffee Creek-Grand River	Coffee Creek @ Combs Rd.	0.23	7.3	Non	174
01 05	Coffee Creek-Grand River	Grand R. @ County Line Donley Rd.	75.58	126.0	Non	295
01 06	Swine Creek	Andrews Creek @ Girdle Rd.	3.62	4.8	Non	1427
01 06	Swine Creek	Grapevine Creek @ Donley County Line Rd.	2.10	0.5	Non	7899
01 06	Swine Creek	Plum Creek @ Girdle Rd.	1.48	1.3	Non	808
01 06	Swine Creek	Swine Creek @ Valley Picnic Area at Swine Cr Park	10.36	6.5	Non	272
01 06	Swine Creek	Swine Creek @ Curtis Middlefield Rd.	8.18	11.8	Non	664
01 06	Swine Creek	Swine Creek E of Mesopotamia @ St. Rt. 87	1.80	17.6	Non	3836
02 01	Upper Rock Creek	Snyder Ditch @ Moore Rd.	0.60	29.0	Non	701
02 02	Middle Rock Creek	Lebanon Creek @ Institute Rd.	1.93	4.2	Non	297
02 02	Middle Rock Creek	Rock Creek upst reservoir @ Dodgeville Rd.	9.64	52.0	Non	323
02 03	Lower Rock Creek	Rock Creek at Rock Creek @ St. Rt. 45	1.23	70.0	Non	224
02 03	Lower Rock Creek	Rock Creek @ Cemetery Bridge adj St. Rt. 166	0.95	70.0	Full	72
02 03	Lower Rock Creek	Whetstone Creek @ St. Rt. 46	2.00	4.0	Non	212
03 01	Phelps Creek	N. Br. Phelps Creek @ Huntley Rd.	0.94	6.3	Non	391
03 01	Phelps Creek	Phelps Creek @ U.S. Rt. 322	5.14	23.5	Non	165
03 01	Phelps Creek	Phelps Creek @ Windsor Rd. Extension	1.23	25.7	Non	1241
03 01	Phelps Creek	S. Br. Phelps Creek @ Peters Rd.	5.16	4.7	Non	800
03 01	Phelps Creek	S. Br. Phelps Creek @ U.S. Rt. 322	0.58	11.8	Full	128

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<b>Nested Subwatershed</b>	<b>Nested Subwatershed Name</b>	<b>Sampling Location</b>	<b>River Mile</b>	<b>Drainage Area (mi<sup>2</sup>)</b>	<b>Attainment Status</b>	<b>Maximum GeoMean</b>
03 02	Hoskins Creek	Hoskins Creek @ St. Rt. 534	4.88	5.7	Non	549
03 02	Hoskins Creek	Hoskins Creek @ Hurlburt Rd.	2.01	13.5	Non	286
03 02	Hoskins Creek	Trib. to Hoskins Creek (2.45) @ St. Rt. 534	1.15	2.0	Non	4436
03 02	Hoskins Creek	Indian Creek N of Windsor @ Montgomery Rd.	1.30	3.9	Non	325
03 03	Mill Creek-Grand River	Grand R @ U.S. Rt 322	65.88	210.0	Non	759
03 03	Mill Creek-Grand River	Grand R @ Montgomery Rd	60.95	222.0	Non	312
03 03	Mill Creek-Grand River	Mill Creek @ Wiswell Rd.	4.94	2.8	Non	234
03 03	Mill Creek-Grand River	Mill Creek @ Sweet West Rd.	2.30	9.0	Non	196
03 03	Mill Creek-Grand River	Trib to Mill Creek (3.79) @ Girdle Rd	0.13	3.5	Full	125
03 03	Mill Creek-Grand River	Garden Creek @ Girdle Rd.	2.31	1.0	Non	474
03 04	Mud Creek	Crooked Creek @ Callahan Rd.	6.70	3.2	Full	64
03 04	Mud Creek	Crooked Creek @ Higley Rd.	3.51	8.2	Non	280
03 04	Mud Creek	Crooked Creek @ Callender Rd.	1.62	9.3	Non	2315
03 04	Mud Creek	Trib. to Crooked Creek (6.50) @ Callahan Rd.	0.29	1.9	Full	72
03 04	Mud Creek	Mud Creek @ Higley Rd.	3.78	1.7	Non	1005
03 04	Mud Creek	Mud Creek @ end of Wilderness Rd.	0.20	20.8	Non	320
03 05	Plumb Creek-Grand River	Grand R. @ U.S. Rt. 6	55.62	251.0	Non	535
05 01	Three Brothers Creek-Grand River	Grand R @ Footville Richmond Rd	48.63	361.0	Full	100
05 01	Three Brothers Creek-Grand River	Three Brothers Creek @ Stumpville Rd.	6.68	5.8	Non	516
05 02	Bronson Creek-Grand River	Grand R @ Camp Beaumont	45.10	383.0	Non	286
05 02	Bronson Creek-Grand River	Grand R. @ Sweitzer Rd.	42.32	417.0	Non	267
05 02	Bronson Creek-Grand River	Spring Creek @ Leggett Rd.	5.02	1.8	Non	364
05 02	Bronson Creek-Grand River	Spring Creek @ Callahan Rd.	2.76	6.5	Non	416
05 02	Bronson Creek-Grand River	Trumbull Creek @ St. Rt. 534	6.23	13.1	Full	42
05 02	Bronson Creek-Grand River	Trumbull Creek @ Riverdale Rd.	2.05	19.6	Non	462



### **B3 Public Drinking Water Supply Use Attainment**

West Farmington obtains its drinking water from the Grand River; the intake is located at river mile 89.12. The total population in West Farmington, according to the 2010 U.S. Census, is 499 people. Data show full support of the beneficial use for nitrate but there are insufficient data to assess use support using atrazine.

<b>Name/Community</b>	<b>Stream</b>	<b>Nitrate Status</b>	<b>Atrazine Status</b>	<b>Impairment (Y/N)</b>
<i>Headwaters Grand River (04110004 01 02)</i>				
West Farmington	Grand River	Full support	Insufficient data to assess	N

In addition, the agricultural water supply use and industrial water supply use apply in the Grand River (upper) watershed. However, applicable criteria for these uses are less stringent than other criteria, so they are not used to assess use support.

### **B4 Human Health Use Attainment**

Fish tissue was not sampled during the 2007 study. However, data were collected in 2004 from the Grand River main stem (in two nested subwatersheds) and in Lake Roaming Rock. Only one nested subwatershed shows impairment from these data (see below).

<b>Waters Sampled</b>	<b>Impairment (Y/N)</b>	<b>Pollutants (Concentration)</b>
<i>Middle Rock Creek (04110004 02 02)</i>		
Lake Roaming Rock	N	Not applicable
<i>Plumb Creek-Grand River (04110004 03 05)</i>		
Grand River	Y	Mercury (0.372 mg/kg)
<i>Bronson Creek-Grand River (04110004 05 02)</i>		
Grand River	N	Not applicable