Appendix

B

STATUS OF WATER QUALITY
UPPER MAHONING RIVER WATERSHED

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Ohio EPA conducted a comprehensive water quality study in the upper Mahoning River watershed in 2006. Seventy-three sites were studied for biological health, 76 sites for water chemistry, 74 sites for recreation use, and six sites for human health (fish contaminants) use. Study results are documented in a watershed report [1]and summarized in this appendix.

B1 Aquatic Life Use Attainment

Twenty-eight (38%) of the evaluated sites fully met the existing or recommended life use. Seventeen (23%) of the sites partially met and twenty-eight (38%) of the sites were not attaining their designated or recommended use. Four (5%) of the sites surveyed met the recreation use criteria while the remaining 70 sites did not meet standards.

Sixty-one percent of the sites survey failed to meet standards for aquatic life uses. Based on the results of this water quality survey, and compared to other watersheds in the state, the upper Mahoning River is of relatively fair to poor quality (statewide average is nearly 20 percent higher in terms of number of sites attaining aquatic life uses and 13 percent higher in terms of assessment units meeting recreation use standards, see the 2010 Integrated Report). However, it is also important to note that these water quality surveys are extensive but not comprehensive therefore, there are several small tributary streams that were not directly monitored. In fact, coverage tends to be around five survey sites per HUC 12 watershed (approximately 20 to 25 square mile area) where there is on average 50 miles of streams in such an area. Nonetheless, it is reasonable to extrapolate the results of the sites that were surveyed to the rest of the watershed assuming that the level of impairment and perhaps more importantly, the causes and sources of impairment, occur in similar proportion to areas that are not assessed. This is especially the case for sources of impairment related to land management such as polluted runoff or channel maintenance in small agricultural streams.

A widespread problem was excess amounts of fine sediment in the channel which was found at 30 percent of all sites surveyed. In most cases this was derived from soil losses on cropland and from stream bank erosion due to management of the stream corridor to facilitate land drainage (i.e., channelization or removal of riparian vegetation). In fact, six of the 23 sites where sediment is a problem have been impacted by cropland soil losses. Another 6 sites (only one of which overlaps those where cropland is listed) have channelization listed as the source of sediment and three where unstable banks or riparian vegetation removal is blamed. At four of the 23 sites livestock with stream access trample banks leading to substantial erosion and sedimentation. Urbanization in which storm flows and land disturbance leads to watershed sources of fine sediment as well as significant channel erosion accounts for two of the sites and natural sources at one site.

Nutrients are also significant pollutants in the watershed where 30 percent (18 sites) of all of the sites were impacted. The dominant source is cropland where both runoff and subsurface drainage are the likely pathways for dissolved and particulate forms of nutrients. Ten percent of all sites and nearly 40 percent of the nutrient impacted sites were affected by cropland. Municipal waste water discharges was also a significant source where six percent of all sites were thus impacted. Less significant sources of nutrients include livestock (three percent of all

[1] Biological and Water Quality Study of the upper Mahoning River and Selected Tributaries**,** 2006, Columbiana, Mahoning, Portage, Stark and Trumbull Counties, Ohio. Report PDF [7,512K] and Appendices PDF [2,761K]

sites), urban areas (three percent of all sites), and home septic systems (one percent of all sites.

Flow alteration is a considerable problem for aquatic life uses in the upper Mahoning River watershed (impacting 20 percent of all sites) due the unusually high density of both large and lowhead dams. Three reservoirs exercise substantial controls over stream flow in the Mahoning River and the West Branch Mahoning River. There are also two smaller reservoirs that occur in series on Deer Creek. Such control on stream flow makes it necessarily difficult for fishes and other aquatic organisms to respond to hydrologic cues that are associated with a natural flow regime. Seven sites (10 percent of all sites) are thus affected. Eight sites (11 percent) have been impacted by flow alteration resulting from dam backwaters (especially lowhead dams). In this case again hydrologic cues are altered, but more substantial impacts is loss of flow variability affecting many organisms that are adapted for faster stream current as well as the degradation of habitat quality.

In combination, the degradation of stream habitat and the loss of tree cover and other protective riparian vegetation is a problem at 11 percent of all sites. The majority of this impairment is due to channelization (nine percent of all sites). Among all of the other causes of impairment that are listed, they all range from one to three percent of all sites in their individual impacts. The range for the remaining sources is one to seven percent. These remaining causes include organic enrichment and low dissolved oxygen, natural limitations of the stream (habitat or flow), and turbidity while sources include storm water runoff from roads and other developed areas.

Table B-1 lists each site and the scores that were determined for the three biological indices (IBI, MiWB, and ICI) and the qualitative habitat evaluation index (QHEI). Table B-2 also lists the sites assessed for aquatic life uses but includes the listed causes and sources of those causes of aquatic life use impairment (based on Integrated Report (2010)). Table B-3 and B-4 summarize the proportional distributions of the individual causes and sources, respectively.

Table B-1. Aquatic life use attainment status and scores for the biological indices (IBI, MiWB, ICI) and habitat (QHEI).

