

# Chapter 5. Challenges and Priorities in the Lower One Subwatershed

## 5.1 Summary of Lower One Challenges and their Impacts

Because of the diverse landscape in the Lower One Subwatershed, there are a variety of challenges and threats to the water quality of the streams and river that flow through the basin. These challenges, pollutants and threats, along with their causes and sources are listed in the tables in this chapter. Although communities and agencies within the subwatershed plan to address all of these pollutants and threats in the long term with various targeted programs, it has been important to prioritize and identify the most pressing concerns in the subwatershed so that resources can be spent cost-effectively in a phased approach, addressing the most important concerns first. These concerns and challenges, as well as their impacts, are summarized below.

**5.1.1. Land Use Changes:** The greatest concern and threat to water quality degradation in the rural areas of the Lower One, is pending land use change. Future development is of utmost concern in rural headwaters communities where high water quality is threatened by the potential impacts of growth. When land is converted from natural areas and low-density use as in a rural area, to a more intensive use such as medium density residential or commercial land use, water quality and quantity can be negatively impacted. Increased flow rates and velocities, increase in stormwater pollutants, as well as the decrease of natural areas can lead to sedimentation, streambank erosion, loss of wildlife habitat, in-stream temperature increase, increased algae, decreased dissolved oxygen and other impacts. Many of the challenges listed below (high stormwater flows, excess nutrients, erosion and sedimentation, loss of natural features) are actually subsets of these land use change concerns.

**5.1.2. High Peak Stormwater Flows:** In the Lower One, high stormwater flows are a current concern downstream of more developed communities such as Canton and Plymouth Townships. Peak stormwater flows in headwaters tributaries in rural communities are currently maintaining levels sufficient for water quality and habitat, but are at risk of experiencing increases due to future development. High stormwater flows are a result of increased impervious surfaces in the landscape. The largest concern with developed landscapes are those that have “directly connected” impervious surfaces. An example of a directly connected impervious surface is a rooftop connected to a driveway via a downspout, that is then connected to the street where stormwater ultimately flows, quickly and untreated, into the stormdrain and into local creeks and streams. In undeveloped areas, mitigation of the effect of impervious surfaces often utilizes the preservation of natural features, incorporating detention ponds or infiltration basins, and other on-site stormwater control systems. In developed areas, managing this flow is difficult, since there is usually limited land on which to build a detention pond or other on-site management system. In urban areas, underground storage systems as well as smaller on-site systems (such as residential rain barrels) can be used to control flow. Increased flow rates and velocities can lead to flooding, bank erosion, sedimentation, loss of aesthetics, increased stormwater pollution and loss of aquatic habitat.

**5.1.3. Excess Nutrients:** A certain amount of nutrients are found in water resources naturally. In excess, however, nutrients can cause aquatic systems, both flowing and impounded, to become out of balance favoring certain organisms over others and changing the function, use and look of creeks, ponds and the river<sup>46</sup>. In the Lower One Subwatershed, the nutrient of most concern is phosphorus (P) because in Michigan aquatic ecosystems, P is the limiting growth factor for algae and other nuisance plants. When excess P enters water resources from excess fertilizer or other sources, it encourages the accelerated growth of plants and algae, reducing the

<sup>46</sup> National Nutrient Guidance Manual: Rivers and Streams, Water Quality Criteria and Standards, U.S. Environmental Protection Agency, Office of Water, July, 2000.  
<http://www.epa.gov/ost/criteria/nutrient/guidance/rivers/index.html>

dissolved oxygen and light entering the water and creating an environment where it is difficult for fish and aquatic insects to live. Imbalanced plant and algae growth also limits recreational opportunities and aesthetics.

