

Chapter 4 - Prioritizing Pollutants, Sources and Causes

4.1 Designated Use Ranking

Different pollutants and conditions exist in the Les Cheneaux watershed that negatively affect water quality, designated, and desired uses of water. This plan is a guide to help Les Cheneaux watershed project partners minimize and even eradicate those pollutants, their sources, and causes, and maintain both designated and desired uses for aquatic resources. Unfortunately, resources to accomplish this goal are limited. Prioritization of these pollutants is necessary in order to systematically focus available resources to manage the most priority pollutants, the most priority sources and causes, at the most priority areas, with the least amount of time, money, and manpower.

The project steering committee ranked designated uses, threatening pollutants, sources, and causes using a number of relevant criteria. First in the prioritization process, designated uses were prioritized based on their direct individual relationship with both human and wildlife health and well being, respectively. For example, the community and the wildlife that share the watershed both need clean water to sustain life. Drinking water is the most priority of the designated uses. Total and partial body contact recreation can be extrapolated to include similar uses in the home, including bathing and washing and will be considered next in priority. Designated uses for both warm/coldwater fishery and other indigenous life are next in importance as also an indicator of the health of surface waters for our use. If organisms can no longer thrive in our surface waters, those waters won't be suitable for our use either. The remaining designated uses either indirectly affect human and wildlife health or affected the basic enjoyment of aquatic resources.

Table 4.1.1 Designated Use Prioritization

Designated Use	Priority Ranking for Protection
Public water supply at the point of intake	1
Total body contact recreation between May 1 and October 31	2
Partial body contact recreation	3
Warm/coldwater fishery	4
Other indigenous aquatic life and wildlife	5
Navigation	6
Agriculture	7
Industrial water supply	8

4.2 Prioritization of Pollutants for Each Designated Use

Since each pollutant has different effects on the threatened designated uses it was important for LCWC to prioritize the pollutants for the threatened uses. This enables water quality managers to see the relationship between pollutants and multiple threatened uses. Prioritizing pollutants for each threatened designated use provided insight into the prevalence of certain pollutants impacting several designated uses. This also provided the logical course for general prioritizations, and later source and cause prioritizations.

Similarities exist between the pollutants affecting our water supply, partial body contact, and full body contact. These designated uses describe our everyday use of water at home and in our everyday lives. Due to LMAS reports of widespread bacteria contamination in wells across the watershed and the ratio of

new OSS and those needing repair, pathogens and nutrients earned the highest prioritization from project stakeholders. Toxins have the potential to do great harm, but lack of documented occurrence limits their priority.



Cedarville Bay



Navigation has been difficult in Cedarville Bay at the center of the watershed project area for the past few years. The main cause has been the long period of lower lake levels during much of the late 1990's and the addition of nutrients from the local municipal discharge.

Picture (left): Dock in Cedarville Bay (September 29, 2003).

The result is algal blooms and increasing aquatic plant growth. Several sources to these pollutants have been verified through visual observations and analysis of local land use practices adjacent the bay.



Clark Township discharges municipal wastewater into Pearson Creek. This process was permitted by state and federal regulators with stipulation that the discharge meets several water quality parameter thresholds. However, considering the large volume of discharge, low amounts of nutrients in the form of phosphates and nitrates accumulate to such an extent that tons of nutrients have entered Cedarville Bay since discharging began, and that nutrient base increases the growth potential for algae and other aquatic vegetation.

Picture (left): Algal bloom near Township dock in Cedarville (September 18, 2003).



Sediment also plays a part in hindering navigation in this heavy-use bay. The last decade has seen an island appear in the bay adjacent to the mouth of Pearson Creek, which enters into the bay at Meridian Road.

Picture (left): The island is the green area in the background - behind the dock (July 10, 2004).



Several upstream road crossings are failing with eroding embankments eventually adding sediment to Pearson Creek and Cedarville Bay.

Picture (left): The crossing of Pearson Creek at State Road (May 6, 2004).

Table 4.2.1 **Watershed Prioritization of Pollutants for Each Designated Use**

Threatened Designated Uses	Pollutants	Priority Ranking
Public water supply at the point of intake	Pathogens	1
	Toxins	2
	Nutrients	3
Total body contact recreation (May 1 / Oct 31)	Pathogens	1
Partial body contact recreation	Pathogens	1
Warm/coldwater fishery	Toxins	1
	Hydro Flow Changes	2
	Sediments	3
	Nutrients	4
	Invasive Species	5
Other indigenous aquatic life and wildlife	Toxins	1
	Hydro Flow Changes	2
	Sediments	3
	Nutrients	4
	Invasive Species	5
Navigation	Nutrients	1
	Sediment	2

According to Michigan Department of Natural Resources fisheries biologist, Dave Fielder, several factors may be considered for the decreasing Les Cheneaux area creel counts documented by MDNR creel clerks since 1985. Increasing cormorant predations and both sport and commercial fishing have been suggested as reasons, and are increasing concerns among local fishermen, but further attention to these activities will be needed to affirm their roles in fishery populations and diversity. Verification of these sources will take a much larger regional management approach than the watershed project partners can take, but for which the watershed project partners will be in full support. On the local level, several pollutants and conditions, according to Fielder, may hinder fishery recovery, and should be managed accordingly.

According to project partners, maintaining sufficient quality aquatic habitat is the highest priority concept for maintaining aquatic biota in the Les Cheneaux area. Increasing development and activity is threatening existing habitat, and the watershed project will focus much time and effort in protecting that which remains and improving that which is degraded.

