

Appendix H: Macatawa Watershed Summary of Priority Pollutants, Sources and Causes

Level of Concern	Source	Cause	Known or Suspected	Affected Waterbodies	Supporting Evidence
Pollutant: Nutrients					
HIGH	Agricultural Runoff	Loss of wetlands	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2011 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
	Agricultural Runoff	Lack of riparian buffers	Known	All Subbasins	2010 Agricultural Inventory (Allegan Conservation District 2010) 2002 Agricultural Inventory (Allegan Conservation District) Poor Riparian Buffer Map (Geomorphology Analysis, aerial photos) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College)
	Agricultural Runoff	Lack of BMPs	Known for some areas, Suspected for others	All Subbasins	2010 Agricultural Inventory (Allegan Conservation District) 2002 Agricultural Inventory (Allegan Conservation District) 2009 Pollutant Loading Model (MDEQ) 2010 Agricultural Survey Results 2011 Geomorphology Analysis (FTCH) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College) Local Knowledge
	Agricultural Runoff	Improper Use or over application of Agricultural Fertilizers/Manure	Suspected	All Subbasins	2010 Agricultural Survey Local Knowledge
	Urban/Residential Sources	Loss of wetlands	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2010 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
MOD	Urban/Residential Sources	Improper use or overapplication of fertilizers	Known	Refer to Urban Critical Areas Map	Historical Resident Surveys 2009 Pollutant Loading Model Local Knowledge
	Urban/Residential Sources	Lack of riparian buffers	Known	All Subbasins	Poor Riparian Buffer Map (Geomorphology Analysis, aerial photos) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College)
	Urban/Residential Sources	Poor storm water mgt practices	Suspected	Refer to Urban Critical Areas Map	Historical Resident Surveys Local Knowledge
	Streambanks	Erosion (loss of vegetation and logjams)	Known for some areas, Suspected for others	All Subbasins	2010 Geomorphology Analysis (FTCH) 2009 Bank Erosion Hazard Index Local Knowledge

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LOW	Urban/Residential Sources	Marinas/Boating	Suspected	Lake Macatawa	Local Knowledge
	Urban/Residential Sources	Car Washing	Suspected	Refer to Urban Critical Areas Map	Local Knowledge
	Agricultural Runoff	Livestock Access	Known for some areas, Suspected for others	North Branch Macatawa River, Peters Creek, Upper Macatawa, Noordeloos Creek	Map of Grazing/Animal Operations (2011 Geomorphology Analysis, FTCH) 2010 Agricultural Inventory (Allegan Conservation District) 2002 Agricultural Inventory (Allegan Conservation District)
	Untreated Sewage	Failing Septic Systems	Suspected	Lower Macatawa, Noordeloos Creek, Upper Macatawa, Peters Creek, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	Map of High Risk areas for Septic System Failure Local Knowledge Ottawa and Allegan County Health Department records and complaints Historical Storm Water Outfall Inspections
	Untreated Sewage	Illicit Connections	Suspected	All Subbasins	Local Knowledge Illicit Discharge Elimination Program Inspections Ottawa Co Health Department Testing (2011)
Pollutant: Sediment					
HIGH	Agricultural Runoff	Loss of wetlands	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2011 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
	Agricultural Runoff	Lack of riparian buffer	Known	All Subbasins	2010 Agricultural Inventory (Allegan Conservation District 2010) 2002 Agricultural Inventory (Allegan Conservation District) Poor Riparian Buffer Map (Geomorphology Analysis, aerial photos) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College)
	Agricultural Runoff	Lack of BMPs	Known for some areas, Suspected for others	All Subbasins	2010 Agricultural Inventory (Allegan Conservation District) 2002 Agricultural Inventory (Allegan Conservation District) 2009 Pollutant Loading Model (MDEQ) 2010 Agricultural Survey Results 2011 Geomorphology Analysis (FTCH) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College) Local Knowledge
	Urban Stormwater	Storm Drains/ Impervious Surfaces	Known	All Subbasins	2009 Hydrology Analysis (MDEQ) Impervious Surfaces Map Storm Drain Outfalls Map