**5.1.4. Erosion and Sedimentation:** Increased soil erosion and sedimentation in water resources is also a result of certain land uses and land use changes all over the subwatershed. Soil erosion from construction sites in the most rapidly developing areas of the subwatershed is of major concern. In many cases, development is so intense, the jurisdiction responsible for soil erosion and sedimentation control (SESC) does not have the resources to regularly inspect and enforce infractions on all sites under construction. Additionally, a lack of understanding of installation and maintenance practices for SESC controls on site can exacerbate erosion problems. Other large sources of sediments include sediments washed off of paved streets and parking lots, as well as unpaved roads. In addition to these sources, high stormwater flows can have enough energy to scour soils and destabilize streambanks, carrying bank sediments downstream. This is not known to be a large source of sediments, but may need to be investigated. In the rural areas of the subwatershed, active agricultural land is suspected to be a source of concern. Traditional farming practices leave soil bare and tilled at certain times of the year which leaves soil vulnerable to wind and water erosion. Impacts of soil erosion and sedimentation on downstream water resources include decrease of aesthetic quality with an increase of turbidity, decreased light penetration and decreased plant growth, and decrease in aquatic habitat with increased sediment islands blocking fish migration and sediment covering and clogging gills of fish and aquatic insects. In addition, nutrients and other pollutants often bond with soil particles, increasing the detrimental impact of sedimentation on water resources.

**5.1.5 Threat of Loss of Natural Features, especially the Riparian Corridor:** Although communities are making great strides in protecting natural features in site planning and design, the loss of natural features that often comes hand in hand with development is of concern in the subwatershed. Natural features - defined sometimes as broadly as woodlands, wetlands, watercourses, permeable soils, vegetative buffers, steep slopes, etc. – provide many natural functions in the landscape with regard to protecting water quality, reducing water quantity and providing wildlife habitat to receiving watercourses. In natural areas, most of the stormwater is infiltrated and utilized where it falls, allowing most pollutants to be filtered through soils. When these areas are lost, and their functions are not replaced (with infiltration, detention or restoration measures), nearby water resources are negatively impacted with increased flow and increased pollutant loads. As stated in a report by Wiley (1998), the riparian vegetation in the headwaters are still fairly in tact and should be prioritized for preservation and restoration based on the critical importance of this natural feature to the whole Rouge watershed. Riparian vegetation has many benefits to water resources, including streambank stabilization, terrestrial and aquatic wildlife habitat structure, and shading and cooling of water. The impacts of losing riparian vegetation include the increase of streambank erosion, loss of habitat and warmer water, which could threaten the survival of fish and aquatic insects. Protecting and restoring the riparian corridor is of particular importance along the smaller tributaries to the Rouge, such as Fellows Creek, which is home to a sensitive fish species called the mottled sculpin.

**5.1.6. Uncontrolled Sources of Bacteria:** In working toward the designated uses of partial body and full body contact recreation (wading, canoeing, swimming) during certain times and in certain locations, uncontrolled sources of bacteria need to first be identified and then corrected. Major sources include failing On-Site Sewage Disposal Systems (OSDS), which are located mostly in the rural areas of the subwatershed and illicit discharges of sanitary waste into storm sewers that are mostly located in older, urban areas. Pet, livestock and waterfowl wastes are also sources of bacteria, but it is very difficult to measure the magnitude of these sources as compared to the sources listed above. However, the increase in households and the subsequent increase in pets, increase in waterfowl habitat in the form of lawn adjacent to detention ponds, and the remainder of small horse farms and livestock operations in the subwatershed suggests that these sources should be considered as having a significant impact on water resources.

Impacts of bacteria in water resources include loss of recreational opportunities such as wading and canoeing due to public health concerns.

**5.1.7. Need for Public Awareness and Action:** Over the past few decades, the public has generally come to regard the Rouge River and its tributaries as degraded systems not providing active or passive recreational opportunities, nor aesthetic qualities in their communities. This perception has led to a lack of awareness or understanding about the high quality areas in the headwaters and the potential for recreation along the Rouge and in other areas. There is also a general misperception about who contributes to the pollution of the river, although non-point source education has increased awareness and a sense of civic responsibility in the watershed overall in the past five years. These misperceptions or lack of awareness has in turn caused a lack of community-based action to protect and restore local water resources. The impact of this lack of awareness and action has direct and indirect consequences. Directly, these negative or complacent attitudes toward, or lack of understanding about, the river encourages the further degradation of the resource by allowing debris and pollutants to enter stormdrains and the river. Indirectly, lack of public awareness and action can lead to a lack of interest by local decision-makers and thus lack of initiatives, programs, policies and funding to either protect or restore water resources.

