3. Pollutants

3.1 Monitoring

Monitoring on Fourmile Creek was done through the IOWATER program, a voluntary water monitoring program supported with expertise and resources through the IDNR and local partners, and results were obtained from Mary Skopec, IOWATER Program Coordinator and Research Geologist. Field measurements were taken for nitrate, nitrite, phosphorous, chloride, dissolved oxygen, and water transparency. Laboratory tests were also run for nitrate, nitrite, orthophosphate as P, total phosphate as P, turbidity, *E. coli* bacteria, total kjeldahl nitrogen, bromide, fluoride, ammonia nitrogen as N, sulfate, and total coliform bacteria. There are 10 monitoring sites along Fourmile Creek and each was sampled one to two times per year from 2004 to 2009 and monthly starting in 2010.

The general findings of the analyzed data are as follows:

- phosphorous levels are high throughout the watershed, with lab data suggesting phosphorous is coming from wastewater discharges
- dissolved oxygen levels are generally normal
- transparency/water clarity measurements vary with season, but are typically high
- nitrate concentrations are typically normal to high
- chloride concentrations increase from upstream to downstream, due to larger road salt applications in the more urban areas downstream, but are typically low
- *E. coli* bacteria levels are high throughout the watershed
- turbidity measurements are low throughout the watershed

Monitoring data from the City of Ankeny can be found in Appendix D. The full report by Mary Skopec can be found in Appendix E. The combination of monitoring results from both sources is summarized in Table 3-1, which compares the Iowa Water Quality Standards to the Monitoring Data Averages.

Table 3-1: Monitoring Data Compared to Water Quality Standards

Parameter	Monitoring Data Averages	Iowa Water Quality Standard	Fourmile Creek Designated Use Classification(s)
Total Suspended Solids	5 to 30 mg/L	None	None
***Escherichia coli* Bacteria**	100 to 10000 CFU/100 ml (CFU = Colony-Forming Unit)	30-day geometric mean 126 organisms/100 ml**	A3[1]
		single-sample maximum 235 organisms/100 ml**	A3[1]
		30-day geometric mean 630 organisms/100 ml**	A2[2]
		single-sample maximum 2880 organisms/100 ml**	A2[2]
Total Phosphorus	0.1 to 5 mg/L	None	None
Nitrite + Nitrate as Nitrogen	5 to 20 mg/L	10 mg/L	C
Dissolved Oxygen	4 to 10 mg/L	5.0 mg/L[3] 4.0 mg/L[4]	B(WW-2)
Chloride	10 to 100 mg/L	389 mg/L (chronic) 629 mg/L (acute)	B(WW-2)
Turbidity	2 to 50 NTU (NTU = Nephelometric Turbidity Unit)	None	None
Transparency	20 to 60 cm	None	None

Source: Iowa Administrative Code [567], Chapter 61
** Depends on pH and temperature of water
[1] From Fourmile Creek mouth to NW 142nd Avenue
[2] Upstream of NW 142nd Avenue
[3] Minimum value for at least 16 hours of every 24-hour period
[4] Minimum value at any time during every 24-hour period

3.2 Sources

Based on the monitoring results, the pollutants of concern in the watershed were prioritized by stakeholders and the WMA. These include groups of both primary and secondary pollutants. Primary pollutants include sediment and bacteria and secondary pollutants include phosphorous and nitrogen. Although the Rapid Assessment of Stream Conditions Along Length (RASCAL) and Revised Universal Soil Loss Equation (RUSLE) assessments (discussed in detail in Section 4) provided ample information on a watershed level, monitoring data can provide targeted information on a local level for priority areas to implement water quality projects. Currently, there is inadequate monitoring data available for the needs of this plan. This proves difficult to determine the origin of the pollutants and

quantities present. More robust monitoring of these parameters is addressed in a later section.

3.3.1 Priority Pollutants

Sediment loading and bacteria levels were prioritized as the primary pollutants in the Fourmile Creek Watershed because of the recreational contact concerns. Even though Fourmile Creek is not a drinking water source, there is still a pollutant concern due to human contact with the water.

Sources of sediment loading could be from any combination of streambank erosion and stormwater runoff from the surrounding rural and urban land uses. Excess amounts of sediment can cloud the stream and harm underwater organisms.

Sources of bacteria could be from any combination of pet waste, wildlife, agriculture, leaking or overflowing septic systems, and failing infrastructure. Bacteria levels can fluctuate greatly based on storm runoff, leaking sewage lines, the time of day, and the time of year. Elevated nutrients and water temperatures also have an effect on bacteria levels. Increased bacteria levels can cause health risks to anyone coming into contact with the water.

The next step would be to monitor the pollutants and determine mitigation actions from the results.

3.3.2 Secondary Pollutants

Phosphorous and nitrogen were set as secondary constituents of concern in the Fourmile Creek Watershed, since Fourmile Creek is not a drinking water source but high levels of these pollutants have a negative impact on the stream. These nutrients are essential for plant and animal growth and naturally abundant in the environment. Elevated nutrient levels can cause overstimulation of growth of plants and algae. Overgrowth can cause decrease dissolved oxygen in a stream, block light to deeper water, and clog water intakes. Both constituents are being considered for further monitoring and mitigation, if and when funding would be available.

3.3 Expected Reduction

The expected reduction of each pollutant is described in the Desired Outcome column under Goal 2 of the Implementation Schedule in Appendix A. Several tasks have been identified as reducing sediment loading, bacteria, phosphorous, and nitrogen.