12-digit HUC	Stream Name	RM	Attainment Status	IBI	Mlwb	ICI	Macro Narrative	QHEI	Latitude	Longitude	Station ID (STORET)
050301030101	Mahoning R @ Winona Rd	102.24	Full	50			Very Good	62.00	40.8281000	-80.9354000	N01K28
050301030101	Mahoning R @ King Rd E Of North Georgetown	100.57	Full	36			Exceptional	74.50	40.8425000	-80.9517000	N01S14
050301030101	Mahoning R @ Georgetown-Damascus Rd	97.69	Full	41		52		75.50	40.8534000	-80.9876000	N01K26
050301030103	Mahoning R @ Knox School Rd	93.23	Full	39	7.44		Marginally Good	57.50	40.8839000	-81.0314000	N01S01
050301030103	Mahoning R @ Us Rt 62 (Aka New Sr 173)	91.11	Non	34	5.33		Marginally Good	33.00	40.9015000	-81.0484000	N01K19
050301030103	Mahoning R. Upst. Alliance @ Lake Park Rd.	89.40	Full			46			40.9139000	-81.0619000	200349
050301030103	Mahoning R. At Alliance @ Webb Ave.	85.51	Non	28	7.11	12		55.00	40.9328000	-81.0947000	602420
050301030103	Mahoning R @ Gaskill Dr At Alliance	84.99	Partial	38	8.43		Low Fair	60.50	40.9314000	-81.1019000	N01S12
050301030306	Mahoning R. Dst Berlin Reservoir	70.75	Partial	29	8.71	30		78.50	41.0483000	-81.0017000	N01S11
050301030306	Mahoning R. At Pricetown @ County Line Rd.	62.68	Partial	29	8.79	34		80.50	41.1342000	-80.9678000	602310
050301030306	Mahoning R @ End Of Starr Rd Ust Water Plant Intake	58.13	Non	33	7.39		Low Fair	41.50	41.1775000	-80.9701000	N02K30
050301030306	Mahoning R Dst Dam Dst Wwtp At Newton Falls	56.53	Partial	42	9.50	26		60.50	41.1967000	-80.9664000	N02S12
050301030406	Mahoning R Dst Confl W Br Mahoning Dst I-80	54.73	Partial	42	8.61	22		58.50	41.2106000	-80.9439000	N02S11
050301030301	Mahoning R Upst Dam At Leavittsburg	45.73	Non	40	7.70	20		48.50	41.2406000	-80.8831000	N03S64
050301030103	Trib To Mahoning R (91.21) @ 12Th St Rd	2.39	Non	28			Poor	54.00	40.9061000	-81.0132000	N01K20
050301030103	Naylor Ditch @ Heritage Dr	3.63	Non	34			Fair	39.00	40.9011000	-80.9778000	N01K23
050301030103	Naylor Ditch @ 12Th St	1.35	Non	20			Poor	45.50	40.8891000	-81.0123000	N01K22

12-digit HUC	Stream Name	RM	Attainment Status	IBI	Mlwb	ICI	Macro Narrative	QHEI	Latitude	Longitude	Station ID (STORET)
	Rd										
050301030101	Trib To Mahoning R (97.11) @ Georgetown Rd	1.15					Low Fair		40.8430000	-80.9896000	N01K25
050301030101	Trib To Mahoning R (98.71) @ Whitacre Rd	4.59	Partial	34			Good	62.00	40.8796000	-80.9312000	N01K27
050301030406	Chocolate Run @ Eagle Creek Rd	0.11	Non	32			Low Fair	46.50	41.2527000	-80.8828000	N02K01
050301030401	Eagle Ck @ Sr 700 Upst Garrettsville	22.44	Non	34			Fair	54.00	41.2819140	-81.1443810	N02S02
050301030403	Eagle Ck @ Brosius Rd Dst Garrettsville Wwtp	17.61	Full	51	9.62	46		81.50	41.2869000	-81.0794000	N02P07
050301030403	Eagle Ck @ Hopkins Rd	15.04	Full	40	7.47	48		61.50	41.2756000	-81.0565000	N02K10
050301030403	Eagle Creek @ Road Off St. Rt. 82, Upst South Fork	12.10	Full			42			41.2589060	-81.0277170	300348
050301030405	Eagle Creek 4.1 Mi E Of Garrettsville @ Silica Sand Rd.	10.10	Full	48	8.04		Very Good	53.00	41.2692000	-81.0119000	N02K05
050301030405	Eagle Creek At Phalanx @ St. Rt. 534	7.20	Full			38			41.2658000	-80.9800000	N02Q01
050301030405	Eagle Ck @ Gage Nr Cr 114 Dst Garrettsville	5.60	Full	43	9.43		Good	65.00	41.2608000	-80.9542000	N02P08
050301030403	Mahoning Ck Dst Pm Estates Mhp	0.70	Non	18			Poor	54.00	41.2624000	-81.0578000	N02K09
050301030404	Tinker Ck @ Center Rd	5.45	Non	24			Good	68.00	41.3018000	-81.0573000	N02K04
050301030404	Tinker Ck @ Nicholson Rd	2.50	Partial	34			Good	68.50	41.2982000	-81.0127000	N02K02
050301030404	Nelson Ditch Near Mouth, Dst. Trib.	0.30	Non	34			Low Fair	44.00	41.2994720	-81.0201500	300148
050301030402	S Fk Eagle Ck @ Windham Rd	3.86	Full	44		46		66.50	41.2280000	-81.0488000	N02K08
050301030402	S Fk Eagle Ck @ Sr 303 At Windham	2.30	Full	41	6.96	52		61.00	41.2339000	-81.0250000	N02K06
050301030403	Camp Ck @ Sr 305	3.16	Full	44			Exceptional	74.00	41.3100000	-81.0967000	N02K11
050301030401	Silver Creek Near Hiram @ St. Rt. 305	2.27	Full	42		52		66.00	41.3097000	-81.1297000	N02S04