**5.1.8. Need for Administrative Support and Institutional and Financial Arrangements:** Communities and agencies in the Lower One have made a commitment to protect and restore water resources in their jurisdictions with a broad spectrum of short term and long term projects and programs. However, as these initiatives get underway, it is increasingly apparent that there is a need for additional support within certain communities and agencies in order to implement, document and report on the various aspects of these increased responsibilities. Some communities have responded to this need to integrate stormwater projects and education into their regular activities by contracting with a consultant or hiring new personnel. With this need for additional support comes a need for additional funding. Creative partnerships, new fees, and grant funds are being explored. In terms of continuing to coordinate these stormwater efforts on a watershed level, communities and agencies that share the Rouge hydrologic boundary have been working with the Wayne County/Rouge Program Office (RPO) and within subwatershed advisory groups (SWAGs). Currently, the SWAGs have decided to coordinate efforts in a three tier system: 1. on the individual community level, 2. within the context of the SWAGs, and 3. within the context of the Rouge Steering Committee which is comprised of a representative from each of the seven SWAGs, businesses, and other organizations. For the future operation of a watershed-wide effort, it will need to be decided if this collaborative institutional arrangement provides the resources and coordination necessary to continue moving the effort forward. The potential impact of inadequate program support, financial resources and institutional arrangements is the failure to create and implement programs, policies and projects that meet the goals set forward in this watershed management plan.

## 5.2 Summary of Lower One Subwatershed Priorities

In the winter of 2000, the six communities and two counties in the Lower One SWAG identified priorities for the river based on different needs or perspectives in the subwatershed. At a monthly SWAG meeting, the members posted a table on the wall listing a summary of the possible threats to the river and pollutants. This list included mostly physical and measurable parameters for the river and the subwatershed and included:

- flow rates,
- nutrients,
- dissolved oxygen,
- in-stream temperature,
- total suspended solids,
- E. coli,
- toxics and heavy metals,

- aquatic wildlife community,
- natural features loss,
- increased impervious surfaces,
- recreational opportunities,
- and aesthetic and visual resources.

After a discussion about how each community may have different priorities, but that they should consider what is most important in their community, participants were asked to rank the threats and pollutants for their locality. First each community/agency was asked to rank their top three priorities from 1-3, 1 being the highest priority, and they were permitted to list more than one pollutant/threat, i.e., they could list multiple ones, twos and threes. After all representatives present prioritized their top three priorities, each was asked to rank their top priorities from 4-5, again with allowance to have multiple items in at a certain ranking level.

After the group had gone through this process, and numbered priorities were listed on the chart on the wall, the group discussed the implications for needed actions. It was not surprising that communities that are currently rural, but increasingly developing in the headwaters areas prioritized protection and conservation concerns, whereas communities that are close to build out and are urban in character prioritized protection as well as restoration concerns. Within the entire subwatershed, this priority-setting exercise allowed for the group to identify their own viewpoints while looking at the context of the larger stormwater management area for prioritizing parameters. A summary of these viewpoints is as follows.

**Priorities of “Rural” Communities:**

Communities that are currently mostly rural in character and land use, but that are experiencing great development pressures are generally Salem Township, Van Buren Township, and Superior Township. Ypsilanti Township on the whole would fall into this category as well, but because the portion of the Township that is in the Rouge watershed is mostly developed, they have more urban concerns for the Rouge. The rural, headwaters communities of Salem Township, Van Buren Township and Superior Township have listed their highest concerns and priorities as increased impervious surfaces and increased flow variability in streams tributary to the River – all aspects of pending development. They also prioritized loss of natural features such as wetlands, woodlands and grasslands as their greatest concerns, also aspects reflected in traditional development patterns that are encroaching onto their landscape. High levels of nutrients and total suspended solids in streams and the river were also high on their list of priority concerns. These pollutants are most likely the result of lack of best management practices with agricultural and residential fertilization, as well as the high levels of exposed land for agriculture and construction in the rural and developing landscape, as well as potential animal and human waste sources such as failing septic systems or improperly managed livestock manure.