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MOD	Streambanks	Erosion (loss of vegetation and logjams)	Known for some areas, Suspected for others	All Subbasins	2009 Bank Erosion Hazard Index 2011 Geomorphology Analysis (FTCH)
	Urban Stormwater	Loss of wetlands	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2010 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
	Road Stream Crossings	Improper design, alignment or maintenance	Known for some areas, Suspected for others	All Subbasins	2009 Bank Erosion Hazard Index
LOW	Road Stream Crossings	Erosion at private crossings	Suspected	Infrequent and scattered in agricultural areas	Local Knowledge
	Urban Stormwater	Construction Sites	Suspected	Locations vary over time	Local Knowledge Soil Erosion and Sedimentation Control from County Enforcing Agencies
	Streambanks	Livestock Access	Suspected	North Branch Macatawa River, Peters Creek, Upper Macatawa, Noordeloos Creek	Map of Grazing/Animal Operations (2011 Geomorphology Analysis, FTCH) 2010 Agricultural Inventory (Allegan Conservation District) 2002 Agricultural Inventory (Allegan Conservation District)
Pollutant: Hydrology					
HIGH	Agricultural Runoff	Drain Tiling and Artificial Drainage	Known	Refer to Agricultural Critical Areas Map	2009 Hydrology Analysis (MDEQ) Environmental History Book (Van Fassen et al. 2008) Local Knowledge
		Wetland Loss	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2011 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
	Urban/Residential Runoff	Impervious Surfaces and Storm Drains	Known	All Subbasins	2009 Hydrology Analysis (MDEQ) Impervious Surfaces Map Storm Drain Outfalls Map
		Wetland Loss	Known	Pine Creek, Lower Macatawa, Noordeloos Creek, Upper Macatawa, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	MDEQ Landscape Level Functional Wetlands Assessment 2010 Geomorphology Analysis (FTCH) 2009 Hydrology Analysis (MDEQ) Wetland Loss Map
LOW	Road Stream Crossings	Improper design or maintenance (hydraulics)	Known in some areas, Suspected in others	All Subbasins	2009 Bank Erosion Hazard Index

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Pollutant: Temperature					
HIGH	Urban/Residential Runoff	Impervious Surfaces/Storm Drains	Known	All Subbasins	2009 Hydrology Analysis (2009) Storm Drain Outfalls Map MDEQ Historical Biosurveys and Water Quality Monitoring Historical Volunteer Monitoring (Secchi Disk Group)
MOD	Agricultural Runoff	Lack of riparian buffers	Known	All Subbasins	2010 Agricultural Inventory (Allegan Conservation District 2010) 2002 Agricultural Inventory (Allegan Conservation District) Poor Riparian Buffer Map (Geomorphology Analysis, aerial photos) Preliminary Results of 2010/2012 Suspended Sediment Monitoring (Hope College)
	Urban/Residential Runoff	Lack of riparian buffers	Known	All Subbasins	Poor Riparian Buffer Map (Geomorphology Analysis, aerial photos) MDEQ Historical Biosurveys and Water Quality Monitoring
LOW	Agricultural Runoff	Tiling and Artifical Drainage	Suspected	Refer to Agricultural Critical Areas Map	2009 Hydrology Analysis (MDEQ) Environmental History Book (Van Fassen et al. 2008)
Pollutant: E. coli					
HIGH	Agricultural Runoff	Manure Applications	Suspected	All Subbasins	Preliminary Results from 2011/2012 E.coli Monitoring Study (Hope College) Local Knowledge
	Agricultural Runoff	Biofilms in drain tiles	Suspected	All Subbasins	Preliminary Results from 2011/2012 E.coli Monitoring Study (Hope College) Local Scientists/Knowledge
	Urban/Residential Runoff	Biofilms in Storm Drains	Suspected	All Subbasins	Preliminary Results from 2011/2012 E.coli Monitoring Study (Hope College) Local Scientists/Knowledge
MOD	Urban/Residential Runoff	Improper Disposal Pet Waste	Suspected	Refer to Urban Critical Areas Map	Local Knowledge
LOW	Urban/Residential Runoff	Birds/Animals	Suspected	Localized, Dunton Park area	Local Knowledge
	Agricultural Runoff	Livestock Access	Suspected	North Branch Macatawa River, Peters Creek, Upper Macatawa, Noordeloos Creek	2011 Geomorphology Analysis (FTCH) Local Knowledge
	Untreated Sewage	Sewer Overflows	Known/Suspected	Infrequent and scattered	Holland Sentinel Public Notifications (Holland BPW and Zeeland Clean Water Plant)
	Untreated Sewage	Failing Septic Systems	Suspected	Lower Macatawa, Noordeloos Creek, Upper Macatawa, Peters Creek, South Branch Macatawa River, North Branch Macatawa River, Direct Tributaries of Lake Macatawa	Preliminary Results from 2011/2012 E.coli Monitoring Study (Hope College) Map of High Risk areas for Septic System Failure Local Knowledge Ottawa and Allegan County Health Department records and complaints
	Untreated Sewage	Illicit Connections	Suspected	All Subbasins	Local Knowledge Ottawa Co Health Department Testing (2011)
	Sediment	Able to grow and harbor bacteria	Suspected/Unknown	Dunton Park area, Lake Macatawa	Local Scientists