12-digit HUC	Stream Name	RM	Attainment Status	IBI	Mlwb	ICI	Macro Narrative	QHEI	Latitude	Longitude	Station ID (STORET)
050301030401	Silver Creek Near Hiram @ St. Rt. 82	0.79	Full	41		54		64.00	41.2939000	-81.1244000	N02S03
050301030404	Kale Creek @ St. Rt. 225	13.57					Good		41.0765250	-81.0510610	300150
050301030301	Kale Ck @ Lane Off Sr 225	13.08	Non	32			Fair	51.00	41.0727000	-81.0463000	N02K32
050301030301	Kale Ck @ Williams Rd Dst Short Unnamed Trb	11.27	Non	26			Fair	54.00	41.0736000	-81.0308000	N02W09
050301030301	Kale Ck @ Whippoorwill Rd	6.05	Partial	32			Marginally Good	51.00	41.1136000	-81.0069000	N02W08
050301030301	Kale Ck @ Canal Rd (Newton Falls County Line Rd)	3.38	Partial	29	7.26	42		65.00	41.1364000	-80.9956000	N02W07
050301030301	Trib To Kale Ck (5.29) @ Whippoorwill Rd	1.08	Partial	34			Good	56.50	41.1134000	-81.0154000	N02K31
050301030302	W Br Mahoning R @ Cooley Rd	27.92	Full	48			Marginally Good	64.50	41.2260000	-81.2017000	N02K28
050301030302	W Br Mahoning R @ Sr 88	24.35	Full	48			Exceptional	72.00	41.1934000	-81.2062000	N02K27
050301030302	W Br Mahoning R @ Newton Falls Rd At Usgs Gage	20.94	Full	49	9.22	52		82.00	41.1616000	-81.1974000	300022
050301030305	W Br Mahoning R @ Wayland Rd At Usgs Gage	11.39	Partial	36	7.83	22		76.00	41.1574000	-81.0714000	300056
050301030305	W Br Mahoning R @ 6Th St Park	3.15	Non	29	6.55	10		34.50	41.1870000	-80.9813000	N02K15
050301030305	W Br Mahoning R @ Cr 114A S Of Newton Falls	0.36	Full	46	8.31	42		78.50	41.2072000	-80.9603000	N02P12
050301030305	Trib To W Br Mahoning R (0.01) @ Sr 534	2.10	Non	28			Fair	67.50	41.2119000	-80.9794000	N02K14
050301030305	Trib To Trib To W Br Mahoning R (9.63/0.74) @ Newton Falls R	0.60	Partial	33		46		40.50	41.1662000	-81.0638000	N02K17
050301030305	Trib To W Br Mahoning R (8.28) @ Gilbert Rd	0.27	Non	32			Marginally Good	42.50	41.1532000	-81.0357000	N02K16

12-digit HUC	Stream Name	RM	Attainment Status	IBI	Mlwb	ICI	Macro Narrative	QHEI	Latitude	Longitude	Station ID (STORET)
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Tallmadge Rd	3.46	Full	48			Good	67.00	41.0992000	-81.1063000	N02K21
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Calvin Rd	1.83	Full	42			Good	68.00	41.1187110	-81.1061280	N02K20
050301030304	Hinkley Ck @ Sr 5	0.70	Full	48			Exceptional	60.50	41.1520000	-81.1678000	N02K22
050301030303	Barrel Run @ Giddings Rd	5.31	Partial	28			Marginally Good	67.50	41.0810000	-81.1880000	N02K24
050301030303	Barrel Run @ Tallmadge Rd	3.65	Full	44			Good	61.50	41.0984000	-81.1876000	N02K23
050301030302	Harmon Brook @ Peck Rd	0.49	Partial	54			Low Fair	77.00	41.1806000	-81.2148000	N02K26
050301030203	Mill Ck @ W Calla Rd	6.28	Non	26			Low Fair	56.50	40.9741000	-80.9544000	N01K04
050301030203	Mill Ck @ Leffingwell Rd	3.64	Full	47		46		74.00	41.0000000	-80.9685000	300061
050301030203	Trib To Mill Ck (3.67) @ Western Reserve Rd	1.10	Non	20			Low Fair	54.50	40.9878000	-80.9747000	N01K03
050301030203	Garfield Ditch @ Sr 165	0.66	Non	24			Poor	39.50	40.9449000	-80.9466000	N01K05
050301030203	Turkey Broth Ck @ Sr 534	3.36	Non	34			Poor	35.50	41.0339000	-80.9478000	N01K01
050301030204	Island Ck @ 12Th St Rd	2.65	Non	30			Poor	43.50	40.9732000	-81.0127000	N01K06
050301030202	Willow Ck @ Porter Rd	8.13	Non	32			Low Fair	34.00	41.0533000	-81.1234000	N01K08
050301030202	Willow Ck @ Notman Rd	3.74	Full	38			Marginally Good	54.50	41.0256000	-81.0796000	300062
050301030201	Deer Ck @ Waterloo Rd	10.87					Poor		41.0238000	-81.1561000	N01K12
050301030201	Deer Ck @ Mccallum Rd	4.48	Partial	37	6.69	32		67.00	40.9741000	-81.1720000	N01K10
050301030201	Deer Ck @ Atwater Rd	2.90	Partial	32	7.34	36		79.50	40.9799000	-81.1481000	300025
050301030102	Beech Ck @ Bayton St	10.50	Non	32			Fair	31.00	40.8769000	-81.1528000	N01K16
050301030102	Beech Ck @ Beech St	8.34	Full	38			Marginally Good	65.00	40.8865000	-81.1757000	N01K15
050301030102	Beech Ck @ Vine St	3.54	Full	42			Good	60.50	40.9307000	-81.1467000	N01K14
050301030102	L Beech Ck @ Lane Off Sr 619	1.83	Non	32			Fair	39.50	40.9439000	-81.1605000	N01K13
050301030103	Fish Ck @ Johnson Rd N Of Sebring	3.56	Non	20			Poor	49.00	40.9367000	-81.0319000	N01S05
050301030103	Fish Creek Nw Of Sebring @ Courtney Rd (Dst Crossing)	2.00	Non	24			Fair	56.50	40.9372000	-81.0550000	N01K18