**Priorities of “Urban” Communities:**

Communities that are already under heavy development and are mostly urbanized responded differently to the prioritization process. These communities are Plymouth Twp, Canton Township, and Ypsilanti Township. At the top of Plymouth Township and Canton Township’s list was sedimentation (TSS), most likely due to sources such as construction sites, new developments, increased sedimentation from streets, and increased stream bank erosion due to increased flows. Increased flow variability and nutrient loading ranked second in their priorities due to the amount of development that creates a “flashy” stream. The increase in residential lawns and golf course land use that may be a source of heightened nutrient loading. Ypsilanti Township is unique in that only a few acres of the Township are in the Rouge watershed and that land consists of only two residential neighborhoods and a mobile home park with no surface water. Therefore, priorities in Ypsilanti Township include nutrient loading from lawn fertilizers, sedimentation from streets, and toxics from automobiles and home toxics.

**County Priorities:**

Washtenaw County expressed an overall concern for land use planning with priorities focusing on controlling flow rates and minimizing total suspended solids. Washtenaw County, representing Salem Township, Superior Township and Ypsilanti Township, also prioritized issues of increasing development pressures in the western headwaters of the subwatershed with concern for loss of natural features and increased impervious surfaces. Wayne County identified similar priorities with a high concern for variable flow rates and sedimentation (TSS). However, Wayne County, with many acres of riparian parkland on the Lower Rouge, identified aquatic habitat and recreation as high priorities in their areas of the subwatershed.

**Subwatershed priorities:**

As a subwatershed, some conclusions can be drawn based on these different priority rankings within their common subwatershed landscape. After summing each parameter's rankings, the overall rankings suggest a pattern of priorities for the whole watershed that will allow each community to focus on their role in the subwatershed priorities. First, flow variability and sedimentation ranked first as overall concerns across the subwatershed. Next, the communities and counties ranked high nutrient loading as a major concern. Thirdly, the development issues of loss of natural features and increase in impervious surfaces were of great concern. Please see the priorities table below to see the remaining rankings as each parameter is important overall, but did not make the list of the top three priorities.

**Table 5.1 : Subwatershed ranking of Priority Indicators for River Quality**

**River Quality Indicators**

Lower One SWAG Community/ Agency	Flow rates (cfs)	Nutrients (N), (P)	Dissolved Oxygen (DO)	Biochemical Oxygen Demand (BOD)	In stream Temperature (C)	Total Suspended Solids (TSS)	E. coli Counts/100 (ml)	Toxics & Heavy Metals	Aquatic Wildlife Community (fish, insects, etc.)	Wetland/Woodland/Grassland (natural features) Loss	increased Impervious Surfaces	Recreation	Aesthetics or Visual resources
Canton Twp.	2	1	4	5	4	1	4	5	4	3	4	5	4
Plymouth Twp.	1	2	4	4	5	1	3	5	4	5	4	4	4
Salem Twp.	1	1	2	2	2	1	2	3	4	1	1	5	4
Superior Twp.	1	2	3	3	2	2	1	4	1	1	1	5	2
Van Buren Twp.	1	3	4	4	5	4	4	5	5	2	1	5	4
Ypsilanti Twp.	5	1	5	4	5	2	4	3	5	5	5	5	5
Washtenaw Co.	1	3	4	4	4	1	4	4	5	2	2	5	5
Wayne Co.	1	2	2	5	4	1	2	3	1	3	4	1	3

<b>Totals =</b>	<b>13</b>	<b>15</b>	<b>28</b>	<b>31</b>	<b>31</b>	<b>13</b>	<b>24</b>	<b>32</b>	<b>29</b>	<b>22</b>	<b>22</b>	<b>35</b>	<b>31</b>
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Ranking: 1 = greatest priority, 2 = priority, 3 = moderate priority, 4 = less of a priority, 5 = not a priority at this time



### 5.3 Pollutants and Threats to River Quality, their Sources and Causes:

In order to reach goals on a subwatershed basis, it is important to identify the pollutants or threats that are detrimental to designated and desired uses. To prevent or restore the subwatershed, we also need a good understanding of the sources and causes of the pollutants or threats. The following table shows the prioritized pollutants, or threats to river quality, in the Lower One Subwatershed, relates the pollutants or threats to the affected designated or desired uses, and lists their prioritized sources and causes. This prioritization is based on various factors such as the SWAG group prioritization exercise described above, a consideration of the magnitude of the source in the subwatershed, as well as review of past studies that indicate which source may be contributing the most problems in the subwatershed. This prioritization has assisted the SWAG in identifying and prioritizing which pollutant should be addressed first and with which best management practices.