High priority has to be placed on toxins such as oils, gases, and cleaners because of their potential to harm aquatic and human life. Sources in the watershed tend to be everywhere from parking lots to leaking boat motors to machinery service stations. Rain and snowmelt transport the toxins into water bodies, where they remain to affect both human and aquatic organisms. Toxins enter Les Cheneaux water bodies from a myriad of different routes, including storm drains, ditches, parking lots, and through boat motors.

Nutrients also come from many different sources. However they may affect aquatic organisms in the Les Cheneaux watershed to a lesser degree. Cedarville Bay has received tons of verifiable nutrients from the Clark Township wastewater discharge. Additional sources come from storm drains which take parking lot and road wastes from Cedarville and transport them into Cedarville Bay. Dissolved oxygen tests suggest priority low levels, especially during the early morning, just after expected plant respiration, where dissolved oxygen is used to sustain plant life.

Hydrological flow changes and sediment exist with one causing the other in the watershed. Les Cheneaux watershed project inventories have delineated several road/stream crossings that are insufficient for the amount of discharge that typically runs through them. Water gets dammed during spring and fall and other large rain events. That water overcomes banks, strips the topsoil off and

transports it downstream. Sedimentation is also a problem on lakefront properties where development activity scours the soil and rains wash the soil into littoral areas where aquatic invertebrates and small fish thrive.

The lowest priority pollutant determined by project partners to affect aquatic organisms is invasive species (also known as exotic and non-native species). Low priority is only given in this case because of the difficulty in managing invasive species by the Les Cheneaux watershed project. It is true that invasive species have the greatest potential to affect aquatic organisms in the Great Lakes, including the Les Cheneaux Islands. Nonetheless, invasives will be managed on a much broader scale than what this project is equipped to do.

All these pollutants are important and should be priorities for maintaining the ecological health of the watershed. Low prioritization only classifies the possible timeline for the project to address the pollutants. In fact, as funding sources and participation change, prioritizations may change.

4.3 Prioritization of Pollutants and Sources

In keeping with human health as a criterion for prioritizing aquatic use, so goes prioritizing the pollutants affecting those uses. The highest priority pollutants, according to local and regional stakeholders are pathogens, toxins and nutrients due to their potential affect on human health and the ease at which they can contaminate water used for so many important designated uses.

Table 4.3.1 Prioritization of Pollutants and Sources

Pollutant or Condition <i>k=known</i> <i>s=suspected</i>	Ranking	Source <i>k=known</i> <i>s=suspected</i>	Ranking
Pathogens (s)	1	Failing Septic Systems (s) Municipal Wastewater Discharge (s) Stormwater (s)	1 2 3
Toxins (k)	2	Stormwater (s) Failing Septic Systems (s) Municipal Wastewater Discharge (s)	1 2 3
Nutrients (k) (Total Phosphorous & Nitrogen)	3	Failing Septic Systems (s) Municipal Wastewater Discharge (s) Stormwater (s)	1 2 3
Sediments (k)	4	Failing road/stream crossing (k) Construction/ development (k) Stormwater (k) Bank/shoreline erosion (k)	1 2 3 4
Alteration of hydrology (k)	5	Road/Stream Crossings (k) Stormwater (k)	1 2
Invasive species (k)	6	Connected waterways (k) Inadequate information/ education about I.S. (k)	1 2

4.4 Prioritization Method for Pollutant Sources and Causes

The next step in the prioritization process is to prioritize the sources and causes of pollutants. To eliminate pollution and conditions that contribute to water quality degradation, the source and cause of that pollution or condition need to be determined. Address the causes and one may, in fact, eliminate

several pollution sources and conditions throughout the watershed. Consequently, prioritizing the different sources and causes of pollution can help focus attention on those origins for much of the pollution problems and negative conditions impacting water quality in the watershed.

The method used to prioritize these sources and causes takes into account the magnitude of the source/cause and the ease at which the pollutants move to the water body. Again, an important criterion is the ability of the project partners to realize success in addressing the sources and causes of pollution in the watershed. LCWC's highest priority sources and causes facilitate the greatest number of pollutants across the widest area and proved to be the most numerous in occurrence. Direct pollutant transfer, such as stormwater and erosion from failing road crossings, warranted a higher priority for LCWC, than an indirect transfer, such as the use of hazardous waste around the home.

Table 4.4.1 Prioritization of Sources and Causes

Known or Suspected Source	Ranking	Known or suspected cause	Ranking
Failing on-site septic systems	1	Poor land use planning Lack of awareness/maintenance Poor system design	1 2 3
Stormwater	2	Developed areas/impervious/disturbed surfaces lacking soil protection and erosion protection Direct unprotected connections between storm drains and creeks/lakes Increase in impervious, filled areas Few stormwater control structures Impervious surfaces directly connected to storm sewers Lack of stormwater management program Impoundments creating <i>flashy</i> flows Karst topography Lack of home owner awareness of motorized machinery pollutants	1 2 3 4 5 6 7 8
Failing road and stream crossings	3	Undersized culverts Insufficient runoff deterrents Improperly placed culverts Unstabilized embankments	1 2 3 4
Construction and development	4	Lack of environmental awareness/stewardship ethic Lack of appropriate land use planning/regulation Insufficient site planning Lack of awareness to stormwater management Increasing development/activity adjacent riparian areas	1 2 3 4 5
Municipal wastewater discharge	5	Poor land use planning Poor system design	1 2
Bank/shoreline erosion	6	Lack of awareness of erosion causes and solutions Altered hydrology from impoundments, and lack of stormwater management Destructive construction practices Lack of riparian buffer	1 2 3 4

Known or Suspected Source	Ranking	Known or suspected cause	Ranking
Connected waterways	7	Great Lakes connection with Ocean provides route for exotic migration, facilitate shipping to watershed port	1
Inadequate information/education about invasive species	8	Lack of awareness of I.S. origin and prevention	1