12-digit HUC	Stream Name	RM	Attainment Status	IBI	Mlwb	ICI	Macro Narrative	QHEI	Latitude	Longitude	Station ID (STORET)
050301030103	Fish Ck @ Lexington Rd W Of Sebring	0.36	Non	24			Poor	42.50	40.9274000	-81.0694000	N01K17
050301030101	Beaver Run @ Center Rd	1.19	Partial	38			Fair	70.50	40.8577000	-81.0207000	N01K24

Table B-2. Causes and sources listed in the Integrated Report (2010) to explain aquatic life use impairments.

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030101	Mahoning R @ Winona Rd	102.24	3.2	Full			N01K28
050301030101	Mahoning R @ King Rd E Of North Georgetown	100.57	8.0	Full			N01S14
050301030101	Mahoning R @ Georgetown-Damascus Rd	97.69	19.8	Full			N01K26
050301030101	Trib To Mahoning R (98.71) @ Whitacre Rd	4.59	5.3	Partial	Sedimentation/Siltation, Nutrient/Eutrophication Biological Indicators	Agriculture	N01K27
050301030101	Beaver Run @ Center Rd	1.19	4.8	Partial	Nutrient/Eutrophication Biological Indicators, Sedimentation/Siltation	Loss of Riparian Habitat, Source Unknown	N01K24
050301030102	Beech Ck @ Bayton St	10.50	4.0	Non	Direct Habitat Alterations, Sedimentation/Siltation	Channelization, Agriculture	N01K16
050301030102	Beech Ck @ Beech St	8.34	8.6	Full			N01K15
050301030102	Beech Ck @ Vine St	3.54	17.4	Full			N01K14
050301030102	L Beech Ck @ Lane Off Sr 619	1.83	9.0	Non	Nutrient/Eutrophication Biological Indicators, Sedimentation/Siltation	Unrestricted Cattle Access, Agriculture	N01K13
050301030103	Mahoning R @ Knox School Rd	93.23	52.7	Full			N01S01
050301030103	Mahoning R @ Us Rt 62 (Aka New Sr 173)	91.11	63.0	Non	Sedimentation/Siltation, Alteration in stream-side or littoral vegetative covers	Loss of Riparian Habitat, Agriculture	N01K19
050301030103	Mahoning R. Upst. Alliance @ Lake Park Rd.	89.40	74.0	Full			200349

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030103	Mahoning R. At Alliance @ Webb Ave.	85.51	89.0	Non	Other flow regime alterations	Dam or Impoundment	602420
050301030103	Mahoning R @ Gaskill Dr At Alliance	84.99	90.0	Partial	Sedimentation/Siltation	Municipal (Urbanized High Density Area)	N01S12
050301030103	Trib To Mahoning R (91.21) @ 12Th St Rd	2.39	4.5	Non	Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges, Agriculture	N01K20
050301030103	Naylor Ditch @ Heritage Dr	3.63	4.5	Non	Nutrient/Eutrophication Biological Indicators, Direct Habitat Alterations	Channelization, Municipal (Urbanized High Density Area)	N01K23
050301030103	Naylor Ditch @ 12Th St Rd	1.35	8.3	Non	Nutrient/Eutrophication Biological Indicators, Fish Kills	Agriculture	N01K22
050301030103	Fish Ck @ Johnson Rd N Of Sebring	3.56	3.0	Non	Direct Habitat Alterations, Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges, Channelization	N01S05
050301030103	Fish Creek Nw Of Sebring @ Courtney Rd (Dst Crossing)	2.00	4.5	Non	Nutrient/Eutrophication Biological Indicators, Sedimentation/Siltation	Municipal Point Source Discharges	N01K18
050301030103	Fish Ck @ Lexington Rd W Of Sebring	0.36	9.0	Non	Sedimentation/Siltation	Natural Sources	N01K17
050301030201	Deer Ck @ Mccallum Rd	4.48	27.9	Partial	Nutrient/Eutrophication Biological Indicators, Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures)	N01K10
050301030201	Deer Ck @ Atwater Rd	2.90	30.1	Partial	Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures)	300025
050301030202	Willow Ck @ Porter Rd	8.13	3.5	Non	Sedimentation/Siltation, Nutrient/Eutrophication Biological Indicators, Alteration in stream-side or littoral vegetative covers	Municipal (Urbanized High Density Area), Channelization	N01K08
050301030202	Willow Ck @ Notman Rd	3.74	7.2	Full			300062