**Table 5.2: Prioritized Pollutants or Threats to River Quality, Sources, Causes and Recommended BMPs for the Lower One Subwatershed**

Prioritized Pollutants or Threats to River Quality	Designated (or Desired Uses) Affected	Sources (k=known, s=suspected)	Causes (k=known, s=suspected)	Recommended Best Management Practices or Actions
1. Flow variability	<ol style="list-style-type: none"> <li>1. Warmwater fishery</li> <li>2. Indigenous aquatic life and wildlife</li> <li>3. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)</li> </ol>	<ol style="list-style-type: none"> <li>1. Urban stormwater (k)</li> </ol>	<ol style="list-style-type: none"> <li>1. Loss of wetlands and other natural features (k)</li> <li>2. Urban areas with no on-site detention (k)</li> <li>3. Directly connected impervious surfaces (k)</li> <li>4. Detention ponds not functioning to highest standard (s)</li> </ol>	<ul style="list-style-type: none"> <li>• Stormwater Management Ordinance</li> <li>• Water resource protection ordinances</li> <li>• Ongoing education for land use decision makers</li> <li>• Streambank stabilization projects</li> <li>• Log jam inventory and management</li> <li>• Rain barrel projects</li> <li>• Retrofitting existing detention systems</li> <li>• Stormwater standards for redevelopment</li> <li>• Wetlands, natural area restoration</li> </ul>

Prioritized Pollutants or Threats to River Quality	Designated (or Desired Uses) Affected	Sources (k=known, s=suspected)	Causes (k=known, s=suspected)	Recommended Best Management Practices or Actions
<b>2. Total suspended solids (sediment)</b>	1. Warmwater fishery 2. Indigenous aquatic life and wildlife 3. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)	1. Construction sites (k) 2. Roads/streets/highways (k) 3. Eroding stream banks (s) 4. Agricultural land (s) 5. Livestock in streams (s)	1. Lack of aggressive soil erosion and sedimentation controls or enforcement (k) 2. Lack of enhanced street sweeping/cleaning program (s) 3. Lack of riparian vegetation (k) 4. High wet weather flows (k) 5. Lack of agricultural best management practices to reduce soil erosion (s) 6. Livestock access to streams (s)	<ul style="list-style-type: none"> <li>• Streambank stabilization projects</li> <li>• Street sweeping and catch basin cleaning</li> <li>• Soil erosion and sedimentation control ordinance, inspection and enforcement, education.</li> <li>• Study/recommend new SESC techniques</li> <li>• Encourage agricultural BMPs</li> <li>• Natural features setback ordinance</li> </ul>
<b>4. Nutrients</b>	1. Warmwater fishery 2. Indigenous aquatic life and wildlife 3. Partial body contact recreation 4. Total body contact recreation 5. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)	1. Residential lawns (k) 2. Failing septic systems (s) 3. Illegal connection to the storm sewer (s) 4. Golf courses (k) 5. Streets (k) 6. Agricultural fertilizers and livestock waste (s) 7. Waterfowl and pet waste (s)	1. Lack of education about proper fertilization and soil testing practices for residents, golf courses, agricultural landowners (k) 2. Lack of improved street sweeping (s) 3. Lack of septic system maintenance education, inspection, correction (s) 4. Lack of illicit connection inspection, correction (s) 5. Lack of proper manure management of livestock (s) 6. Lack of education about waterfowl and pet waste (s)	<ul style="list-style-type: none"> <li>• Stormwater management ordinance</li> <li>• Water resource protection ordinances</li> <li>• Ongoing education for land use decision makers</li> <li>• Local fertilizer ordinance</li> <li>• On-site sewage disposal system ordinance, maintenance, education</li> <li>• Revise local weed ordinance, encourage native landscaping</li> <li>• Lawn care nutrient reduction education</li> <li>• Animal/pet waste management</li> <li>• Retrofit existing detention systems, maintain systems</li> <li>• Golf course nutrient management programs</li> <li>• Street sweeping and catch basin cleaning</li> </ul>