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030203	Mill Ck @ W Calla Rd	6.28	9.9	Non	Sedimentation/Siltation	Unrestricted Cattle Access	N01K04
050301030203	Mill Ck @ Leffingwell Rd	3.64	19.1	Full			300061
050301030203	Trib To Mill Ck (3.67) @ Western Reserve Rd	1.10	3.7	Non	Natural Conditions (Flow or Habitat), Sedimentation/Siltation	Natural Sources, Channelization	N01K03
050301030203	Garfield Ditch @ Sr 165	0.66	4.0	Non	Sedimentation/Siltation	Channelization	N01K05
050301030203	Turkey Broth Ck @ Sr 534	3.36	4.9	Non	Sedimentation/Siltation, Other flow regime alterations, Nutrient/Eutrophication Biological Indicators	Unrestricted Cattle Access, Upstream Impoundments (e.g., PI-566 NRCS Structures)	N01K01
050301030204	Island Ck @ 12Th St Rd	2.65	4.2	Non	Sedimentation/Siltation, Nutrient/Eutrophication Biological Indicators	Agriculture	N01K06
050301030301	Kale Ck @ Lane Off Sr 225	13.08	4.1	Non	Sedimentation/Siltation, Direct Habitat Alterations	Agriculture, Channelization	N02K32
050301030301	Kale Ck @ Williams Rd Dst Short Unnamed Trb	11.27	9.1	Non	Oxygen, Dissolved, Sedimentation/Siltation	Source Unknown	N02W09
050301030301	Kale Ck @ Whippoorwill Rd	6.05	14.4	Partial	Natural Conditions (Flow or Habitat)	Natural Sources	N02W08
050301030301	Kale Ck @ Canal Rd (Newton Falls County Line Rd)	3.38	21.9	Partial	Oxygen, Dissolved, Turbidity	Agriculture	N02W07
050301030301	Trib To Kale Ck (5.29) @ Whippoorwill Rd	1.08	3.4	Partial	Sedimentation/Siltation	Streambank Modifications/destabliz ation	N02K31
050301030302	W Br Mahoning R @ Cooley Rd	27.92	5.0	Full			N02K28
050301030302	W Br Mahoning R @ Sr 88	24.35	9.4	Full			N02K27
050301030302	W Br Mahoning R @ Newton Falls Rd At Usgs Gage	20.94	21.8	Full			300022

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030302	Harmon Brook @ Peck Rd	0.49	4.1	Partial	Sedimentation/Siltation, Nutrient/Eutrophication Biological Indicators, Organic Enrichment (Sewage) Biological Indicators	Upstream Impoundments, Agriculture, On-site Treatment Systems	N02K26
050301030303	Barrel Run @ Giddings Rd	5.31	5.1	Partial	Other flow regime alterations	Dam or Impoundment	N02K24
050301030303	Barrel Run @ Tallmadge Rd	3.65	10.2	Full			N02K23
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Tallmadge Rd	3.46	5.5	Full			N02K21
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Calvin Rd	1.83	9.3	Full			N02K20
050301030304	Hinkley Ck @ Sr 5	0.70	10.8	Full			N02K22
050301030305	W Br Mahoning R @ Wayland Rd At Usgs Gage	11.39	80.9	Partial	Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures)	300056
050301030305	W Br Mahoning R @ 6Th St Park	3.15	101.0	Non	Other flow regime alterations	Dam or Impoundment	N02K15
050301030305	W Br Mahoning R @ Cr 114A S Of Newton Falls	0.36	103.0	Full			N02P12
050301030305	Trib To W Br Mahoning R (0.01) @ Sr 534	2.10	4.1	Non	Sedimentation/Siltation	Urban Runoff/Storm Sewers	N02K14
050301030305	Trib To Trib To W Br Mahoning R (9.63/0.74) @ Newton Falls R	0.60	1.6	Partial	Direct Habitat Alterations	Channelization	N02K17
050301030305	Trib To W Br Mahoning R (8.28) @ Gilbert Rd	0.27	5.1	Non	Other flow regime alterations, Sedimentation/Siltation	Upstream Impoundments (e.g., PI-566 NRCS Structures)	N02K16

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030306	Mahoning R. Dst Berlin Reservoir	70.75	248.0	Partial	Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures), Dam or Impoundment	N01S11
050301030306	Mahoning R. At Pricetown @ County Line Rd.	62.68	274.0	Partial	Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures)	602310
050301030306	Mahoning R @ End Of Starr Rd Ust Water Plant Intake	58.13	306.0	Non	Other flow regime alterations	Dam or Impoundment	N02K30
050301030306	Mahoning R Dst Dam Dst Wwtp At Newton Falls	56.53	307.0	Partial	Other flow regime alterations	Upstream Impoundments (e.g., PI-566 NRCS Structures)	N02S12
050301030401	Eagle Ck @ Sr 700 Upst Garrettsville	22.44	5.2	Non	Natural Conditions (Flow or Habitat)	Natural Sources	N02S02
050301030401	Silver Creek Near Hiram @ St. Rt. 305	2.27	8.8	Full			N02S04
050301030401	Silver Creek Near Hiram @ St. Rt. 82	0.79	11.2	Full			N02S03
050301030402	S Fk Eagle Ck @ Windham Rd	3.86	7.5	Full			N02K08
050301030402	S Fk Eagle Ck @ Sr 303 At Windham	2.30	23.5	Full			N02K06
050301030403	Eagle Ck @ Brosius Rd Dst Garrettsville Wwtp	17.61	32.0	Full			N02P07
050301030403	Eagle Ck @ Hopkins Rd	15.04	36.0	Full			N02K10
050301030403	Eagle Creek @ Road Off St. Rt. 82, Upst South Fork	12.10	73.6	Full			300348
050301030403	Mahoning Ck Dst Pm Estates Mhp	0.70	3.7	Non	Nutrient/Eutrophication Biological Indicators, Sedimentation/Siltation	Natural Sources, Package Plant or Other Permitted Small Flows Discharges	N02K09

12-digit HUC	Site Description	River Mile	Drainage Area (sq.mi.)	Attainment Status	Listed Cause of Impairment	Listed Source of Impairment	Station Code (STORET)
050301030403	Camp Ck @ Sr 305	3.16	4.2	Full			N02K11
050301030404	Tinker Ck @ Center Rd	5.45	4.4	Non	Nutrient/Eutrophication Biological Indicators	Agriculture	N02K04
050301030404	Tinker Ck @ Nicholson Rd	2.50	11.2	Partial	Nutrient/Eutrophication Biological Indicators	Agriculture	N02K02
050301030404	Nelson Ditch Near Mouth, Dst. Trib.	0.30	3.9	Non	Direct Habitat Alterations, Sedimentation/Siltation	Channelization	300148
050301030405	Eagle Creek 4.1 Mi E Of Garrettsville @ Silica Sand Rd.	10.10	74.0	Full			N02K05
050301030405	Eagle Creek At Phalanx @ St. Rt. 534	7.20	95.0	Full			N02Q01
050301030405	Eagle Ck @ Gage Nr Cr 114 Dst Garrettsville	5.60	97.6	Full			N02P08
050301030406	Mahoning R Dst Confl W Br Mahoning Dst I-80	54.73	417.0	Partial	Other flow regime alterations	Dam or Impoundment	N02S11
050301030406	Chocolate Run @ Eagle Creek Rd	0.11	4.4	Non	Direct Habitat Alterations, Sedimentation/Siltation, Nutrient/Eutrophication Biological Indicators	Channelization	N02K01

Table B-3. Proportional distribution of the listed causes of aquatic life use impairment across the sites surveyed.

Cause of Aquatic Life Use Impairment	Number of Incidents	Percent of All Sites	Percent of Impaired Sites	Percent of Total Incidents of Causes
Siltation	24	33%	50%	32%
Nutrient/eutrophication biological indicators	18	25%	38%	24%
Flow regime alteration	15	21%	31%	20%
Direct habitat alteration	6	8%	13%	8%
Alterations in stream side vegetative cover	3	4%	6%	4%
Natural conditions (flow and habitat)	3	4%	6%	4%
Low dissolved oxygen	2	3%	4%	3%
Organic enrichment (sewage) biological indicators	1	1%	2%	1%
Past fish kill	1	1%	2%	1%
Turbidity	1	1%	2%	1%
Oil and grease	1	1%	2%	1%

Table B-4. Proportional distribution of the listed sources of aquatic life use impairment across the sites surveyed.

Source of Aquatic Life Use Impairment	Number of Incidents	Percent of All Sites	Percent of Impaired Sites	Percent of Total Incidents of Sources
Agriculture	12	17%	25%	19%
Channelization	9	13%	19%	15%
Upstream dam	8	11%	17%	13%
Downstream dam	7	10%	15%	11%
Natural source	5	7%	10%	8%
Municipal point source	4	6%	8%	6%
Livestock	4	6%	8%	6%
Loss of riparian habitat	3	4%	6%	5%
Unknown	3	4%	6%	5%
Septic systems	2	3%	4%	3%
Urbanized area	2	3%	4%	3%
Reservoir	1	1%	2%	2%
Storm water	1	1%	2%	2%
Unstable stream bank	1	1%	2%	2%

B2 Recreation Use Attainment

Only four (5%) of the sites surveyed met the recreation use criteria while the remaining 70 sites did not meet standards. Table B-5 is a list of each of the sites evaluated for recreation uses with the geometric mean of the concentration of E coli bacteria as well as the maximum value observed form data collected during the TMDL project. Table B-5 also includes the status of recreation use attainment.

Table B-5. Recreation use attainment status and E coli concentration statistics for sites in the upper Mahoning River TMDL area.