Prioritized Pollutants or Threats to River Quality	Designated (or Desired Uses) Affected	Sources (k=known, s=suspected)	Causes (k=known, s=suspected)	Recommended Best Management Practices or Actions
<b>4. Land Use Change/Loss of natural features (especially the riparian corridor)</b>	1. Warmwater fishery 2. Indigenous aquatic life and wildlife 3. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)	1. New development (k) 2. Older, urban development/redevelopment (k)	1. High development pressures (k) 2. Lack of master plans and zoning ordinances that reflect conservation planning (k) 3. Lack of protective ordinances/enforcement (k) 4. Lack of education about innovative options for developers, local officials, judges (k) 5. Lack of public awareness (s) 6. Lack of recreation planning (s) 7. Lack of restoration in older, urban areas (k)	<ul style="list-style-type: none"> <li>• Conduct natural features inventory and assessments</li> <li>• Develop restoration programs</li> <li>• Wetlands, woodlands, natural features setback, zoning ordinance revision</li> <li>• Encourage conservation easements</li> <li>• Work with MDEQ, RPO to review existing monitoring programs</li> <li>• Identify specific desired uses to direct monitoring</li> <li>• Establish additional long-term monitoring program to protect temperature regime</li> </ul>
<b>5. E. coli bacteria</b>	1. Partial body contact recreation 2. Total body contact recreation	1. Human waste from failing septic systems (s) 2. Illegal connection to the storm sewer (s) 3. Livestock waste (s) 4. Pet and waterfowl waste (s)	1. Lack of septic system maintenance education, inspection, correction (k) 2. Lack of illegal connection investigation, correction (s) 3. Lack of proper manure management of livestock (s) 4. Lack of education about disposing of pet waste (s) 5. Lack of education about controlling waterfowl waste (s)	<ul style="list-style-type: none"> <li>• Eliminate sources of bacteria that prevent desired recreational activities</li> <li>• Identify and prioritize key potential recreational areas and desired activities</li> <li>• Improve aesthetics of river</li> <li>• Improve potential for recreational warm water fishery in river</li> <li>• Work with MDA, NRCS to reduce bacteria sources on agricultural land</li> <li>• Animal/pet waste management</li> </ul>
<b>6. Temperature increase (decreasing dissolved oxygen, decreasing habitat for fish and insects)</b>	1. Warmwater fishery 2. Indigenous aquatic life and wildlife 3. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)	1. Impervious surfaces (s) 2. Lack of riparian vegetation (k)	1. Lack of incentives and regulations to decrease impacts of impervious surfaces in new developments (k) 2. Lack of education and support for disconnecting impervious surfaces in urban areas (k) 3. Lack of regulations, incentives, education, and support for preserving or restoring riparian vegetative cover (trees, overhanging vegetation for shade) (k)	<ul style="list-style-type: none"> <li>• Streambank stabilization, bioengineering</li> <li>• Encourage conservation easements</li> <li>• Natural features setback ordinance</li> </ul>

Prioritized Pollutants or Threats to River Quality	Designated (or Desired Uses) Affected	Sources (k=known, s=suspected)	Causes (k=known, s=suspected)	Recommended Best Management Practices or Actions
7. Toxics/Heavy metals	<ol style="list-style-type: none"> <li>1. Warmwater fishery</li> <li>2. Indigenous aquatic life and wildlife</li> <li>3. (Developing and enhancing recreational uses in and along the river system; enhancing aesthetics)</li> </ol>	<ol style="list-style-type: none"> <li>1. Atmospheric deposition (s)</li> <li>2. Construction materials (s)</li> <li>3. Automobile break linings and tires (k)</li> <li>4. Household Hazardous Waste (s)</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of air quality control (k)</li> <li>2. Lack of education regarding best construction practices (s)</li> <li>3. Lack of "ultra urban" underground stormwater treatment devices (s)</li> <li>4. Lack of education and support for business and household hazardous waste disposal (s)</li> </ol>	<ul style="list-style-type: none"> <li>• Work with automobile and repair industry to reduce pollutants</li> <li>• Establish household hazardous waste reduction program</li> <li>• Work with construction industry to reduce pollutants</li> <li>• Coordinate with air pollution control groups</li> </ul>