12-digit HUC	Site Description	River Mile	Drainage Area (square miles)	Geometric Mean of E coli Concentration	Maximum Value of E coli Concentration	Attainment Status	Station Code (STORET)
050301030101	Beaver Run @ Center Rd	1.19	4.8	951	1,700	Non	N01K24
050301030101	Mahoning R @ Georgetown-Damascus Rd	97.69	19.8	2,176	6,000	Non	N01K26
050301030101	Mahoning R @ King Rd E Of North Georgetown	100.57	8	987	1,500	Non	N01S14
050301030101	Mahoning R @ Winona Rd	102.24	3.2	407	2,400	Non	N01K28
050301030101	Trib To Mahoning R (97.11) @ Georgetown Rd	1.15	4.3	1,002	1,900	Non	N01K25
050301030101	Trib To Mahoning R (98.71) @ Whitacre Rd	4.59	5.3	1,433	28,000	Non	N01K27
050301030102	Beech Ck @ Bayton St	10.5	4	508	1,700	Non	N01K16
050301030102	Beech Ck @ Beech St	8.34	8.6	1,324	2,600	Non	N01K15
050301030102	Beech Ck @ Vine St	3.54	17.4	305	1,200	Non	N01K14
050301030102	L Beech Ck @ Lane Off Sr 619	1.83	9	1,271	1,900	Non	N01K13
050301030103	Fish Ck @ Johnson Rd N Of Sebring	3.56	3	1,099	3,400	Non	N01S05
050301030103	Fish Ck @ Lexington Rd W Of Sebring	0.36	9	334	550	Non	N01K17
050301030103	Fish Creek Nw Of Sebring @ Courtney Rd (Dst Crossing)	2	4.5	778	1,800	Non	N01K18
050301030103	Mahoning R @ Gaskill Dr At Alliance	84.99	90	294	664	Non	N01S12
050301030103	Mahoning R @ Knox School Rd	93.23	52.7	1,995	40,000	Non	N01S01
050301030103	Mahoning R @ Us Rt 62 (Aka New Sr 173)	91.11	63	1,462	2,800	Non	N01K19
050301030103	Mahoning R. At Alliance @ Webb Ave.	85.51	89	1,080	39,000	Non	602420
050301030103	Naylor Ditch @ 12Th St Rd	1.35	8.3	496	1,100	Non	N01K22
050301030103	Naylor Ditch @ Heritage Dr	3.63	4.5	574	1,000	Non	N01K23
050301030103	Sulphur Ck Ditch Dst Sebring Wwtp @ Mixing Zone	0.47	0.8	511	3,700	Non	N01S07
050301030103	Trib To Mahoning R (91.21) @ 12Th St Rd	2.39	4.5	465	730	Non	N01K20
050301030201	Deer Ck @ Atwater Rd	2.9	30.1	485	5,800	Non	300025
050301030201	Deer Ck @ Mccallum Rd	4.48	27.9	61	270	Full	N01K10
050301030201	Deer Ck @ Waterloo Rd	10.87	3.5	506	3,900	Non	N01K12
050301030202	Willow Ck @ Notman Rd	3.74	7.2	1,610	20,000	Non	300062
050301030202	Willow Ck @ Porter Rd	8.13	3.5	301	3,900	Non	N01K08
050301030203	Garfield Ditch @ Sr 165	0.66	4	1,079	15,000	Non	N01K05

12-digit HUC	Site Description	River Mile	Drainage Area (square miles)	Geometric Mean of E coli Concentration	Maximum Value of E coli Concentration	Attainment Status	Station Code (STORET)
050301030203	Mill Ck @ Leffingwell Rd	3.64	19.1	2,455	87,000	Non	300061
050301030203	Mill Ck @ W Calla Rd	6.28	9.9	1,695	87,000	Non	N01K04
050301030203	Trib To Mill Ck (3.67) @ Western Reserve Rd	1.1	3.7	547	2,800	Non	N01K03
050301030203	Turkey Broth Ck @ Sr 534	3.36	4.9	2,107	15,000	Non	N01K01
050301030204	Island Ck @ 12Th St Rd	2.65	4.2	448	21,000	Non	N01K06
050301030301	Kale Ck @ Canal Rd (Newton Falls County Line Rd)	3.38	21.9	831	15,000	Non	N02W07
050301030301	Kale Ck @ Lane Off Sr 225	13.08	4.1	2,005	3,500	Non	N02K32
050301030301	Kale Ck @ Whippoorwill Rd	6.05	14.4	445	3,200	Non	N02W08
050301030301	Kale Ck @ Williams Rd Dst Short Unnamed Trb	11.27	9.1	218	3,900	Non	N02W09
050301030301	Trib To Kale Ck (5.29) @ Whippoorwill Rd	1.08	3.4	709	5,400	Non	N02K31
050301030302	Harmon Brook @ Peck Rd	0.49	4.1	325	2,000	Non	N02K26
050301030302	W Br Mahoning R @ Cooley Rd	27.92	5	505	2,000	Non	N02K28
050301030302	W Br Mahoning R @ Newton Falls Rd At Usgs Gage	20.94	21.8	567	7,300	Non	300022
050301030302	W Br Mahoning R @ Sr 88	24.35	9.4	866	4,800	Non	N02K27
050301030303	Barrel Run @ Giddings Rd	5.31	5.1	793	1,800	Non	N02K24
050301030303	Barrel Run @ Tallmadge Rd	3.65	10.2	1,133	1,900	Non	N02K23
050301030304	Hinkley Ck @ Sr 5	0.7	10.8	1,050	1,900	Non	N02K22
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Calvin Rd	1.83	9.3	841	2,900	Non	N02K20
050301030304	Silver Ck (Trib To W Br Mahoning R) @ Tallmadge Rd	3.46	5.5	1,713	2,900	Non	N02K21
050301030305	Trib To Trib To W Br Mahoning R (9.63/0.74) @ Newton Falls R	0.6	1.6	3,322	32,000	Non	N02K17
050301030305	Trib To W Br Mahoning R (0.01) @ Sr 534	2.1	4.1	333	2,200	Non	N02K14
050301030305	Trib To W Br Mahoning R (8.28) @ Gilbert Rd	0.27	5.1	1,201	3,100	Non	N02K16
050301030305	W Br Mahoning R @ 6Th St Park	3.15	101	585	2,500	Non	N02K15
050301030305	W Br Mahoning R @ Cr 114A S Of Newton Falls	0.36	103	417	15,000	Non	N02P12
050301030305	W Br Mahoning R @ Wayland Rd At Usgs Gage	11.39	80.9	20	91	Full	300056

12-digit HUC	Site Description	River Mile	Drainage Area (square miles)	Geometric Mean of E coli Concentration	Maximum Value of E coli Concentration	Attainment Status	Station Code (STORET)
050301030306	Mahoning R @ Broad St At Newton Falls	57.35	307	242	750	Non	N02K29
050301030306	Mahoning R @ End Of Starr Rd Ust Water Plant Intake	58.13	306	377	1,500	Non	N02K30
050301030306	Mahoning R Dst Dam Dst Wwtp At Newton Falls	56.53	307	334	930	Non	N02S12
050301030306	Mahoning R. At Pricetown @ County Line Rd.	62.68	274	39	370	Full	602310
050301030306	Mahoning R. Dst Berlin Reservoir	70.75	248	16	41	Full	N01S11
050301030401	Eagle Ck @ Sr 700 Upst Garrettsville	22.44	5.2	327	1,100	Non	N02S02
050301030401	Silver Ck @ Sr 305 Nr Hiram	2.27	8.8	522	870	Non	N02S04
050301030401	Silver Ck @ Sr 82 Nr Hiram	0.79	11.2	403	690	Non	N02S03
050301030402	S Fk Eagle Ck @ Sr 303 At Windham	2.3	23.5	410	530	Non	N02K06
050301030403	Camp Ck @ Sr 305	3.16	4.2	303	820	Non	N02K11
050301030403	Eagle Ck @ Brosius Rd Dst Garrettsville WWWTP	17.61	32	520	870	Non	N02P07
050301030403	Eagle Ck @ Hopkins Rd	15.04	36	383	850	Non	N02K10
050301030403	Mahoning Ck Dst Pm Estates Mhp	0.7	3.7	740	1,100	Non	N02K09
050301030404	Nelson Ditch @ Sr 305	1.11	3.9	204	520	Non	N02K03
050301030404	Tinker Ck @ Center Rd	5.45	4.4	764	2,200	Non	N02K04
050301030404	Tinker Ck @ Nicholson Rd	2.5	11.2	1,184	3,600	Non	N02K02
050301030405	Eagle Ck @ Gage Nr Cr 114 Dst Garrettsville	5.6	97.6	507	15,000	Non	N02P08
050301030405	Eagle Ck @ Silica Sand Rd 4.1 Mi E Of Garrettsville	10.1	74	524	630	Non	N02K05
050301030406	Chocolate Run @ Eagle Creek Rd	0.11	4.4	665	990	Non	N02K01
050301030406	Mahoning R @ Sr 5 Ne Of Newton Falls	53.63	418	696	8,700	Non	N02P02
050301030406	Mahoning R Dst Confl W Br Mahoning Dst I-80	54.73	417	191	350	Non	N02S11
050301030406	Mahoning R Upst Dam At Leavittsburg	45.73	542	860	1,200	Non	N03S64

B3 Public Drinking Water Supply Use Attainment

Four of the five public water supplies (PWS) in this TMDL study area are meeting their use based on the applicable criteria (see Section 2.2.3 for discussion of these facilities). The PWS associated with the Mahoning Valley Sanitary District (in the 12-digit HUC 02-04) did not have enough water quality data to determine its use attainment status.

B4 Human Health Use Attainment

Four 12-digit HUC assessment units are impaired for human health uses based on concentrations of PCBs and mercury in the tissue of sport fish. These are the 05030103 – 01-03; 02-01; 02-04; and 03-06 12-digit HUCs. Three reservoirs are found to likewise be impaired, namely Lake Milton, Berlin Reservoir, and Deer Creek Reservoir while the Kirwan Reservoir met the criteria for human health. Tables B-6 and B-8 list these results, while Table B-7 lists the assessment units that were formerly impaired; however, due to a lack of data recent enough to sustain or alter that determination, the status is currently considered unknown.

Table B-6. Assessment units impaired for human health uses related to fish consumption in the upper Mahoning River TMDL area.

12-Digit HUC	HUC Description	Pollutant Causing Impairment
05030103 01 03	Fish Creek-Mahoning River	PCBs
05030103 02 04	Island Creek-Mahoning River	PCBs
05030103 03 06	Charley Run Creek-Mahoning River	PCBs

Table B-7. Assessment units formerly impaired for human health uses related to fish consumption in the upper Mahoning River TMDL area but due to insufficient data, no longer hold that attainment status.

12-Digit HUC	HUC Description
05030103 04 03	Camp Creek-Eagle Creek
05030103 04 05	Mouth Eagle Creek
05030103 04 06	Chocolate Run-Mahoning River

Table B-8. Attainment status for human health uses related to fish consumption for reservoirs and lakes in the upper Mahoning River TMDL area.

Reservoir/Lake Name	Human Health Attainment Status
Dale Walborn Reservoir	Not Impaired
Deer Creek Reservoir (Mahoning basin)	Impaired (PCBs)
Lake Milton	Impaired (PCBs)
West Branch Reservoir	Not Impaired